Occasional Papers

OF THE

CALIFORNIA ACADEMY OF SCIENCES

XVII

PRINTED FROM THE
JOHN W. HENDRIE PUBLICATION ENDOWMENT

SAN FRANCISCO
PUBLISHED BY THE ACADEMY
FEBRUARY 14, 1931

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Occasional Papers

OF THE

CALIFORNIA ACADEMY OF SCIENCES

XVIII

PRINTED FROM THE
JOHN W. HENDRIE PUBLICATION ENDOWMENT

SAN FRANCISCO
PUBLISHED BY THE ACADEMY
JUNE 29, 1931

THE AVIFAUNA

OF THE

GALAPAGOS ISLANDS

BY

HARRY S. SWARTH

Curator, Department of Ornithology and Mammalogy

SAN FRANCISCO

California Academy of Sciences

June 29, 1931

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THE AVIFAUNA
OF THE
GALAPAGOS ISLANDS

INTRODUCTION

In the years 1905-1906 the California Academy of Sciences, under the directorship of Leverett Mills Loomis, sent an expedition to the Galapagos Islands to study and collect of the fauna and flora thereof. The expedition left San Francisco on June 28, 1905, and returned on November 29, 1906. A full year (September 24, 1905, to September 25, 1906) was spent in the Galapagos Archipelago, and a ten day visit (September 3-13, 1905) made to Cocos Island, Costa Rica*. Birds were collected by R. H. Beck, E. W. Gifford, J. S. Hunter, and E. S. King, 8691 specimens in all. Of this collection about 5800 are land birds of the Galapagos Islands and of Cocos Island, and it is with these land birds that this study is primarily concerned.

Several reports based upon this same collection and covering, systematically, all of the water birds and the one species of pigeon, have already appeared (see Gifford, 1913; Loomis, 1918). Circumstances prevented Mr. Gifford from completing this study as had been planned, and for many years the cases containing the series of land birds remained undisturbed.

When I was appointed curator of the Department of Ornithology and Mammalogy in the Academy, March 1, 1927, it was with the understanding that of first importance among my duties was the completion and publication of a report, primarily taxonomic, covering such part of the Galapagos avifauna as had not been studied by Gifford and Loomis. This proved to be a far lengthier and more arduous undertaking than was anticipated. The collection is considerably larger than any previously brought from the Archipelago, and the wealth of material, besides creating difficulties in the mere handling of innumerable specimens and the proper assembling of the facts presented, developed a disturbing tendency

*For detailed itinerary see: "Log of the schooner *Academy* on a voyage of scientific research to the Galapagos Islands, 1905-1906", by Joseph R. Slevin. Calif. Acad. Sci., Occasional Papers no. 17, 1931.

to upset previously published conceptions that had been comfortably established upon the evidence of a few specimens. At an early stage in the work I borrowed from the Stanford University Museum a large part of the bird collection resulting from the Hopkins-Stanford Galapagos Expedition, including all of the Geospizidæ and all *Nesomimus*, so that I had available the extensive series upon which Snodgrass and Heller (1904) had based their conclusions. I was generously permitted to keep these skins for the many months that it seemed desirable to do so.

My study reached a point where it became apparent that a satisfactory end could not be attained without examining more of the material of former writers, notably the birds collected by Darwin that served Gould as the basis for the first published descriptions of Galapagos species. Perhaps four-fifths of the types of birds described from the Galapagos are contained in the British Museum, in the Rothschild Museum at Tring, England, and in the United States National Museum, mostly in the first two institutions. In the spring of 1930 it proved possible for me to make the necessary trip, and I visited the British Museum and the Rothschild Museum in the interval between April 27 and June 13, and the United States National Museum on my way home the latter part of June, having abundant opportunity to examine all of the Galapagos material in those several institutions.

This report could not possibly have been concluded satisfactorily without examination of those specimens, and to the several institutions wherein the collections are placed I owe a debt of gratitude for the favors I have received in this connection. By the authorities of the British Museum (Natural History) I was granted the privilege of working in the Bird Room during the long period necessary for a protracted study of the many Galapagos types in that collection. Dr. P. R. Lowe, in charge of the collection, his associate Mr. N. B. Kinnear,* and their assistant, Mr. H. B. Usher, by their cordial co-operation and assistance made of my visit there a pleasurable experience, terminated with reluctance at the conclusion of my work. Similar courtesies received from Lord Rothschild opened to me the remarkable collections in his museum at Tring, where I also benefited by the invaluable assistance of his aide, Mr. A. T. Goodson. Again, at the United States

*Mr. Kinnear has, furthermore, in the interests of accuracy, checked up in the proof of this report on all references to specimens in the British Museum. Additional information thus obtained is entered as footnotes followed by the initials, N.B.K.

National Museum, through Dr. Alexander Wetmore, Assistant Secretary of the Smithsonian Institution, and with the assistance of Dr. Herbert Friedmann, Curator, and Dr. Charles W. Richmond, Associate Curator, Division of Birds, I was enabled to examine the abundant pertinent material therein, and also to borrow for longer study the several types and other unique specimens for which I asked. From the American Museum of Natural History, New York, through Dr. F. M. Chapman, I received the loan of South American mainland birds needed for comparison. For information regarding Galapagos birds in the Royal Natural History Museum, Stockholm, I am indebted to Dr. Einar Lönnberg, Director, and for the facts pertaining to the one Galapagos bird type in the Museum National d'Histoire Naturelle, Paris, I am similarly indebted to Mons. J. Berlioz, in charge of the bird collection thereof. My indebtedness to Dr. Casey A. Wood is no small one, for in his wide and intimate acquaintance with men, collections, and libraries the world over there has been a mine of information that has always been available to me, and that has been invaluable in the present study. The drawings of *Geospiza magnirostris* and *G. dentirostris* are the work of Mr. Henrik Grönvold, to execute which he generously interrupted the course of some far more interesting painting in which he was engaged. The chart on page 139 and the several graphs were drawn by Miss Margaret W. Wythe; the rest of the drawings are from the pen of Mrs. Frieda Abernathy, of Berkeley, California. The map used in delineation of ranges was drawn by Mrs. Mary E. Davidson, Assistant Curator in this department, who has also helped importantly in many other ways throughout the course of this study.

Scope of this Report

The attempt has been made to consider herein every bird species with a valid claim to inclusion in the Galapagos list, with, in addition, the four resident land birds of Cocos Island, Costa Rica. The latter seem obviously to be part of the problem of the relationships and origin of the Galapagos avifauna, and so deserving of mention here, while the water birds of Cocos and vicinity have no such claim upon our attention. At the outset this study was intended to include no more than the species not already covered by Loomis and Gifford, and to a great extent this is the plan that has been followed. It seemed desirable, though, to have in one place a complete catalogue of the birds of the Galapagos Archi-

pelago compiled in the light of most recent findings, and the work was extended accordingly. Then, with the exceptional opportunities that I have had, both in our own extensive collection of Galapagos birds and in the chance to examine many of the specimens upon which previous writers based their conclusions (and I have seen nearly all of the types described from the islands), it seemed desirable to make this study something more than a brief report upon our own material, to endeavor, in fact, to have included within one set of covers a fairly comprehensive account of the Galapagos avifauna. So, beside my own personal contribution toward the taxonomy of the several groups, I have attempted, through the bibliography, synonymies and in other ways, to make available such information as has been published on other phases of Galapagos ornithology. It is my hope that others may find it useful to have here conveniently in one place, the answers to queries, or at least statements of current opinion, regarding matters whereof the original documents are in many cases scattered and difficult to find.

The order in which the species are listed is that given in Wetmore's "A systematic classification for the birds of the world" (Proc. U. S. Nat. Mus., vol. 76, art. 24, Jan. 8, 1930). While for the most part I have not gone into detail regarding species covered by Loomis and Gifford, there are certain phases of the subject that they ignored and these gaps I have filled out throughout the list. Then, too, regarding some of those species, the additional material that I have been able to examine has led me to amplify or to differ from Gifford's conclusions and I have stated my findings accordingly.

Manner of treatment is as follows: (1) The accepted name of the species. (2) A synonymy, not intended to be "complete", but giving citations to such publications as contain first-hand facts; general works and compilations are as a rule not included. (3) Data regarding type specimens, including all forms (accepted names and synonyms) that have been described from the territory here covered; data copied from the label are given first, further information or comment in parentheses or below. The method of handling this subject matter has been modeled after Bangs' "Types of birds now in the Museum of Comparative Zoology" (1930). (4) Habitat, in general terms for wide-ranging species, in greater detail for birds restricted to the islands. (5) The number of specimens collected by the Academy expedition, with the running numbers by which they

are listed in our departmental catalogue. The above items are generally not given by Loomis and Gifford, and they are entered here for every species. They are followed by whatever comments the different series suggest. This report is purely taxonomic and life histories and habits are not considered. The present writer has had no field experience in the Galapagos, and in any event Gifford's publication upon the life histories of the entire list is based upon this same collection.

Descriptions have been drawn up for some species and not for others. Where accurate and detailed descriptions have been published in works that are easily accessible (for example, Ridgway's [1907] treatment of *Nesomimus*) a reference to the book is considered sufficient.

All measurements in this paper were taken by myself, so that uniformity is assured in making comparisons. It was not possible to repeat each measurement, as might have been desirable for greater accuracy (a thousand or more specimens were measured), but in every column the extremes were gone over several times. Measurements are in millimeters; those that might be taken by different methods were obtained as follows:

Length of wing.—A straight line from bend of closed wing to tip of longest primary, with those feathers in their natural position (not straightened).

Length of tail.—From point of insertion of middle rectrices to tip of the longest.

Culmen.—Measured in a straight line from a point where the feathers cease to hide the culmen, to tip of maxilla; the chord of the exposed culmen.

Depth of bill.—From base of culmen to angle formed by feathers at lower edge of ramus of mandible.

Width of bill.—Measured at base of lower mandible.

Tarsus.—A straight line from center of heel joint on posterior side to joint between metatarsus and middle toe on anterior side.

Middle toe with claw.—Measured along upper side, from joint between metatarsus and middle toe to tip of claw.

In the tables of measurements I have as a rule used ten birds of each sex from any one island where the series contained that many specimens, with the precaution of looking over the entire series with sufficient care to see that extremes were included. In some cases where it seemed desirable I took a given measurement of not only the entire extensive series in our own collection but

of all other specimens that became available to me elsewhere.

Color terms are from Ridgway's *Color Standards and Color Nomenclature.*

The bibliography has been compiled with some care, most of the entries therein being of publications that were consulted in course of preparation of this report. There is a voluminous literature pertaining to the Galapagos Islands, including many papers upon branches of science other than ornithology, and including books of travel with more or less casual mention of the islands and of their birds. The items that I have listed include everything that I could find containing some definite contribution to the ornithology of the Galapagos. The few publications that are not primarily ornithological in purpose contain, nevertheless, some subject matter bearing directly upon ornithological problems.

Historical

Our knowledge of Galapagos birds begins with Darwin's historic visit to the Archipelago in 1835, and with Gould's descriptions of the birds that Darwin collected, published from 1837 to 1841. It should be a source of satisfaction to ornithologists that it was observation of the peculiarities of these same birds that apparently first turned Darwin's attention toward those problems of evolution, whereby he so profoundly influenced subsequent human thought. Darwin's itinerary during the *Beagle's* cruise among the islands (compiled from the "Narrative") was briefly as follows: September 15, 1835, Chatham and Hood in sight. September 16, Hood Island; in afternoon Chatham Island. September 17-22, Chatham Island, September 23, Chatham to Charles. September 24-27, Charles. September 28, toward southwestern point of Albemarle. September 29, Elizabeth Bay, Albemarle. September 30-October 2, Tagus Cove, Albemarle. October 3, around north end of Albemarle. October 4, toward Abingdon (did not land). October 5-7, passing Abingdon, Bindloe and Tower. October 8-17; during this period Darwin, with a companion, remained upon James Island while the *Beagle* continued its surveys elsewhere. October 18, Albemarle, thence toward Abingdon. October 19, Abingdon. October 20, past Wenman and Culpepper and then westward.

Study of the itinerary shows that most of Darwin's collecting must have been done upon James Island, with much lesser periods upon Chatham, Charles and Albemarle. A fact that has been regretted by all subsequent students, and Darwin himself was the

first to deplore it, is that no exact data were kept regarding the specimens collected, the island where a bird was taken being in most cases not recorded. Of course that was a period antedating the elaborate technique that has been developed in the collection and care of natural history specimens. A few examples of a species were considered ample for any purpose in those days, and there was no such careful labelling of every specimen as is now the rule. It is conceivable that a general locality indicated upon a box or jar might have been regarded as sufficient information upon the entire contents thereof.

At any rate, Darwin's new discoveries were first described by Gould merely as from the Galapagos Islands. Later, in the general report upon the birds of the *Beagle* expedition, an attempt was made to indicate the island or islands upon which each species was found. In most cases the grounds for these decisions are not known, but it may well have been from verbal information given by Darwin to Gould. Of course, where only one bird or two were shot of a conspicuous species such as the Barn Owl such recollections may be accepted as accurate, but there are other cases where this is not the case. Thus, Darwin says of *Geospiza magnirostris*, "I have strong reasons for believing this species is not found in James Island." But he says of *Camarhynchus crassirostris*, "I am nearly certain that this species is not found in James Island", and as this species is now known to be common on James, his impression of the non-occurrence of *magnirostris* there should not be allowed to out-weigh the evidence contained in the character of his *magnirostris* specimens, which certainly resemble recently collected birds from James Island.

Then, although knowledge of Darwin's itinerary should be of help in determining the origin of some of the *Beagle* material, these facts, too, are subject to modification. Captain Fitzroy, commander of the *Beagle*, collected many birds himself, some of which, at least, were examined by Gould together with Darwin's series. The *Beagle*, or parties therefrom, visited various islands that Darwin did not set foot upon, so that Fitzroy's specimens* might have come from any part of the archipelago. Obviously, except for certain conspicuous and outstanding species and specimens, the source of these unlabelled specimens can only be determined insofar as the various specific or subspecific characters give the necessary information.

*7 from Charles Id., 13 from James Id., 2 from Chatham Id. N.B.K.

"The collections made by Darwin during the voyage of the *Beagle* passed into the Museum of the Zoological Society [of London], and were afterward acquired* by the British Museum. Unfortunately, a few of the types had either perished or were overlooked by Mr. G. R. Gray, when he made his selection, since they are not now in the National Collection" (Sharpe, 1906, p. 336; see also p. 514). Most of these birds were mounted, presumably for exhibition in the Zoological Society's Museum; when they were acquired by the British Museum they were dismounted and placed in the research series. As I saw them (in 1930) they mostly gave evidence of their former mounted state in the presence of wire in the legs and by their glass eyes. A few had merely been removed from the stands, with slight modification of the "mounted" attitude. Some were "study skins", more or less well made, that had never been in the taxidermist's hands. For the most part they showed little or no sign of fading from exhibition; worn plumage had evidently been so when the bird was collected. T. C. Eyton bought some of Darwin's skins at the dispersal of the Zoological Society's collection. Upon Eyton's death his own collection was scattered, and many skins purchased for the Salvin-Godman collection and by the British Museum. So that there are Darwin-collected bird skins in the British Museum bearing a variety of labels. I saw, too, in the Leiden Museum several Galapagos birds which, from the "make" of the specimens I judged to be of the *Beagle* collection, though their exact history I could not ascertain.

On none of the British Museum birds did I find any label or other paper known to have been written by Darwin or Gould. Labels were all of a later date, mostly attached after the specimens had left the Zoological Society's Museum. In a few cases labels had pasted upon them bits of written paper that had been removed from the stands on which the birds had been perched.

Fitzroy's specimens are entered in the British Museum records as presented by Sir W. Burnett and Admiral Fitzroy. "The specimens were collected by Admiral Fitzroy, a celebrated meteorologist of his time . . . . Sir Wm. Burnett was the King's physician, and what he had to do with the presentation of a collection made by the Admiral, I have never been able to discover" (Sharpe, 1906, p. 323).†

*Purchased at the dispersal of the Society's Museum.

†Sir William Burnett was Physician-General to the Navy. N.B.K.

The next important bird collection from the Galapagos was made by Dr. Habel in 1868, to serve as the basis for Salvin's (1876) comprehensive study, "On the Avifauna of the Galapagos Archipelago." The type specimens here described eventually found their way, too, into the British Museum collection. Nowhere in ornithological literature nor upon specimen labels can I find the collector's name given other than as "Dr. Habel" or "Dr. A. Habel". The significance of the initial letter "A" is unknown to me. It was rather disconcerting to find at last his name given in full as Dr. Simeon Habel, as it appears in the Smithsonian Report for 1879 (p. 15) in acknowledgment of a gift to the United States National Museum.

Ridgway's "Birds of the Galapagos Archipelago" (published March 15, 1897) and the preceding descriptions of many new forms were based upon collections made by the naturalists of the *Albatross* in 1888 and 1891 (Prof. Leslie A. Lee, Mr. Charles H. Townsend and Mr. Thomas Lee), and by Messrs. Baur and Adams in 1891. The *Albatross* collections went to the United States National Museum. The bulk of Dr. Baur's collection, with the numerous type specimens, after the completion of Ridgway's studies was purchased by the Rothschild Museum, Tring, England. In 1897 the Webster-Harris Expedition visited the Galapagos on behalf of the Rothschild Museum, obtaining important collections that served as the basis of Rothschild & Hartert's "A review of the ornithology of the Galapagos Islands" (1899). Of the bird collection many specimens were later distributed to the British Museum and elsewhere, though most of the material, with the types, remains at the Rothschild Museum. The Hopkins-Stanford Galapagos Expedition (1898-1899), the personnel comprising Robert E. Snodgrass and Edmund Heller, made a large collection of birds for the Stanford University Museum, the basis for a published report by the collectors (1904). This completes the account of the more important ornithological collections to be made upon the Galapagos prior to the California Academy of Sciences Expedition in 1905-1906.

Features of the Galapagos Avifauna*

The Galapagos Archipelago lies on the equator in the Pacific Ocean about 500 miles west of the coast of Ecuador, to which country politically it belongs. There are nine larger islands and a number of smaller ones. The Galapagos have been generally regarded as oceanic islands. Dr. G. Baur has argued at length to the contrary, asserting that the avifauna as well as other features of the archipelago point to a former land connection with the American continent. Van Denburgh, studying the reptiles, agrees with Baur that the Galapagos are the surviving remnants of a subsiding continental land mass, but most writers have felt obliged to explain the Galapagos fauna as having been established upon islands that were already existent as such. The Galapagos have yielded fossils of Pliocene age. As far as the birds are concerned, explanation of peculiarities of the avifauna is not dependent, it seems to me, upon acceptance of the subsidence theory, and there are many facts in opposition. In this connection see Rothschild & Hartert (1899, pp. 136-142) with whose conclusions I am generally in accord.

Assuming that the Galapagos Archipelago are oceanic islands, not very different today from what they were in ages past, we can imagine the fortuitous arrival thereon of the ancestral Geospizids, for example, at a very remote date. Their place of origin may be inferred from the present day occurrence of *Pinaroloxias inornata* (said to resemble certain West Indian Cœrebidæ in some respects) upon Cocos Island, between the Galapagos and Panama, and from the manner in which masses of vegetation are known to be carried by ocean currents for great distances southward from the Panamic region toward Cocos and the Galapagos. Original settlement by birds of the ancestral type upon one or more of the large central islands might be followed by changes in different strains of their descendants, producing generalized types ancestral to the several genera and more strikingly differentiated species that are widely spread over the archipelago today. Wandering individuals of these several types would eventually reach many or few additional islands, there to develop more or less widely differentiated strains of the several major divisions. Natural results of such a mode of origin would be, as we see is actually

*This chapter in modified form was read at the Seventh International Ornithological Congress, Amsterdam, June 4, 1930.

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the case, a greater number of forms upon the large central islands, fewer upon the outlying ones. For some reason Hood and Tower seem to have been peculiarly difficult of access (there is present day evidence to show that this is still the case), and the few forms that did succeed in becoming established upon those islands were probably very rigidly isolated there, practically exempt from later infiltration of the parent stock, and thus able to develop into the very strongly differentiated species that we find upon those islands today.

There are 108 species and subspecies of birds in the Galapagos list. Of these there are 89 that are breeding and resident upon the islands, 77 of which are confined thereto, 12 found elsewhere as well. Of the 89 breeding birds, 37 are of the Geospizidæ, the dominant group of land birds and of uncertain affinities.

The different bird groups show various degrees of differentiation. At one extreme there is the very distinct assemblage of Geospizids. Then, there are some peculiar genera of unquestioned acceptance, such as *Nesomimus*, and others that are in dispute, as *Nannopterum* and *Eribates*. There are many distinct Galapagoan species of mainland genera, as of *Pyrocephalus*, *Progne*, *Buteo* and others; at least one accepted subspecies of a mainland species, *Dendroica petechia;* several Galapagoan forms, as yet unnamed, that do, nevertheless, exhibit faintly impressed characteristics in island specimens (such as *Himantopus mexicanus*); and a brief list (including *Pelecanus occidentalis*, *Casmerodius egretta*, *Gallinula chloropus cachinnans*, and *Coccyzus melacoryphus*) in which no variation from the parent stock has been detected. Whether these varying degrees of peculiarity in the several groups indicate relative remoteness of times of arrival upon the islands is questionable; with little doubt some groups and some species have developed and altered more rapidly than others. Present day distribution of species over the Archipelago may perhaps contain suggestions as to times of arrival.

The birds of the Galapagos, where relationships at all are shown, are unmistakably American in affinities, but the islands are remarkably destitute of the highly characteristic bird life of the adjacent coast of South America. Resemblances are almost all toward Central American, West Indian, or even North American species. Evidence of Atlantic coast affinities crops out over and over again, as for instance, in that the Flamingo of the Galapagos

is the West Indian form, not the Peruvian, and the Pelican the West Indian species, not the Californian.

The Geospizids, including the so-called Galapagos finches, in their curious variations, complicated inter-relations, and manner of occurrence, present many facts worth dwelling upon. I lump in the one group the "finches" and the "creepers" of the Galapagos, and *Pinaroloxias* of Cocos Island. There can be no doubt of the close relationship there. In this group there have been 67 specific and subspecific names applied, of which, in my opinion, about 40 are valid. Synonyms fall mostly into two classes, of names applied to single specimens of uncertain status, and of names applied to forms upon an island or islands as differing from a recognized and nearly related form elsewhere, and where I have been unable to appreciate the difference.

In the first category there are such names as *Geospiza dentirostris* Gould, and *Cactornis brevirostris* Ridgway, the types of which are practically unique, and which, in my opinion are aberrant examples of *Geospiza fortis*. In several of the series in the Academy collection there are single specimens that in some one character (generally bill structure) depart just as widely from the most nearly related species. This happens sufficiently often to make it seem possible that notably different variants are appearing not uncommonly among these birds, but not necessarily perpetuating their peculiarities. This possibility, together with the wide range of variation in bill structure that appears in some of the species, has made me unwilling to recognize forms based upon one or two specimens that show even outstanding peculiarity in that one organ and in no other particular.

Other synonyms are found in names that have been applied to the form upon one island as differing *en masse* from a recognized form upon some other island or islands, and where I have regarded the described differences as imperceptible or as not sufficiently pronounced for naming. This has been an exceedingly difficult matter of discrimination, and I am not sure that I have been entirely consistent in my treatment. Variation in all degrees of accentuation occurs among series from different islands, and it is not at all easy to decide just what degree of an observed trend deserves the artificial (and perhaps unduly exaggerated) emphasis of a separate name. Perhaps the only consistent handling of the situation would lie in giving a separate designation to the representative of

each separate form upon every island, whether obviously different or not, a safe enough procedure in almost every case among birds so nearly sedentary as are these. Not caring to go to that length I have tried under each species to convey exact information as to variation upon different islands by descriptive accounts, adopting a conservative use of names to distinguish what appears to be the better defined forms. Intergradation between different extremes occurs to a bewildering degree, so as to render any system of nomenclature more or less of an artificial procedure.

In fact, it seems to me that any discussion centering upon the question as to what system the classification of these birds should follow, whether a given form is a species or a subspecies, or whether or not it is a "good" subspecies, is rather beside the mark, they so resolutely refuse to conform to the standards applied to continental species. A system of names regarded as labels to so many pigeonholes of definite capacity is out of the question; for one thing it would at once lead to the farther extension of the list of species that are represented each by a unique type, most of which I believe are non-existent as species. Rigid adherence to accepted criteria for subspecific association of forms could be followed to absurd lengths. Certain writers have lumped the genera *Geospiza*, *Platyspiza*, *Cactospiza* and *Camarhynchus* in one genus and upon plausible grounds, but the same argument could be advanced for the inclusion of *Certhidea* as well. Furthermore, it would be just as possible to argue for the specific unity of all the forms concerned (from *Geospiza* to *Certhidea*), to regard them all as only subspecifically separate. Intergradation through individual variation can be traced between any of the extremes, though not always between forms that are geographically adjacent. There is abundant material on hand for ordinary purposes of classification, but most assuredly the facts demonstrated thereby do not lend themselves satisfactorily to interpretation through our current system. Whether the bewildering conditions existent among these island birds arise entirely from the presence of factors that are ordinarily absent from the surroundings of mainland forms, or whether they are due in part to an instability in rapidly succeeding generations such as is not commonly seen elsewhere, can not be said, but I incline to the latter view. In the system that I have adopted I have been concerned to present clearly what seemed to me to be the facts in the case, rather than to adhere strictly to technicalities of treat-

ment that to my notion might here be disregarded. Some inconsistencies will doubtless be found but I trust none that seriously interfere with presentation of the facts.

Of recent years there have been important studies of Galapagos birds by Ridgway (1897, 1901, 1902), by Rothschild & Hartert (1899, 1902), and by Snodgrass & Heller (1904), in all of which the Geospizidæ claimed a large share of attention. The treatments adopted by these authors differ in certain important respects, though all agree in regarding *Certhidea* as of the Mniotiltidæ, the remaining forms as of the Fringillidæ. Ridgway consistently avoids trinomials, regarding every form that is recognizable at all as a distinct species, and in the "finches" he recognized the genera *Geospiza*, *Platyspiza*, and *Camarhynchus*. Rothschild & Hartert and Snodgrass & Heller use trinomials freely, regarding slightly differentiated forms as subspecies, and they lump the three above-mentioned genera under the one name, *Geospiza*. It seems to me eminently desirable to recognize the several genera here differentiated, especially so in view of my recognition of the whole assemblage as a distinct family. *Geospiza*, *Platyspiza*, *Cactospiza*, and *Camarhynchus*, are groups that are better understood as separate genera, despite the intergradation of a sort that can be traced between some of them.

There are differences of habits that are fairly well correlated with *Geospiza* on the one hand, with *Platyspiza*, *Cactospiza*, and *Camarhynchus*, on the other. The species of *Geospiza* ("ground finches") are for the most part ground feeders, though the long-billed *scandens* and its allies (the "cactus finches") resort primarily to cactus (eating both fruit and blossoms) and to the introduced oranges and other fruits. *Platyspiza*, *Cactospiza*, and *Camarhynchus* ("tree finches") are tree dwellers, feeding on leaves, fruit and insects in the shrubbery, rarely on the ground. It is noticeable that it is in the more sharply differentiated species, such as *Geospiza debilirostris* (strictly terrestrial and with skulking, rail-like habits), and *Platyspiza crassirostris* (noticeably arboreal), that there is found the most rigid adherence to certain given surroundings. In certain abundant, widely distributed, and widely variable species, *Geospiza fortis* and *G. fuliginosa*, food requirements are not so rigidly restricted, these birds being noted as feeding chiefly on the ground, but also commonly in trees and bushes, among the rocks on the beaches, and even picking at carrion and

among the refuse of a camp. Many of the finches have turned to introduced oranges and other fruit, to such an extent, indeed, in one case (*G. scandens*), as to cause that bird to have spread in abundance into the humid zone on islands where oranges are established in that belt, while elsewhere, under primitive conditions, it is characteristic of the arid zone, dependant upon the cactus fruit.

Altogether, in many of the Galapagoan Geospizidæ there is seen a variability in physical characteristics and an adaptability in habits that argues well for their future. It is in striking contrast to the highly specialized development found in, and rigid requirements controlling, the avifaunas of oceanic islands elsewhere, of which the Hawaiian birds (often compared with those of the Galapagos) at once come into mind.

The mode and amount of variation in these birds suggest that various types of development are being pushed to extremes, and without the elimination of the connecting intermediates; the extraordinary variants that crop up in many of the series give an impression of a process of change and experiment going on. Such remarkable extremes of variation in bill structure as are seen, for example, in series of *fortis* or *fuliginosa* from any one of the larger islands, connected as they are by every intermediate stage, lie outside my experience with any North American mainland bird. All these features give trouble, of course, in any attempt at an orderly classification of the forms concerned.

I am aware that Ridgway (1897, p. 468) has stated: "I have failed to discover in the series of specimens from any one island a greater range of variation in measurements than often exists among an equal number of specimens of mainland forms." Ridgway's series were limited in number, however, and the much greater amount of material that is now available does show extraordinary variation as described. Furthermore, in Ridgway's restricted series, some groups of specimens to which he gave separate names are now clearly seen as different points, sometimes widely separated extremes, along lines of variation that are nowhere broken into separated segments.

Darwin has stated one objection to the theory of evolution through natural selection in the following words: "Why, if species have descended from other species by insensibly fine gradations, do we not everywhere see innumerable transitional forms? Why

is not all nature in confusion, instead of the species being, as we see them, well defined?" Various answers, more or less satisfactory, have been made to these queries, but here just the conditions that are predicated by Darwin are what seem to obtain among the very birds that first inspired his researches in evolutionary problems. There *are* "innumerable transitional forms" (and, also, aberrant individuals apparently departing in entirely new directions). There *is* a pronounced degree of confusion and some forms that we are obliged to treat as species are *not* well defined.

Snodgrass (1902), in his study of these birds, concluded that there was no correlation between food and the widely variable size and shape of bill. In other words, natural selection was eliminated as a factor in the production of the observed variations, and apparently justly so, for in the amount and sort of differentiation that is seen here, and in the extraordinary amount of intergradation, it is not apparent that there are useful adaptations in the remarkable extremes nor any lessened fitness in the numerous intermediates. There are large bills and small bills, heavy bills and slender bills, among the ground feeding species of *Geospiza*, and also, pushed to nearly as great extremes, among the tree-frequenting genera.

In the classification of the Geospizidæ that is here followed I have used trinomials fairly extensively. These birds may be divided into groups of obvious similarity, and within these groups there are more or less closely resembling forms. It seems desirable to use binomials or trinomials, as the case may be, to express, mainly, degree of difference. Intergradation of characters occurs from one extreme of the family to the other, as noted by nearly everyone who has studied these birds, though it is not always between birds of geographically adjacent islands. It is, of course, a matter of little importance whether I designate a bird by binomial or trinomial, or place it in one genus or another, all this amounting to no more than the expression of my opinion of the bird's relationships. What I have expended much thought and effort upon, however, is the attempt to express clearly and thoroughly the conditions presented in each series from every island. The classification that I have adopted is the result of my translation of those facts, but my effort has been to present the evidence in full, likewise, so that others may judge for themselves regarding my conclusions.

In the distribution and manner of occurrence of Geospizidæ on the islands of the Galapagos there are several noteworthy features. It will be seen that the different forms arrange themselves in groups, and that these groups, in their different members (subspecies or closely related species), are distributed more or less widely throughout the archipelago. The avifauna of each island is composed of representatives of different groups, not of several representatives of any one group. (There are only one or two cases, as in the occurrence of *Camarhynchus pauper* and *C. psittacula* upon Charles, where this may be called into question.) It will be noted (see Fig. 18, p. 290) that the central islands have the greater number of species, 11 on James, 11 on Indefatigable, and 10 on Albemarle, as compared with 4 on Tower, 4 on Hood, 9 on Abingdon and 7 on Bindloe. It will be noted, too, that the islands with the fewest forms have the largest proportion of forms that are peculiar to them. Of the four Geospizidæ upon Tower Island, three are clearly distinct, while the fourth, *Geospiza magnirostris*, exhibits upon Tower Island the extreme of development in that form. Of the four species upon Hood Island, two are distinct.

It seems curious that, among the outlying islands, there should be as many "ground finches" upon the far distant Culpepper, and more upon Wenman, Abingdon, and Bindloe, than upon Tower and Hood, which are no farther from the main group, but this condition doubtless results from the same factor that has produced such sharply differentiated species among the few forms that have succeeded in reaching, or in surviving upon, the two last mentioned islands. There are 3 of these finches reported from Culpepper, 5 from Wenman, 8 from Abingdon, and 6 from Bindloe, as compared with 3 each from Tower and Hood. Wenman has been reached by stray individuals of *fortis* and *parvulus*, and Abingdon by *parvulus*, neither of which have wandered to Tower. It is worth noting that the one specimen of *fortis* at hand from Wenman Island (apparently the first reported from there) is not of the "*fratercula*" mode (the small sized form) occurring upon Abingdon and Bindloe, the nearest islands, but is exactly like the larger sized bird of more distant Albemarle Island. Altogether, the evidence goes to show a wandering of individuals of the several species of "finches" from island to island toward the north, but not to Tower, far distant in the northeast. In this connection it may be well to assemble here the scattered facts given by Gifford

(1919) pertaining to the wanderings of these birds. He saw finches flying between Hood and Gardner-near-Hood, and assumed that some were *Geospiza conirostris* (p. 226). Of *G. fortis*, one bird was taken at sea 3 or 4 miles west of Charles Island, flying north, on May 23; one was taken 20 miles south of Brattle Island, flying northwest, on June 6; two came on board the next day (pp. 230, 231). Of *G. fuliginosa*, single birds were seen on two occasions "on the small islet off northeast James"; they were "often seen flying between Hood and the adjacent Gardner"; and on several occasions they came aboard the vessel when it was anchored off shore (p. 237). One example of *G. scandens* came aboard 20 miles south of Indefatigable (p. 241). No *Platyspiza*, *Camarhynchus* or *Cactospiza* was seen at sea at any time, but the occurrence of *Camarhynchus p. parvulus* on Wenman and Abingdon is nevertheless apparently due to the casual wandering of stray individuals.

In *Geospiza* an all-black plumage, in *Platyspiza* and *Camarhynchus* a black-headed plumage, in most forms of *Certhidea* a chestnut-throated plumage, is regarded as the "perfect" or "fully mature" condition of the adult male. These plumages may be admitted to be the "perfect" stage of the adult male, but it does not follow that all males eventually reach those stages. It is a notable fact that a different percentage of males in this "perfect" plumage should occur upon different islands, and also that several species, not closely related, should be similarly affected upon the same island. But consider the following: There are eight forms of Geospizidæ upon Abingdon (omitting *Certhidea*), in which plumage condition is as follows in the series at hand: *Geospiza magnirostris*, 21 males, of which 5 are black, 16 streaked; *G. fortis*, 22 males, 3 black, 19 streaked; *G. fuliginosa minor*, 17 males, 4 black, 13 streaked; *G. difficilis*, 6 males, 4 black, 2 streaked; *G. scandens abingdoni*, 9 males, all streaked; *Platyspiza crassirostris*, 9 males, 3 black-headed, 6 streaked; *Camarhynchus habeli*, 8 males, 1 black-headed, 7 streaked; *Camarhynchus p. parvulus*, 1 streaked male.

It is thus apparent that on Abingdon Island the "perfect" plumaged males (black or black-headed) are extremely scarce in all but one of the species occurring there. Besides the evidence of our specimens there are many corroborative statements scattered through the literature. It is beyond belief that the large proportion of streaked males in the several Abingdon series is a fortuitous

circumstance, due merely to the chances of collecting; I am convinced that this represents actual conditions. In all probability there is an even larger proportion of high plumaged males in the collected series than there is among the living birds, for the black and the black-headed birds are more conspicuous than the others and are also especially likely to be pursued by the collector when but few of them are seen.

Bindloe is close to Abingdon, and the two are nearer to each other than to any other island, yet conditions on Bindloe are very different in that high-plumaged males are in the majority. Of the several species thereon, black and non-black males are represented in our series as follows: *Geospiza magnirostris*, 3 black, 1 streaked; *G. fortis*, 9 black, 3 streaked; *G. fuliginosa minor*, 8 black, 1 streaked; *G. scandens rothschildi*, 4 black, 3 streaked; *Platyspiza crassirostris*, 3 black-headed, 2 streaked; *Camarhynchus habeli*, 8 black-headed, 9 streaked.

On Chatham Island, again, there is a small proportion of high plumaged males in some forms. In *Camarhynchus parvulus salvini* (in which the ordinarily non black-headed condition has been used as a specific character), only 5 males show any black on the head as against 64 with none, and on none of those five is it as fully developed as on *parvulus* from other islands. Of *Platyspiza crassirostris* there are 2 black-headed males, 21 with no black. In *Geospiza fortis* and *G. fuliginosa* (the first with 39 black males, 19 streaked, the second with 44 black, 26 streaked) there is no strong leaning in either direction.

In contrast to those islands where the "immature" plumage preponderates we find the Barrington Island series: *G. f. fuliginosa*, 28 black, 2 streaked; in the Tower Island series: *Geospiza magnirostris*, 7 black, 3 streaked; *G. acutirostris*, 17 black, 1 streaked; in the Jervis Island series: *Geospiza magnirostris*, 20 black, 1 streaked; *G. f. fuliginosa*, 5 black, 2 streaked; *G. s. scandens*, 5 black, none streaked. On James Island, with a strong preponderance of high plumaged males, the numbers of black and streaked males in our series are as follows: *G. magnirostris*, 23, 14; *G. fortis*, 16, 5; *G. f. fuliginosa*, 6, 2; *G. debilirostris*, 29, 0; *G. s. scandens*, 10, 0; *P. crassirostris*, 14, 6; *C. psittaculus*, 12, 0; *C. p. parvulus*, 10, 0.

There is an exasperating dearth of molting birds, showing transition from one stage to the other, but with such an absence of

streaked males as we find in the series of *acutirostris* from Tower Island, and *debilirostris* from James Island, for example, it seems likely that in those forms the streaked stage is frequently, perhaps almost invariably, not passed through.

So far from its being a proved fact that the black and the black-headed plumages of adult males of *Geospiza*, *Platyspiza* and *Camarhynchus*, respectively, are attained by every male bird after a preliminary streaked plumage that follows the juvenal stage, it is apparent that there are several other conditions that may obtain. It may be that in some cases the black and the black-headed plumages appear as color phases, occurring in some individuals throughout their lives while others remain streaked. This seems especially probable in certain of the black-headed species, where some juveniles are black-headed, others not.

In other words, instead of any one bird always passing through various intermediate stages for several years before reaching the "perfect" plumage, it seems more likely that the extent of blackness that is reached varies with, and is inherent in, the individual to some extent, in the aggregation of birds upon different islands in general character, and that the degree of perfection that is attained is reached very quickly, either with or without a preliminary year spent in the entirely streaked female plumage. There are islands where most male birds apparently do not pass through the streaked stage before attaining perfect plumage, others where most male birds apparently never pass beyond the streaked stage.

In the genus *Camarhynchus* there are two distinct types of plumage that are common to the female and the non-perfect male, one type more or less streaked, the other immaculate below. I have not been able to ascertain the significance of these plumages. A young *pauper* at hand is molting from the streaked juvenal stage into an immaculate-breasted plumage. Yet there are plenty of specimens in the series in later stages (breeding birds) with streaked underparts. In the *parvulus* series, too, breeding birds (non black-headed males and females) are about equally divided into streaked-breasted and immaculate. A plain plumage, unmarked below, occurs also in some forms of *Geospiza*, but much more rarely than in *Camarhynchus*.

The color variations just described, though fairly consistent on any one island, are erratic as regards the archipelago as a whole, but there are certain trends of variation that seem to pursue definite

lines. Thus, in *Geospiza magnirostris* the largest billed birds are at the north and size diminishes steadily toward the south; of birds in the streaked plumage, those from the northern islands average darker and more heavily marked than those from the southern ones. In *G. fortis* and in *G. fuliginosa*, as regards size of bill, the reverse is the case, those with the smallest bill being at the north, the largest to the southward. Coloration, however, in *fortis* and *fuliginosa* varies in the same way as in *magnirostris*, though in a lesser degree, with the northern birds in streaked plumage on the average somewhat darker than southern ones. In the non-black plumages of the several species there are differences between the series of the same form from different islands in the relative grayness, green-ness, or olivaceous tinge of the generally gray or brown color tone, but I am not sure that there is any general trend toward the same tinge in several forms from any one island.

Snodgrass & Heller (1904) outline six different phases of plumage ("stages") which they claim represent an orderly development throughout the group and which they use as a basis for their classification. I am not able to follow them in their conclusions. The different plumages are accurately described, but I find no evidence in their report or in their specimens to show that the age period of these plumages (except the juvenal) is established upon any definite knowledge of the age of the birds described. Their theory is, briefly, that the plumages of these "finches" show a progression from a primitive plain buffy-yellow color upward through streaked and black-headed stages, to an entirely black condition. The plain colored *Cactospiza* are placed at the bottom, and adult *Geospiza conirostris* (with black male and blackish female) at the top, with the young of the several intermediate stages all described as reverting each to an immediately lower stage.

The much more abundant material that is now at hand shows wide departures from their proposed arrangement. The young (juvenal) plumage of *Cactospiza pallida*, for instance, is heavily streaked, to become plain later in the adult. The juvenal plumage of certain forms of *Camarhynchus* is distinctly streaked and frequently black-headed, though in later stages an unmarked plumage occurs. These and other peculiarities of plumage render it impossible to accept these authors' diagramatic arrangement of species.

It was a disappointment to find that our own enormous collection of Geospizidæ did not suffice to establish the progressive changes of plumage in the several species, from young to adult, and from males in the female-like plumage to the higher stages. This is due primarily to the fact that the collectors did not determine the age of specimens as based upon condition of the skull, as can be done in such birds for some months beyond the juvenal stage, and also because very few molting birds were collected. Ridgway (1901) and Snodgrass & Heller (1904) describe "young," "immature," and other stages for certain of the species, but in our own large series I find so many facts contradictory to the assumption of any given age for certain of the described plumages that I can not agree with their conclusions nor can I indicate any positively ascertained line of development in the individuals of any one species. This, however, could probably be done with relative ease by the collecting, not of vastly greater series of specimens, but of a few birds carefully selected and at the proper seasons, and with their ages definitely ascertained.

Certain facts do stand out in our collection that advance our knowledge of conditions to some extent. I regard it as proved that in adults of both sexes the bill changes color seasonally, being black during the breeding period, pale colored at other times. Color of bill in these birds has heretofore been described either as a specific character, as a sexual or age character, or as being individually variable and without any particular significance. There is one exception to this statement in that Sharpe (1888, p. 6) expressed his belief that the bill changes color with different seasons, but he coupled this with a conviction of seasonal change in plumage, too. I think that there can be no doubt that changing color in the bill is partly with age and partly with the seasons. With age in that the juvenal bill is pale colored in both sexes; in breeding birds (both sexes) the bill becomes black, reverting to a pale color at the close of each breeding season. In this conviction I have been careful to give the details of conditions in every series, so that others can weigh the evidence for themselves. The nesting season with these birds seems to be for the most part from early November to early April, and black-billed birds are almost invariably collected at that time. There are some slight discrepencies, but they may be explained as due to variations in the breeding season upon different islands, or it

may be the case that all individuals upon one island are not engaged in breeding activities throughout the entire length of the extended nesting period. At any rate, every one of the many specimens that are marked as associated with nest or eggs has a black bill. There is this further qualification to be made, too, that in the larger billed birds (such as *magnirostris*) the bill rarely becomes entirely pale colored in the adult, retaining a partly dusky appearance throughout the year, though much less black after the close of the nesting season.

It seems evident that, following the post-juvenal molt, there is but one molt during the year, in the period immediately following the nesting season, during April and May for the most part. The post-juvenal molt takes place at about the same time. Allowing for different breeding seasons, this is a condition common to many Passerine birds.

Regarding the relationships of the Geospizidæ to other groups elsewhere (American or Polynesian), as to position of the family in the general scheme of avian classification, I have no new ideas to offer. It seems to me that the statement of Rothschild & Hartert (1899, p. 153) that "the South American members of the genus *Guiraca* . . . are . . . the nearest relations to *Geospiza*" has no more to support it than incidental resemblance in shape of bill between certain species of the two groups, and can be dismissed with exactly the words those authors (*loc. cit.*) use in denying such relationship between *Geospiza* and some Hawaiian birds: "The resemblance with certain thick-billed Hawaiian finches, such as *Telespiza*, cannot have any serious consideration, as indicative of real relationship." Salvin's (1876, p. 488) assertion of resemblance between *Camarhynchus* and the Peruvian genus *Neorhynchus* has been denied by Ridgway (1897, p. 466), presumably on good ground; and Lucas' (1894) and Ridgway's (1897) assignment of *Certhidea* to the Mniotiltidæ seems to me to be a mistake. It will be noted that the above mentioned claims of relationship imply different mainland sources of origin for at least three of the genera of Geospizidæ. My own view is of close relationship between these several genera, so close as to imply their differentiation after the establishment of the ancestral Geospizid upon the Galapagos. It seems to me that the clue to the question may be found in the genus *Pinaroloxias*, which, as pointed out by Ridgway (1897, p. 466, footnote), offers various significant

facts in its specific characters and in its geographic location. This form, indubitably of the Geospizidæ, is, according to Ridgway, suggestive of certain West Indian Cœrebidæ in some respects, and its habitat, Cocos Island, is on a line of drift-sweeping currents known to extend from Panama southward toward the Galapagos.

Melanism in the Geospizidæ is probably a group character, and not a result of some peculiarity in the island environment. Though conspicuous in this one dominant group of birds, and also in the *Buteo* of the Galapagos, it does not commonly occur in other species. In fact, melanism might well be expected here in *Pyrocephalus*, as it occurs in a form of that genus in Peru, on the adjacent coast of South America. Its non-appearance in the Galapagos species may be interpreted as being due to their having a different origin, and also as indicating the absence from the Galapagos environment of any favorable stimulus to that condition.

Next to the Geospizids the most important bird group is the genus *Nesomimus* (Mockingbirds), peculiar to the Galapagos and distributed throughout the archipelago. There are four distinct species, three of them each restricted to one large island with its nearby islets, the fourth divided into a number of recognizable subspecies and distributed over many islands. The three first mentioned occur upon three large islands at the southeastern extremity of the archipelago, islands that are nearer to each other than to the rest of the group. Another variable genus is *Pyrocephalus* (Vermilion Flycatchers), which has developed one sharply distinguished species upon Chatham Island, a slightly variable species over the rest of the archipelago.

Then there are various other bird groups, mostly representatives of mainland genera, but nearly all distinct and sharply differentiated species, restricted to the Galapagos and showing various peculiarities of distribution. In several cases these are divided into clearly differentiated varieties upon different islands, and in nearly every other species there can be found upon one island or another some slight departure from the mode of its kind. I cannot see in the different bird groups any conformity in the ways in which species and subspecies of each have been developed. On the contrary, it looks much more as though the Geospizidæ, *Nesomimus* and *Pyrocephalus*, for example, had obtained their first foothold in the Galapagos at different points, perhaps at different times, and had accordingly each produced their most strongly

differentiated forms where varied circumstances governed. It is certainly true of Chatham Island, though, that there have been more or less conspicuous developments there in many different species, some of which are uniform over other islands.

Most of the outlying islands are small, with relatively few species. Chatham, however, is one of the larger islands, it is on the edge of the archipelago and it is rather remote from the others. As with the other large islands it has more bird species than the smaller islands, and as with the other outlying islands (all of which are much smaller) it has a large proportion of forms peculiar to itself. *Nesomimus*, *Certhidea*, and *Pyrocephalus* have all produced strongly characterized Chatham Island species. *Camarhynchus parvulus* and *Cactospiza pallida* have differentiated to the point where they can be accorded subspecific recognition, while *Butorides sundevalli*, *Myiarchus magnirostris*, and *Geospiza scandens intermedia*, all exhibit tendencies, not so far advanced, toward the development of certain characters peculiar to this one island.

In conclusion it may be said, and most emphatically, that, despite the enormous collections already accumulated therefrom, the Galapagos Islands offer an unrivalled opportunity for further field work. I am not alluding to the chance of discovering additional un-named species, as can probably still be done, nor does it seem desirable to pursue general collecting on a large scale. The work I have in mind could, some of it, be done by the visiting collector, spending relatively few weeks upon the islands, but the most promising lines of investigation are such as might be taken up by some one who could devote a period of years to almost or entirely continuous residence there. If large series of any one species should be collected they should be of selected forms and from selected localities, to provide correlations with similarly large series taken twenty-five or thirty years ago. My idea, though, of the sort of collecting that would be most apt to yield valuable data at once, is as follows: Of specimens taken two or three months subsequent to the breeding season, young and old after the post-juvenal and annual molts, respectively, with ages definitely ascertained from anatomical evidence; of molting birds in considerable number; of paired birds, and of whole families, parents and well-grown young together; and of specimens preserved entire for dissection. Specimens of these sorts are very scarce in collections. Then, there is need of careful observations not entailing the killing of

the birds; of censuses upon different islands showing relative abundance of species, and, especially, the ratio of high-plumaged males; of evidence of any sort bearing upon the inter-relations in life of the many closely similar forms. Lines of inquiry almost without number would open up with the beginning of any investigations of such nature.

There is a great opportunity here for some one, in the life study of a group of island birds, the Geospizidæ, of highly peculiar development as a result of ages of isolation. The especial attraction about this particular group is that, instead of being rigidly dependent upon circumscribed conditions, the pampered and helpless heirs of a secluded heritage, such as are the Drepanids of the Hawaiian Islands, the Geospizids seem to be a particularly virile and aggressive stock. Although different lines of development are pushed to remarkable extremes, they have not been proved to be adaptations, and unlike forms apparently pursue very similar sorts of lives. Much might be learned from carefully directed observations of the living birds amidst natural surroundings, and perhaps of the same species in captivity.

Check-List of Galapagos Birds

1. Spheniscus mendiculus Sundevall
2. Diomedea irrorata Salvin
3. Pterodroma phæopygia (Salvin)
4. Puffinus obscurus subalaris Ridgway
5. Procellaria tethys (Bonaparte)
6. Oceanodroma castro (Harcourt)
7. Oceanites gracilis galapagoensis Lowe
8. Phaëthon æthereus Linnæus
9. Pelecanus occidentalis Linnæus
10. Sula piscator websteri Rothschild
11. Sula dactylatra granti Rothschild
12. Sula nebouxii Milne-Edwards
13. Nannopterum harrisi (Rothschild)
14. Fregata magnificens Mathews
15. Fregata minor ridgwayi Mathews
16. Ardea herodias cognata Bangs
17. Casmerodius egretta (Gmelin)
18. Butorides sundevalli Reichenow
19. Nyctanassa violacea pauper (Sclater & Salvin)
20. Phœnicopterus ruber Linnæus
21. Querquedula discors (Linnæus)
22. Pæcilonitta galapagensis Ridgway
23. Buteo galapagoensis (Gould)
24. Pandion haliaëtus carolinensis (Gmelin)

25. Creciscus spilonotus (Gould)
26. Gallinula chloropus cachinnans Bangs
27. Hæmatopus palliatus galapagensis Ridgway
28. Squatarola squatarola (Linnæus)
29. Charadrius semipalmatus Bonaparte
30. Arenaria interpres interpres (Linnæus)
31. Pisobia bairdii (Coues)
32. Pisobia minutilla (Vieillot)
33. Crocethia alba (Pallas)
34. Tringa solitaria Wilson
35. Catoptrophorus semipalmatus inornatus (Brewster)
36. Heteroscelus incanus (Gmelin)
37. Actitis macularia (Linnæus)
38. Numenius hudsonicus Latham
39. Himantopus mexicanus (Müller)
40. Lobipes lobatus (Linnæus)
41. Steganopus tricolor Vieillot
42. Stercorarius pomarinus (Temminck)
43. Larus fuliginosus Gould
44. Larus pipixcan Wagler
45. Creagrus furcatus (Neboux)
46. Sterna fuscata crissalis (Lawrence)
47. Anous stolidus galapagensis Sharpe
48. Gygis alba (Sparrman)
49. Nesopelia galapagoensis galapagoensis (Gould)
50. Nesopelia galapagoensis exsul Rothschild & Hartert
51. Coccyzus melacoryphus Vieillot
    [Coccyzus ferrugineus Gould. *Cocos Id.*]
52. Tyto punctatissima (Gray)
53. Asio galapagoensis (Gould)
54. Myiarchus magnirostris (Gray)
55. Pyrocephalus nanus nanus Gould
56. Pyrocephalus nanus intercedens Ridgway
57. Pyrocephalus dubius Gould
    [Nesotriccus ridgwayi Townsend. *Cocos Id.*]
58. Progne modesta (Neboux)
59. Hirundo erythrogaster Boddaert
60. Nesomimus trifasciatus (Gould)
61. Nesomimus macdonaldi Ridgway
62. Nesomimus melanotis (Gould)
63. Nesomimus parvulus parvulus (Gould)
64. Nesomimus parvulus barringtoni Rothschild
65. Nesomimus parvulus bindloei Ridgway
66. Nesomimus parvulus personatus Ridgway
67. Nesomimus parvulus wenmani Swarth
68. Nesomimus parvulus hulli Rothschild
69. Nesomimus parvulus bauri Ridgway
70. Dendroica petechia aureola (Gould)
71. Dolichonyx oryzivorus (Linnæus)
72. Geospiza magnirostris Gould
73. Geospiza fortis Gould
74. Geospiza fuliginosa fuliginosa Gould
75. Geospiza fuliginosa minor Rothschild & Hartert

76. Geospiza acutirostris Ridgway
77. Geospiza difficilis Sharpe
78. Geospiza debilirostris Ridgway
79. Geospiza septentrionalis septentrionalis Rothschild & Hartert
80. Geospiza septentrionalis nigrescens Swarth
81. Geospiza scandens scandens (Gould)
82. Geospiza scandens intermedia Ridgway
83. Geospiza scandens abingdoni Sclater & Salvin
84. Geospiza scandens rothschildi Heller & Snodgrass
85. Geospiza conirostris conirostris Ridgway
86. Geospiza conirostris propinqua Ridgway
87. Platyspiza crassirostris (Gould)
88. Camarhynchus psittacula Gould
89. Camarhynchus habeli Sclater & Salvin
90. Camarhynchus affinis Ridgway
91. Camarhynchus pauper Ridgway
92. Camarhynchus parvulus parvulus Gould
93. Camarhynchus parvulus salvini Ridgway
94. Camarhynchus aureus Swarth
95. Camarhynchus conjunctus Swarth
96. Cactospiza pallida pallida (Sclater & Salvin)
97. Cactospiza pallida producta (Ridgway)
98. Cactospiza pallida striatipecta Swarth
99. Cactospiza giffordi Swarth
100. Cactospiza heliobates (Snodgrass & Heller)
101. Certhidea olivacea Gould
102. Certhidea fusca Sclater & Salvin
103. Certhidea becki Rothschild
104. Certhidea mentalis Ridgway
105. Certhidea ridgwayi Rothschild & Hartert
106. Certhidea luteola Ridgway
107. Certhidea cinerascens Ridgway
108. Certhidea bifasciata Ridgway

[Pinaroloxias inornata (Gould) *Cocos Id.*]

Accounts of the Species

1. Spheniscus mendiculus Sundevall

Spheniscus mendiculus Sundevall, 1871, pp. 126, 129 (James Id.; orig. descr.).—Salvin, 1876, p. 508, pl. 89.—Wolf, 1879, p. 297 (41) (Charles Id.).—Ridgway, 1890, p. 119 (Albemarle Id.); 1897, p. 660 (map of range).—Ogilvie-Grant, 1898, p. 653.—Rothschild & Hartert, 1899, p. 199 (Albemarle, Duncan and Brattle); 1902, p. 416.—Snodgrass & Heller, 1904, p. 235 (Seymour, Albemarle, Narboro; Wenman? Habits).—Gifford, 1913, p. 16, pl. 1, fig. 1 (Charles, Duncan, South Seymour, James, Narborough, Albemarle, Jervis, Onslow. Habits, description, measurements, etc.).—Gyldenstolpe, 1927, p. 106 (particulars of type specimen, in Royal Natural History Museum, Stockholm).

Spheniscus humboldtii Townsend, 1927, p. 509, pl. xxviii (actions in captivity).

Spheniscus mendiculus Sundevall

Type.—Royal Natural History Museum, Stockholm, no. 9797; ♂ ad.; James Island; May 10, 1852; "Eugenie" expedition.

Habitat.—Vicinity of Galapagos Archipelago.

The Academy expedition of 1905-1906 collected 17 specimens (nos. 338-354). On a subsequent visit to the Galapagos by members of the Academy staff in December, 1927, and January, 1928, two adult male penguins were brought home alive. These lived for some months in the Steinhart Aquarium, dying, respectively, on July 7 and October 15, 1928, when they were preserved as study skins (nos. 31709, 31743).

2. Diomedea irrorata Salvin

"Two kinds of Albatrosses" Habel, *in* Salvin, 1876, p. 458, in text (Hood Id.).

Diomedea exulans Wolf, 1879, p. 269 (13), in text.

Diomedea irrorata Salvin, 1883, p. 430 (orig. descr.; "Callao Bay, Peru, December 1881."); 1896, p. 445, pl. viii.—Rothschild & Hartert, 1899, p. 192 (habits, descr., etc.); 1902, p. 414 (habits).—Godman, 1907-1910 (1910), p. 330, pl. 93 (mon.).—Snodgrass & Heller, 1904, p. 240 (descr. eggs, etc.).—Loomis, 1918, p. 75, pls. 6-12 (distr., habits, meas., etc.); 1919, p. 370, pls. 14-16 (variation).—Beebe, 1926, pp. 105, *et seq.*, 433, pls. (nesting habits).

? *Diomedea exulans* Ridgway, 1897, p. 646.

? *Diomedea nigripes* Ridgway, 1897, p. 647.

Diomedea irrorata Salvin

Type.—British Museum, no. 88.5.18.165; ♂ ad.; Callao Bay, Peru; December, 1881; Captain A. H. Markham.

Habitat.—Known to nest only on Hood Island, Galapagos Archipelago; extent of migrations elsewhere unknown, but occasionally, at least, to the adjacent coast of South America.

Seventy-three specimens were collected by the Academy expedition (nos. 1174-1246).

3. Pterodroma phæopygia (Salvin)

Œstrelata phæopygia Salvin, 1876, p. 507, pl. 88, fig. 1 (Chatham Id., Galapagos Archipelago; orig. descr.); 1896, p. 407.—Godman, 1907-1910 (1908), p. 207, pl. 56 (mon.).

Æstrelata phæopygia Ridgway, 1897, p. 648.—Rothschild & Hartert, 1899, p. 198; 1902, p. 414.—Snodgrass & Heller, 1904, p. 242.

Pterodroma phæopygia Loomis, 1918, p. 97 (description, measurements, distribution, etc., Hawaiian and Galapagos birds declared to be indistinguishable).

Œstrelata phæopygia Salvin

Cotype.—British Museum, no. 59.1.31.20; ad., sex?; Chatham Island*

Cotype.—British Museum, no. 59.1.31.21; ad; sex?; Chatham Island.

Both received from Captain Kellett and Lieutenant Wood, as entered in the "Catalogue of Birds" (vol. XXV, p. 407), though no such notation is made upon the labels. No. 59.1.31.20 now carries a red "type label;" the description was based upon both skins.

Habitat.—The Galapagos Archipelago; ? Hawaiian Islands. Extent of migration unknown.

The Academy expedition collected 181 specimens (nos. 928-1108).

4. Puffinus obscurus subalaris Ridgway

Puffinus obscurus Salvin, 1883, p. 431 (Charles Id.); 1896, p. 382.—Loomis, 1918, p. 122 (descr., habits, meas., crit.).

Puffinus subalaris Ridgway (ex Townsend MS.), 1897, p. 650 (Dalrymple Rock, Chatham Id.; orig. descr.).—Godman, 1907-1910 (1908), p. 117 (mon.).

Puffinus obscurus subalaris Rothschild & Hartert, 1899, p. 194; 1902, p. 241.—Snodgrass & Heller, 1904, p. 241.

Puffinus lherminieri subalaris Mathews, 1912, p. 70 (southern part of Galapagos Archipelago).

Puffinus lherminieri becki Mathews, 1912, p. 70 (Culpepper and Wenman islands).

Puffinus tenebrosus Townsend, 1890, p. 142; 1895, p. 126.

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*With original label of either Kellett or Wood. Marked "type" in Salvin's handwriting. N.B.K.

PUFFINUS SUBALARIS Ridgway

Type.—United States National Museum, no. 117472; ♂ ad.; Dalrymple Rock, Chatham Island; April 6, 1888; C. H. Townsend.

PUFFINUS LHERMINIERI BECKI Mathews

Type.—Rothschild Museum; ♀ ad.; Culpepper Island; July 27, 1895; C. M. Harris (Webster-Harris expedition); orig. no. 184.

HABITAT.—Breeding upon the Galapagos Islands. Extent of migration elsewhere unknown.

The Academy expedition collected 109 specimens (nos. 814-922).

5. Procellaria tethys (Bonaparte)

Thalassidroma Tethys Bonaparte, 1853, p. 47 ("noch kleiner, als die *pelagica* ex Insulis Gallapagoes."). [See also Mathews, 1925, p. 12.]

Procellaria tethys Salvin, 1876, p. 507, pl. 88, fig. 2; 1896, p. 346.—Townsend, 1895, p. 126 (off Chatham Id. and 400 miles east of Galapagos Islands).—Ridgway, 1897, p. 656.—Rothschild & Hartert, 1899, p. 199; 1902, p. 416.—Snodgrass & Heller, 1904, p. 242.—Godman, 1907-1910 (1907), p. 4, pl. 2 (mon.).

Oceanodroma tethys Loomis, 1918, p. 151 (monograph).

HABITAT.—Breeds upon the Galapagos Islands. Its range "extends over the intertropical seas contiguous to the American west-coast" (Loomis, 1918, p. 152).

The Academy expedition collected 92 specimens (nos. 355-446).

6. Oceanodroma castro (Harcourt)

Oceanodroma cryptoleucura Townsend, 1895, p. 125 (Wenman Id.).—Salvin, 1896, p. 350.—Ridgway, 1897, p. 654.—Rothschild & Hartert, 1899, p. 198.—Snodgrass & Heller, 1904, p. 243.

Oceanodroma castro Rothschild & Hartert, 1902, p. 415.—Loomis, 1918, p. 156 (habits, meas., crit., etc.).—Godman, 1907-1910 (1907), p. 15, pl. 5 (mon.).

Oceanodroma castro bangsi Nichols, 1914, p. 388 ("Type. No. 12413. Collection of E. A. and O. Bangs. ♀. Collected 1° N. 93° W., February 6, 1901, by R. H. Beck.").—Bangs, 1930, p. 172 (particulars of type specimen, in Museum of Comparative Zoology).

OCEANODROMA CASTRO BANGSI Nichols

Type.—Museum of Comparative Zoology, no. 112413; ♀; Galapagos Islands, long. 93° W.; February 6, 1901; R. H. Beck.

HABITAT.—Vicinity of Galapagos Islands. Tropical and temperate seas, both in the Atlantic and Pacific.

The Academy expedition collected 35 specimens (nos. 485-488, 490-520).

7. Oceanites gracilis galapagoensis Lowe

Oceanites gracilis Ridgway, 1897, p. 658.—Rothschild & Hartert, 1899, p. 198; 1902, p. 416.—Snodgrass & Heller, 1904, p. 243.——Godman, 1907-1910 (1907), p. 48, pl. 13 (mon.).—Loomis, 1918, p. 180 (meas., molt, occurrence, etc.).

Oceanites gracilis galapagoensis Lowe, 1921, p. 140 (Charles Id.; orig. descr.).

Oceanites gracilis galapagoensis Lowe

Type.—British Museum, no. 99.9.1.523; ♂ ad.; Charles Island; November 4, 1897; Webster-Harris expedition.

Habitat.—Galapagos Archipelago.

The Academy expedition collected 87 specimens (nos. 659-745), all from the Galapagos. There is no material from other points available for comparison.

8. Phaëthon æthereus Linnæus

Phaeton æthereus Salvin, 1876, p. 497 (Tower Id.).

Phaethon æthereus Ridgway, 1897, p. 600.—Rothschild & Hartert, 1899, p. 180 (Tower, Hood, Gardner and Culpepper islands); 1902, p. 409 (habits).—Snodgrass & Heller, 1904, p. 244.—Beck, 1904, p. 10, fig. (habits).—Gifford, 1913, p. 104 (throughout the Galapagos Archipelago).

Phaethon æthereus limatus Peters, 1930, p. 261 (Tower Island).

Phaethon æthereus limatus Peters

Type.—Museum of Comparative Zoology, no. 65699; ♂ ad.; Tower Island; September 3, 1891; George Baur.

Habitat.—Both coasts of tropical America.

The Academy expedition collected 78 specimens (nos. 2715-2792).

9. Pelecanus occidentalis Linnæus

Pelecanus fuscus Sundevall, 1871, pp. 125, 129.—Salvin, 1876, p. 496; 1883, p. 427 (Charles Id.).—Gifford, 1913, p. 107 (distr. in the Galapagos, habits, meas., etc.).

Pelecanus fuscus californicus Ridgway, 1897, p. 593.—Rothschild & Hartert, 1899, p. 176 (crit.; nest and eggs); 1902, p. 406 (nesting).

Pelecanus californicus Ridgway, 1890, p. 113 (Chatham Id.).—Grant, 1898, p. 478.—Snodgrass & Heller, 1904, p. 251 (distr. in Galapagos, colors of soft parts, meas., etc.).

HABITAT.—Coast of South Carolina south to Brazil, northern Peru and the Galapagos Islands.

The Academy expedition collected 10 specimens (nos. 2793-2802). Breeding adults from the Galapagos Islands have the neck light reddish in color, as compared with blackish in Californian and Lower Californian birds (*Pelecanus californicus*), which, according to Brewster (1902, p. 38), is one of "the most striking points of distinction between the two species."

10. Sula piscator websteri Rothschild

Sula piscator Ridgway, 1897, p. 598.
Sula websteri Rothschild, 1898a, p. lii (orig. descr.).—Beck, 1904, p. 8 (habits).
Sula piscatrix websteri Rothschild & Hartert, 1899, p. 177; 1902, p. 406.—Snodgrass & Heller, 1902, p. 515 (Cocos and Galapagos); 1904, p. 246.
Sula piscatrix Gifford, 1913, p. 85, pl. V, fig. 1 (occurrence on Galapagos, habits, meas., etc.).

HABITAT.—"Clarion Island, Galapagos, and the neighboring seas" (Rothschild, 1898).

The Academy expedition collected 58 specimens (nos. 2408-2465).

11. Sula dactylatra granti Rothschild

Dysporus cyanops Sundevall, 1871, p. 125 (Galapagos Islands).
Sula cyanops Salvin, 1883, p. 427 (Charles Id.).—Ridgway, 1897, p. 595.
Sula variegata Rothschild & Hartert, 1899, p. 178; 1902, p. 407.—Snodgrass & Heller, 1904, p. 244.—Gifford, 1913, p. 89.
Sula granti Rothschild, 1902b, p. 7 (orig. descr.).
Sula dactylatra granti Rothschild, 1915, p. 44.—Hartert, 1925, p. 274 (particulars of type specimen, in Rothschild Museum).

SULA GRANTI Rothschild

Type.—Rothschild Museum; ♀ad.; Culpepper Island; July 29, 1897; F. P. Drowne (Webster-Harris expedition); orig. no. 126.

HABITAT.—Galapagos Islands.

The Academy expedition collected 69 specimens (nos. 2466-2534).

12. Sula nebouxii Milne-Edwards

Sula nebouxii Ridgway, 1897, p. 596 (distr. in Galapagos Ids., descr., etc.).
Sula nebouxi Grant, 1898, p. 435.—Rothschild & Hartert, 1899, p. 178 (distr. in Galapagos, eggs, etc.); 1902, p. 407.—Snodgrass

& Heller, 1904, p. 248.—Beck, 1904, p. 6, fig. (habits.)—Gifford, 1913, p. 93, pl. 5, fig. 2 (plumages, eggs, meas., crit.).
Sula gossi Ridgway, 1890, p. 114, (Chatham Id.).
? *Dysporus leucogaster* Sundevall, 1871, p. 125.
? *Sula leucogaster* Salvin, 1876, p. 496.
? *Sula brewsteri* Ridgway, 1897, p. 597, part (Galapagos occurrences). —Rothschild & Hartert, 1899, p. 179.

Habitat.—Gulf of California and southward to Galapagos Islands and coast of Chili.

The Academy expedition collected 65 specimens (nos. 2535-2599).

Genus Nannopterum Sharpe

Nannopterum Sharpe, Hand-list of the Genera and Species of Birds, vol. 1, 1899, p. 235. (Type, *Phalacrocorax harrisi* Rothschild.)

13. Nannopterum harrisi (Rothschild)

Phalacrocorax harrisi Rothschild, 1898a, p. lii (Narborough Id.; orig. descr.).—Ogilvie-Grant 1898, p. 655.—Rothschild & Hartert, 1899, p. 179; 1902, p. 408, pl. X (habits).—Gadow, 1902, p. 169, pls. XIV-XV (osteology).—Beck, 1902, p. 20, text fig. (habits).—Snodgrass & Heller, 1904, p. 249 (habits, eggs, etc.). —Hartert, 1925, p. 274 (particulars of type specimen, in Rothschild Museum).
Nannopterum harrisi Gifford, 1913, p. 80 (habits, nesting, meas., etc.).—Shufeldt, 1915, pp. 86-114, pls. XV-XIX (osteology).

Phalacrocorax harrisi Rothschild

Type.—Rothschild Museum ♂ (not fully adult); Narborough Island; December 6, 1897; C. D. Hull (Webster-Harris expedition); orig. no. 2879.

Habitat.—Galapagos Archipelago, where it is almost, or entirely, confined to the coast of Narborough and the adjacent coast of Albemarle Island.

The Academy expedition of 1905-1906 collected 27 specimens (nos. 2354-2380). On a later visit to the Galapagos by members of the Academy staff, five more were collected (one, entire, in alcohol), at Tagus Cove, Albemarle Island, December 12, 1927 (nos. 31338-31342).

14. Fregata magnificens Mathews

Fregata aquila Gould, 1841, p. 146, part ?.—Salvin, 1876, p. 497, part ? (Tower Id.).—Ridgway, 1897, p. 590.—Rothschild & Hartert, 1899, p. 175, part; 1902, p. 405, part ?.—Snodgrass & Heller, 1902, p. 516, part; 1904, p. 252, part.—Gifford, 1913, p. 100, pls. VI, VII, part.

Tachypetes aquilus Sundevall, 1871, p. 125, part.
Fregata minor magnificens Mathews, 1914, p. 120 (orig. descr.; "Barrington, Indefatigable, Albemarle Islands, etc.").—Hartert, 1925, p. 274 (particulars of type specimen, in Rothschild Museum).
Fregata magnificens Rothschild, 1915, p. 145.
Fregata magnificens magnificens Lowe, 1924, p. 303.

FREGATA MINOR MAGNIFICENS Mathews

Type.—Rothschild Museum; ♂ ad.; Barrington Island; July 8, 1891; Dr. G. Baur; orig. no. 259.

15. Fregata minor ridgwayi Mathews

Fregata aquila Gould, 1841, p. 146, part ?—Salvin, 1876, p. 497, part ? (Tower Id.).—Rothschild & Hartert, 1899; p. 175, part; 1902, p. 405, part? (Culpepper, Wenman and Tower islands, nesting).—Snodgrass & Heller, 1902, p. 516, part; 1904, p. 252, part.—Gifford, 1913, p. 100, pls. VI, VII, part.
Tachypetes aquilus Sundevall, 1871, p. 125, part.
Fregata aquila minor Ridgway, 1897, p. 591.
Fregata minor ridgwayi Mathews, 1914, p. 120 (orig. descr.; "Culpepper and Wenman Islands").—Rothschild, 1915, p. 145.—Lowe, 1924, p. 306, *et seq.*—Hartert, 1925, p. 275 (particulars of type specimen, in Rothschild Museum).

FREGATA MINOR RIDGWAYI Mathews

Type.—Rothschild Museum; ♂ ad.; Culpepper Island; July 27, 1897; C. M. Harris (Webster-Harris expedition); orig. no, 194.

In the Academy's series of *Fregata* from the Galapagos Islands it is easily possible to differentiate the species *minor* and *magnificens*, easily, that is, as regards the adults and some immatures, inferentially as regards most of the young birds. The characters pointed out by Mathews (1914), and especially by Lowe (1924), are readily apparent. This series of *Fregata* was reported upon by Gifford (1913, p. 100), as regards life history and habits, and, as it happens, he gives colors of some of the "soft parts" of birds from two different islands. The observed variations he ascribes, inferentially at least, to the one lot being in breeding, the other in non-breeding, condition, but the two lots, according to my view, are of two species. He remarks that "the colors of the naked parts of birds taken on Hood [= *F. minor ridgwayi*] . . . . were as follows: Orbital ring black in adult males, red in adult females, and pale blue in immature birds. Bills were pale blue in all but adult males." Three adults taken at Academy Bay, Indefatigable Island, in July [= *F. magnificens*] were thus described: "Two were adult females with orbital rings dark blue, gular sacs purplish, and feet red. The remaining bird, an adult male, had a bright

SPECIMENS OF *Fregata magnificens* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

Number	Sex and age	Locality	Date
2678	♂ ad.	Indefatigable	July 21, 1906
2681	♂ ad.	Indefatigable	July 16, 1906
2707	♂ im.	South Albemarle	April 27, 1906
2680	♀ ad.	Indefatigable	July 20, 1906
2684	♀ ad.	Indefatigable	July 17, 1906
2688	♀ ad.	Duncan	Dec. 14, 1905
2686	♀ ad.	Duncan	Dec. 12, 1905
2687	♀ ad.	Hood	Sept. 28, 1905

SPECIMENS OF *Fregata minor ridgwayi* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

Number	Sex and age	Locality	Date
2679	♂ ad.	Hood	June 25, 1906
2683	♂ ad.	Hood	June 28, 1906
2689	♀ ad.	Hood	June 25, 1906
2690	♀ ad.	Hood	June 28, 1906
2692	♀ ad.	Hood	June 28, 1906
2693	♀ ad.	Hood	July 2, 1906
2694	♂ im.	Hood	July 2, 1906
2697	♂ im.	Hood	July 2, 1906
2700	♂ im.	Hood	July 2, 1906
2695	♂ im.	Hood	Sept. 28, 1905
2698	♂ im.	Hood	Sept. 28, 1905
2702	♂ im.	Hood	Sept. 28, 1905
2703	♂ im.	Hood	Sept. 28, 1905
2708	♂ im.	Hood	Sept. 28, 1905
2701	♂ im.	Lat. 14°11′N. Lat. 109°20′W.	Oct. 9, 1906
2696	♀ im.	Hood	June 28, 1906
2699	♀ im.	Hood	June 28, 1906
2706	♀ im.	Hood	June 28, 1906
2691	♀ im.	Hood	Sept. 28, 1905
2704	♀ im.	Brattle	Oct. 30, 1905
2705	♀ im.	Hood	July 2, 1906
2709	♂ nat.	Hood	Sept. 28, 1905
2710	♂ nat.	Hood	Sept. 28, 1905
2711	♀ nat.	Hood	June 25, 1906
2712	? nat.	Hood	June 25, 1906
2713	? nat.	Hood	June 25, 1906
2714	? nat.	Hood	June 25, 1906

red gular sac." The red feet of the adult female *magnificens* remain a distinguishable character of the specimens to the present time, twenty-five years after the birds were collected.

Both forms apparently occur throughout the Archipelago, but nothing is known as to the degree to which breeding colonies of the two are segregated, whether upon different islands, upon different parts of the same island, or whether individuals of both species nest side by side. From the localities of capture of the Academy series there is suggested general segregation of the two, with occasional individuals of each wandering into the territory of the other.

The Academy series includes 8 specimens of *magnificens* and 27 of *ridgwayi* (nos. 2678-2714).

16. Ardea herodias cognata Bangs

Ardea herodias Gould, 1841, p. 128.—Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).—Salvin, 1876, p. 497.—Ridgway, 1890, p. 114 (Duncan Id.).—Sharpe, 1898, p. 80, part.—Rothschild & Hartert, 1899, p. 180 (Albemarle and Indefatigable islands); 1902, p. 410 (eggs).—Snodgrass & Heller, 1904, p. 254 (Seymour, Indefatigable, Duncan, Albemarle and Narborough; descr. nest and eggs).—Gifford, 1913, p. 58 (James, Duncan, Seymour, Indefatigable, Albemarle, Narborough, Charles, Hood and Chatham islands).

?*Ardea herodias* Ridgway, 1897, p. 601 (crit.).

Ardea herodias cognata Bangs, 1903, p. 100 (Indefatigable Id.; orig. descr.); 1930, p. 180 (particulars of type specimen, in Museum of Comparative Zoology).—Oberholser, 1912, p. 549 (monograph of the species).

ARDEA HERODIAS COGNATA Bangs

Type.—Museum of Comparative Zoology, no. 112,451; Indefatigable Island; February 16, 1901; R. H. Beck.

SPECIMENS OF *Ardea herodias cognata* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

Number	Sex and age	Locality	Date
2014	♂ ad.	Indefatigable	July 16, 1906
2019	♂ ad.	Indefatigable	July 18, 1906
2016	♂ ad.	Indefatigable	July 23, 1906
2020	♂ ad.	S. Seymour	July 26, 1906
2018	♂ ad.	Albemarle	Aug. 10, 1906
2017	♀ ad.	Indefatigable	Oct. 27, 1905
2013	♀ ad.	Indefatigable	July 23, 1906
2021	♂ im.	Indefatigable	July 16, 1906
2022	♀ im.	Indefatigable	July 16, 1906
2015	— nat.	Indefatigable	Oct. 27, 1905

Habitat.—The Galapagos Archipelago, where it has been found on all the larger central and southern islands. So far not reported from Tower, Abingdon, Bindloe, Wenman and Culpepper.

17. Casmerodius egretta (Gmelin)

? *Herodias egretta* Ridgway, 1897, p. 601 (Albemarle Id., breeding).
Herodias egretta Rothschild & Hartert, 1899, p. 181 (Albemarle Id.).—Snodgrass & Heller, 1904, p. 254 (Albemarle Id.).—Gifford, 1913, p. 59 (Albemarle and Indefatigable islands).

Habitat.—Temperate and tropical America. In the Galapagos Archipelago it has thus far been reported only from Albemarle and Indefatigable islands.

The Academy expedition collected six specimens (nos. 2024-2029).

18. Butorides sundevalli Reichenow

Ardea Sundevalli Reichenow, 1877, p. 253.
Butorides sundevalli Sharpe, 1898, p. 185 (Charles and Indefatigable islands).—Gifford, 1913, p. 62 (distr., habits, crit., etc.).
Ardea plumbea Sundevall, 1871, pp. 125, 127 (orig. descr.; James Id.).
Butorides plumbeus Salvin, 1876, p. 497 (Indefatigable Id.); 1883, p. 428 (Charles Id.).—Ridgway, 1890, p. 114 (Hood, James, Duncan and Abingdon islands); 1897, p. 602.—Rothschild & Hartert, 1899, p. 181; 1902, p. 411.—Snodgrass & Heller, 1904, p. 255.
Butorides javanicus Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).

Ardea plumbea Sundevall

Type.—Royal Natural History Museum, Stockholm; Galapagos; May 10-15, 1852; "Eugenie" expedition.

This specimen was not entered in Gyldenstolpe's "Types of Birds in the Royal Natural History Museum in Stockholm", but I am informed by Dr. Lönnberg that it is in the collection, with data as given above.

Habitat.—The Galapagos Islands, where found practically throughout the Archipelago.

The Academy series numbers 102 specimens (nos. 2067-2168), as listed in the accompanying table.

There is a strong temptation to describe the Chatham Island bird as a subspecies distinct from typical *sundevalli*, as shown by the five skins in the Academy collection and two in the Rothschild

Museum. The differences are just those noted by Ridgway years ago (1897, p. 605), consisting of generally paler color in the Chatham Island specimens, with, on the fore neck, an accentuation of pale brown markings that are almost or entirely lacking on skins from other islands. One of the Chatham Island birds is slightly darker than the others, and there are two specimens in other series (one from Albemarle, one from Indefatigable) that approach the Chatham Island form in pallor. So I am refraining from affixing a name to this race, but it may be noted as illustrating an early stage of differentiation in an island population. Chatham Island has produced such a number of strongly marked forms among the variable species that it is not surprising to find one of the more stable species showing some change thereon.

SPECIMENS OF *Butorides sundevalli* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

	Male adult	Female adult	Male juv.	Female juv.
Abingdon	2	3	1	1
Bindloe		2		
James	3		1	
Jervis			1	
Duncan	2	1		
Narborough				1
Albemarle	5	3	1	2
Daphne	1	2		
Indefatigable	20	19	5	2
Seymour	1	2		1
Charles			1	
Barrington	1		1	
Gardner-near-Hood	4	2		1
Hood	3	1		1
Chatham	4	1		

19. Nyctanassa violacea pauper (Sclater & Salvin)

Nycticorax violaceus Gray, *in* Gould, 1841, p. 128 (a specimen from "the Gallapagos Archipelago").

Nycticorax pauper Sclater & Salvin, 1870, pp. 323, 327 (Indefatigable Id.; orig. descr.).—Salvin, 1876, p. 498 (Indefatigable and Bindloe islands).—Ridgway, 1890, p. 114 (Hood and Indefatigable islands).

Nyctanassa pauper Sharpe, 1898, p. 134, pl. I c (juv.).

Nyctanassa violacea paupera Rothschild & Hartert, 1902, p. 411 (Narborough Id.; descr. nest and eggs; crit.).

Ardea violacea Sundevall, 1871, pp. 125, 128.

Nyctanassa violacea Ridgway, 1897, p. 606 (crit.).—Rothschild & Hartert, 1899, p. 182.—Snodgrass & Heller, 1904, p. 255.—Gifford, 1913, p. 59, pl. II, fig. 1 (nest and eggs).

Nycticorax pauper Sclater & Salvin

Cotype.—British Museum, no. 1893.2.1.958; ♂ juv.; Indefatigable Island; August 30, 1868; Dr. A. Habel.*

Cotype.—British Museum, no. 93.2.1.957; ♂ juv.; Indefatigable Island; August 29, 1868; Dr. A. Habel.

Original description based upon both skins; no. 1893.2.1.958 now bears a red "type label."

Habitat.—The Galapagos Archipelago, where it has been found upon practically all of the islands except the two northernmost, Culpepper and Wenman.

The Academy expedition collected 33 specimens of this species in the Galapagos Archipelago, three on Cocos Island, and one on Socorro, of the Revillagigedo group (nos. 2030-2066). These birds were variously collected during every month of the year except January, April and May.

To my eye, the Galapagos birds, old and young, as compared with those from Cocos Island and Mexican localities, present obviously enough the characters that have been pointed out by others as distinguishing the subspecies *pauper* from typical *violacea* (see especially Rothschild & Hartert, 1902, p. 411). In addition it may be repeated (as pointed out by Gifford, *loc cit.*) that the Cocos Island specimens (including one in juvenal plumage) have notably heavy bills as compared with those at hand from the Galapagos, from the Revillagigedo Islands (5) and from the Mexican mainland (1). There is not sufficient material at hand for satisfactory comparison, but there is the suggestion of a distinguishable race upon Cocos Island.

Specimens of *Nyctanassa violacea pauper* in the Collection of the California Academy of Sciences

Locality	Male adult	Female adult	Male im.	Female im.	Male juv.	Female juv.
Abingdon	1					
Tower	1					
James				1		
Jervis	1	2				
Duncan			1			
Albemarle					3	2
Brattle	2					1
Indefatigable	3		1			2
Seymour						1
Hood	5	1	1			1
Gardner-near-Hood	1					1
Charles					1	

*The word "type" written on the label in Salvin's handwriting. N.B.K.

20. Phœnicopterus ruber Linnæus

Phœnicopterus ruber Salvin, 1876, p. 498.—Ridgway, 1890, p. 114 (James and Charles islands); 1897, p. 608 (Charles, James and Indefatigable islands; crit.).—Salvadori, 1895, p. 9 (Galapagos).—Rothschild & Hartert, 1899, p. 182 (Albemarle, Charles and James islands); 1902, p. 411 (eggs).—Snodgrass & Heller, 1904, p. 253 (Albemarle Id.).—Gifford, 1913, p. 66 (plumages, molt, meas., habits, etc.).

Phœnicopterus glyphorhynchus Gray, 1869, p. 442, pl. XIV, fig. 5 (orig. descr.; "Galapagos").

PHŒNICOPTERUS GLYPHORHYNCHUS Gray

Type.—British Museum, no. 50.1.31.114; ad., sex?; Galapagos; "Pres. by Kellett & Wood."

HABITAT.—Atlantic coast of subtropical and tropical America; in the Pacific, only in the Galapagos Archipelago.

The Academy series from the Galapagos consists of 70 specimens (nos. 2175-2244).

21. Querquedula discors (Linnæus)

Querquedula discors Gifford, 1913, p. 79.

HABITAT.—Temperate and tropical America.

The record of this species by Gifford (*loc. cit.*,) appears to be the only one from the Galapagos, where, however, it seemed to be of not unusual occurrence. The one specimen collected, an adult male (no. 2336), shows very strongly the white head markings which gave rise to the subspecific name *Querquedula discors albinucha* Kennard (from Louisiana), which fact suggests the inference that the individuals migrating to the Galapagos come from the southeastern portion of the species' breeding range.

22. Pæcilonitta galapagensis Ridgway

Pæcilonitta Bahamensis Gould, 1841, p. 135.

Dafila bahamensis Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).—Salvin, 1876, p. 499; 1883, p. 428 (Charles Id.).

Anas bahamensis Sundevall, 1871, p. 126.

Pœcilonetta bahamensis Gifford, 1913, p. 76 (occurrence, habits, meas., etc.).

Pœcilonetta galapagensis Ridgway, 1890, p. 115 (Charles Id.; orig. descr.); 1897, p. 612 (Albemarle, Duncan, Charles, Hood, Chatham, Barrington, Indefatigable, Jervis and Tower).—Salvadori, 1895, p. 284.

Pœcilonetta bahamensis galapagensis Rothschild & Hartert, 1899, p. 183; 1902, p. 411.—Snodgrass & Heller, 1904, p. 253.
Anas galapagensis Phillips, 1923, p. 351, pl. 41 (monograph).
Pœcilonitta galapagensis Bangs, 1918, p. 87.

PŒCILONETTA GALAPAGENSIS Ridgway

Type.—United States National Museum, no. 115931; ♂ ad.; Charles Island; April 8 (1888); U. S. Fish Commission, Voyage of Albatross.

HABITAT.—Galapagos Archipelago, where it has been found upon all but Narborough and the outlying northern islands. Specifically reported from Tower, James, Jervis, Duncan, Albemarle, Seymour, Indefatigable, Barrington, Chatham, Hood, and Charles.

The Academy expedition collected 91 specimens (nos. 2245-2335.)

Querquedula versicolor, an Argentine species, has been included in the Galapagos list upon the basis of a specimen recorded by Sundevall (*Anas maculirostris* Sundevall, 1871, p. 126). According to information received by me from Dr. Einar Lönnberg this bird, from the "Eugenie" expedition, is still extant, in the Royal Natural History Museum, Stockholm. It is labelled simply "Galapagos". While it is possible that this duck actually was taken in the archipelago, it seems more likely that this is another case (there are many among early maritime expeditions) where a specimen has been mistakenly attributed to a locality remote from where it was actually obtained. It seems to me an insufficient basis for inclusion of the species in the list of Galapagos birds.

23. Buteo galapagoensis (Gould)

Polyborus galapagoensis Gould, 1837, p. 9 ("In insulis Galapagorum.").
Craxirex galapagoensis Gould, 1841, p. 23, pl. II.—Sclater & Salvin, 1870, p. 323 (Indefatigable and Abingdon).
Buteo galapagoensis Ridgway, 1890, p. 113; 1897, p. 587.—Rothschild & Hartert, 1899, p. 174; 1902, p. 404.—Snodgrass & Heller, 1904, p. 264.—Swann, 1926, p. 351.
Buteo galapagensis Sundevall, 1871, pp. 125, 127.—Sharpe, 1874, p. 170.—Salvin, 1876, p. 495.—Gifford, 1919, p. 190 (habits).

POLYBORUS GALAPAGOENSIS Gould

Cotype.—British Museum, no. 55.12.19.202; (♂ ad.); "Galapagos Arch."; C. Darwin.

Cotype.—British Museum, no. 55.12.19.203; ♀juv.; "Galapagos Arch."; C. Darwin.

The two birds are apparently the originals of Gould's description and plate. No. 55.12.19.202 is now labelled as the "type."

Description.—First three primaries deeply emarginate. Sexes alike in color but female appreciably larger than male. *Adult*:

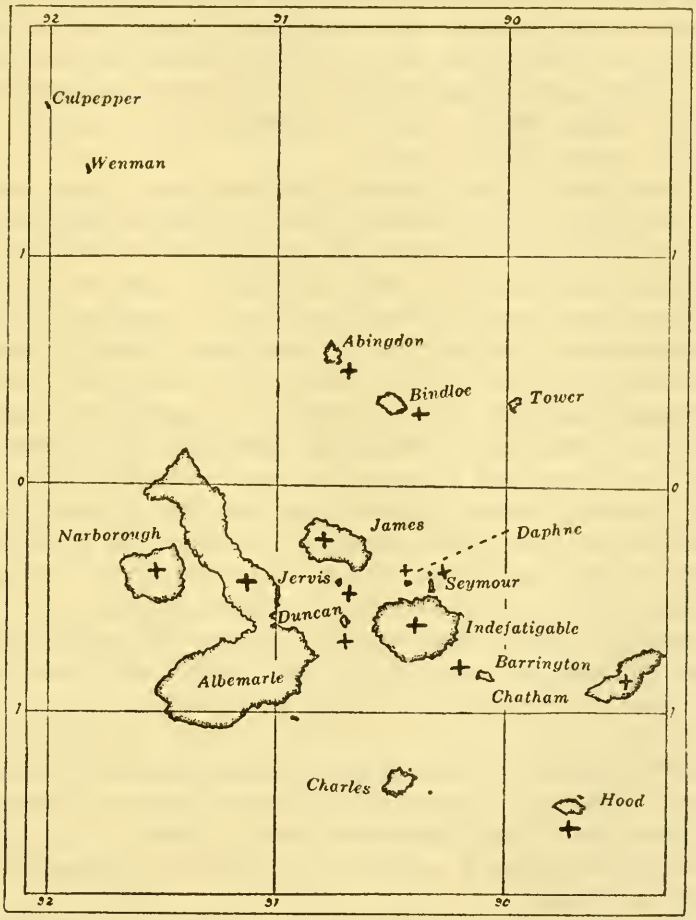


Fig. 1. Map showing distribution of *Buteo galapagoensis*. Symbols indicate islands where recorded.

Nearly uniform sooty brown, darkest (almost black) on head and dorsum, paler on belly and flanks, where the feathers are usually tipped with pale brown and sometimes barred with reddish. Under

tail coverts basally white, and variously barred with white and reddish brown. Flight feathers above blackish brown, darker than coverts; on under surface primaries and secondaries are dusky at the tip, grayish to almost white basally, the inner webs marked with broken bars and frecklings of brown or gray. Upper tail coverts barred (mostly on outer web) with white and dark brown. Tail feathers above sometimes brownish gray, sometimes distinctly hoary, crossed by about nine dusky bars; toward the base bars and ground color merge into a freckling of brownish and hoary gray. Bar at tip of tail broadest, and narrowly margined by a terminal dirty whitish edge. Tail feathers below grayish, with dusky cross bars fairly distinct.

Young (sexes alike): Ground color above sooty brown, broken everywhere by streaks, subbasal spots, or marginal edges to the feathers, of buffy or whitish. Wings about as in the adult, but with more or less buffy or reddish markings on the coverts. Tail feathers hoary gray on central pair and on outer webs of the others, distinctly reddish brown on inner webs, crossed by nine or ten dusky bars, much as in the adult. Tail coverts mostly reddish on exposed portions, whitish elsewhere, and barred with irregular dusky cross markings. Under parts (including sides of head and neck) ochraceous-buff in varying degrees of intensity, with a variable amount of streaks, blotches, and tear shaped spots of dark sooty brown, these largest, sometimes confluent over considerable areas, on flanks and belly. Thighs, under tail coverts and under wing coverts transversely barred with reddish brown.

Nestlings with the above described plumage not entirely acquired have the head and parts of the body clothed with white down. Presumably the natal down is white throughout.

Habitat.—The Galapagos Archipelago, where reported from the following islands: Bindloe, Abingdon, James, Jervis, Duncan, Albemarle, Narborough, Indefatigable, Daphne, Seymour, Barrington, Chatham, Hood and Gardner-near-Hood. Gifford (1919, p. 190) definitely states that it was not seen on Charles, Culpepper, Wenman, and Tower.

The Academy series contains 92 specimens (nos. 2803-2894). There is as yet no definite proof as to whether the two types of coloration in this species are or are not indicative of different ages, or if they are individual variations (color phases) that persist unchanged throughout the life time of the individual. Such

evidence as we have tends to show that the streaked plumage pertains to the young, the dark plumage to the fully mature bird, but the evidence is not conclusive.

Nestlings in the collection are in the streaked plumage, none of the dark colored birds show signs of immaturity, dark colored birds have been found with nests (Gifford, 1919, p. 191; also Gifford, MS), and thus far streaked birds have not been found nesting. The Galapagos hawk is very like *Buteo swainsoni* (which has light and dark color phases in the adult stage), and the streaked plumage of *B. galapagoensis* is very similar to the young plumage of *B. swainsoni* (which differs from either adult phase). I am not aware that young *swainsoni* is ever uniformly dark colored. Reasoning from analogy (it is not conclusive), I would infer that the young *Buteo galapagoensis* is always streaked, upon a buffy ground color, and that the fully mature bird is always dark colored throughout. Of most North American hawks the immature plumage is carried through the second summer at least, and I believe that of most species occasional individuals (not many) will be found breeding while still in the immature plumage. Such diverse species as *Buteo platypterus*, *Accipiter cooperi* and *Asturina plagiata* come to mind as within my personal experience. So it is not always an easy matter to decide with hawks as to just what plumages are real color phases and what are representative of different ages, nor is it safe to decide upon a basis of any one sort of evidence. In the case of the Galapagos hawk, Rothschild & Hartert (1899, p. 174) believe that it "occurs in a dark and in a light phase". Ridgway (1897, p. 590) states, "only dark colored adults have hitherto been taken, and *B. galapagoensis* may possibly not have a light colored phase of plumage". The last mentioned is my own belief.

It seems rather curious that a bird of this sort, a powerful flyer, should not be of general distribution throughout the archipelago, but it seems to be definitely absent from certain of the islands. Measurements show the three adult males from Hood Island to be slightly, but appreciably, larger than those from other islands (see table), and while this is a very small number to judge from, of course, it may be said that three streaked males from Hood Island (not included in the table) are of virtually the same size as the dark colored birds from the same place. If these hawks are as sedentary as might be implied from their absence from some

of the islands, it is not surprising that slight variations should appear in parts of their habitat, variations such as the larger measurements of Hood Island specimens seem to be.

Buteo leucops Gray (1848, p. 36) has been generally cited as a synonym of *Buteo galapagoensis*. Sharpe (1874, p. 170) used the type specimen of *leucops* as the basis for his description of the immature plumage of *galapagoensis*. The type of *leucops* is in the British Museum, a well made skin in good condition, and it is not an example of *galapagoensis*. It is a young bird, in fresh plumage, of the wide-spread South American mainland species, *Buteo poliosoma*, whether of true *poliosoma* or var. *pœcilochrous* (if the two really are distinct), I cannot say. It was presented to the British Museum by Burnett and Fitzroy, presumably collected by Captain Fitzroy during the voyage of the "Beagle", of which he was commander. There is little reason to suppose that it was collected upon the Galapagos, and it might have been shot at any one of several South American mainland points at which the "Beagle" touched.* *Buteo leucops* Gray, 1848, is apparently a *nomen nudum*, simply an entry in a list, with one specimen indicated. *Buteo* (*Poecilopternis*) *infulatus* Kaup was based on the same specimen. When I examined this bird I had the benefit of the company of Dr. C. E. Hellmayr, who was working upon South American hawks at the time, and he verified my conclusions regarding the specimen in question.

Specimens of *Buteo galapagoensis* in the Collection of the California Academy of Sciences

Island	Male (black)	Female (black)	Male (streaked)	Female (streaked)
Bindloe		1		1
Abingdon				1
Jervis	1	1		
Duncan	3	2		1
Indefatigable	9	9	28	18
Seymour	2	1		
Barrington	4	1	2	
Chatham			1	
Hood	3		3	

*This specimen I think without doubt is no. 37.2.21.232 of Burnett and Fitzroy, and came from Port Desire. N.B.K.

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF ADULT (BLACK) SPECIMENS OF *Buteo galapagoensis*

Number of Specimens	Island	Wing	Tail	Culmen (from cere)	Tarsus	Middle toe without claw
		MALE				
1	Jervis	385.0	200.0	27.5	79.0	44.0
3	Duncan	386.3 (377.0-395.0)	199.7 (191.0-210.0)	27.3 (27.0-28.0)	73.7 (72.0-75.0)	44.0 (42.0-46.0)
11	Indefatigable	379.5 (365.0-393.0)	207.1 (205.0-215.0)	26.9 (26.0-28.0)	72.4 (70.0-76.0)	42.9 (41.0-44.0)
4	Barrington	389.7 (385.0-395.0)	209.5 (207.0-212.0)	27.4 (27.0-27.5)	75.5 (75.0-76.0)	43.5 (42.0-44.0)
3	Hood	420.0 (410.0-432.0)	223.0 (217.0-235.0)	30.0 (28.5-32.5)	80.3 (74.0-85.0)	49.3 (46.0-56.0)
		FEMALE				
1	Bindloe	435.0	243.0	30.0	80.0	47.0
1	Jervis	420.0	225.0	31.0	81.0	50.0
2	Duncan	412.0-415.0	222.0-223.0	31.5-32.0	81.0-82.0	48.0-48.0
10	Indefatigable	419.7 (410.0-433.0)	231.9 (225.0-237.0)	30.9 (30.0-32.0)	81.1 (74.0-89.0)	47.6 (44.0-53.0)
1	Barrington	435.0	233.0	32.0	84.0	50.0

24. Pandion haliaëtus carolinensis (Gmelin)

Pandion haliaëtus Gifford, 1919, p. 193.

Apparently first reported from the Galapagos Islands by the Academy expedition. As recorded by Gifford (*loc. cit.*), the species was seen about Cocos Island in September, and on Albemarle and Chatham islands during August, November and February. Two specimens were collected, both adult males, one on Cocos Island, September 7, 1905 (no. 2903), and one on South Albemarle, November 2, 1905 (no. 2907). These birds are almost purely white below, with only a few flecks of brownish on the upper breast. They are indistinguishable from Lower Californian specimens at hand, and are presumably of the North American form. Chapman (1926, p. 243) speaks of *carolinensis* as "known in Ecuador only as a winter visitant," which may be taken as the manner of its occurrence upon the Galapagos.

25. Creciscus spilonotus (Gould)

Zapornia spilonota Gould, 1841, p. 132, pl. 49 ("Galapagos Archipelago"; orig. descr.).

Ortygometra spilonota Gray, 1844, p. 119.

Porzana spilonota Sclater & Salvin, 1870, p. 323 (Indefatigable).—Salvin, 1876, p. 500.—Ridgway, 1897, p. 618.—Snodgrass & Heller, 1904, p. 256.

Creciscus spilonotus Sharpe, 1894, p. 137.—Rothschild & Hartert, 1899, p. 184.—Gifford, 1913, p. 12 (distribution, life history, etc.).

Porzana galapagoensis Sharpe, 1894, p. 113 (orig. descr.; no type or exact type locality designated).—Ridgway, 1897, p. 619.

Creciscus sharpei Rothschild & Hartert, 1899, p. 185 (orig. descr.; Indefatigable Island); 1902, p. 412.—Hartert, 1927, p. 24 (particulars of type specimen, in Tring Museum).

Porzana sharpei Snodgrass & Heller, 1904, p. 256 (Narborough).

ZAPORNIA SPILONOTA Gould

PORZANA GALAPAGOENSIS Sharpe

Cotype.—British Museum; juv., sex?; (Galapagos). This is specimen "a" of Catalogue of Birds, vol. XXIII, p. 113, apparently never entered in any Museum register, as it has no catalogue number. It bears two red "type labels" (!), one for *Zapornia spilonota* Gould, one for *Porzana galapagoensis* Sharpe, both attached at a relatively recent date.

Cotype.—British Museum, no. 180a; juv., sex?; Galapagos;

"ex coll. Burnett & Fitzroy." Specimen "b" of Catalogue of Birds, *loc cit.*

Cotype.—British Museum; ad., sex?; Galapagos. Specimen "e" of Catalogue of Birds, vol. XXIII, p. 137.

CRECISCUS SHARPEI Rothschild & Hartert

Type.—Rothschild Museum; ♂ ad.; Indefatigable Island; September 2, 1897; C. D. Hull (Webster-Harris expedition); orig. no. 942.

DESCRIPTION.—Sexes essentially alike. Length 145 to 160 mm., spread wings 228 to 245 (collector's measurements of dead birds). Adult: Head, neck and lower parts dark slate (from neutral gray to deep neutral gray), deepening to blackish on lower flanks and abdomen. Dorsum clear brownish (close to chestnut-brown), abruptly defined against gray of neck; outer surface of wings duller and paler brown; lower back, rump and tail feathers becoming blackish. Flank feathers with paired white spots or narrow bars; wing coverts, tertials, and lower back usually with more or less white spotting. In a few cases the white spots are entirely absent, and when present vary in amount from a few inconspicuous flecks, to a larger number, sharply defined and with margins of blackish. White spots may be present on the wings and not on the back, but in no case are they present on the back and not on the wings. "Bill blackish, feet and legs brownish, iris reddish" (R. H. Beck, MS). Juvenal: Top of head and lower parts generally sooty brown, darkest on pileum and sides, slightly grayish on face and throat. Back of neck and upper back slightly paler brown, lower back, rump, tail (with upper and lower coverts), sooty blackish. Outer surface of wings dark brownish, almost black. No white spots on wing, flanks or belly. (From specimen in the British Museum.)

HABITAT.—The Galapagos Islands, where reported from Abingdon, James, Seymour, Indefatigable, Albemarle and Narborough.

The Academy expedition collected 79 specimens (nos. 257-335).

Zapornia spilonota was described and figured by Gould in the account of the birds collected on the voyage of the "Beagle" (1841, p. 132, pl. 49). No type specimen was indicated, but Darwin's statement that his specimens were collected upon James Island suffices to fix a type locality. Three of those specimens eventually went to the British Museum, where they now are. Sharpe (1894)

regarded these as representing two genera and species, *Creciscus spilonotus* (p. 137) from James and Indefatigable, and *Porzana galapagoensis* (p. 113), "exact island not indicated". Rothschild & Hartert (1899, pp. 184-185), similarly convinced that two species of rails occur in the Galapagos, named *Creciscus sharpei* (from

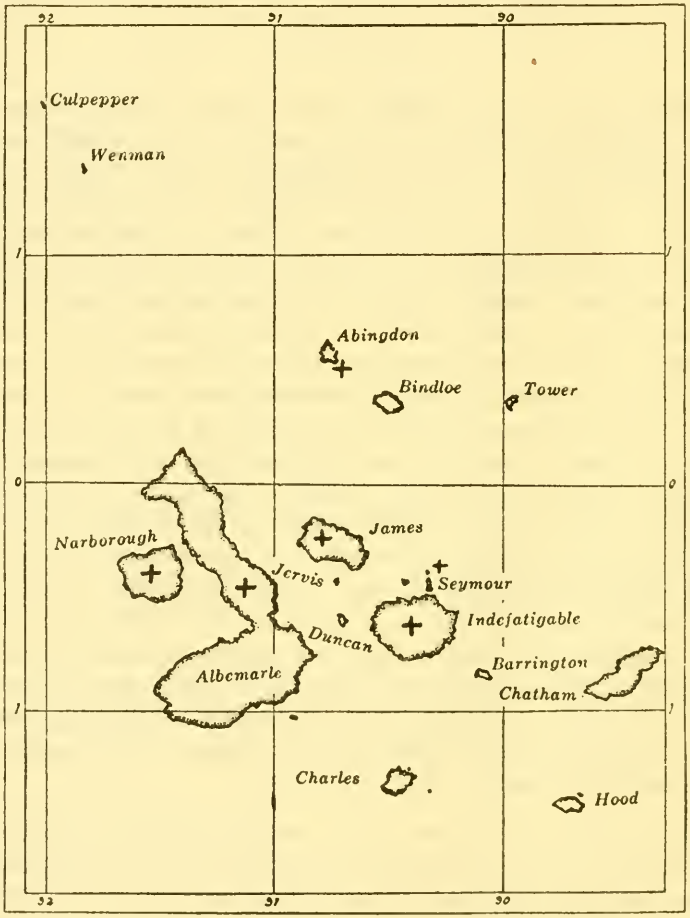


Fig. 2. Map showing distribution of *Creciscus spilonotus*. Symbols indicate islands where recorded.

Indefatigable Island), regarding *Porzana galapagoensis* as a synonym of *Creciscus spilonotus* (Gould). Up to that time Darwin's three skins assumed to be from James Island were the only ones to be collected upon that island.

The Academy expedition brought back twelve specimens from James Island, and in our own and other collections I have been able to examine other series from Abingdon, Indefatigable and Albemarle. They are all the same; I can see no grounds for recognition even of subspecies from the different islands. Two of the three "Beagle" specimens in the British Museum are juveniles, one entirely in juvenal plumage, the other acquiring some adult gray feathers on the breast. These are the two birds that Sharpe described as *Porzana galapagoensis*. The third, an ordinary adult, he listed as the young of *Creciscus spilonotus*.

Sharpe (*loc. cit.*, p. 138) says: "The type specimen [of *Zapornia spilonota*] seems not to have been transferred with the rest of the Zoological Society's Collection," a statement that Rothschild & Hartert (1899, p. 185) question, in the belief that the several skins now in the British Museum were the entire type series. However, not one of these three skins accords with Gould's description and colored plate, in that none has the white spots on the wing, and only one the spots on the flanks that are there so carefully featured. So that the type series may very well have included one or more additional adults that were subsequently lost.

SPECIMENS OF *Creciscus spilonotus* IN THE ACADEMY COLLECTION

Island	Male	Female	Sex undetermined
Abingdon	1	2	
James	4	8	
Seymour	1		
Indefatigable	33	28	2

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Creciscus spilonotus*

MALES

Number of specimens	Island	Wing	Tail	Culmen	Tarsus	Middle toe with claw
1	Abingdon	67.0	26.2	16.0	22.2	28.5
4	James	67.5 (66.0-69.0)	26.4 (25.0-27.0)	15.4 (15.0-16.2)[1]	23.4 (23.0-24.0)	29.8 (29.5-30.2)
10	Indefatigable	66.6 (64.0-72.5)	24.0 (22.0-26.2)	15.8 (15.0-17.0)	22.6 (21.5-23.5)	28.8 (27.5-29.0)
1[2]	Albemarle	69.0	23.5	14.5	22.5	31.0

FEMALES

2	Abingdon	65.5-66.0	24.0-24.0	14.5-14.5	21.0-21.0	27.5-28.0
8	James	66.6 (65.0-68.5)	25.1 (23.5-27.0)	15.7 (14.5-16.2)	22.7 (22.0-23.5)[3]	28.9 (28.0-29.5)
10	Indefatigable	66.1 (61.0-70.5)	23.2 (20.0-25.0)	14.5 (13.5-15.5)	21.6 (20.0-23.0)	27.9 (26.5-29.5)
1[2]	Albemarle	68.5	26.0	14.8		30.5

[1] Three specimens
[2] Rothschild Collection
[3] Seven specimens

SPECIMENS OF *Creciscus spilonotus* IN THE BRITISH MUSEUM COLLECTED ON THE VOYAGE OF THE "BEAGLE"

No.	Sex	Age	Locality	Wing	Tail	Culmen	Tarsus	Middle toe with claw	
	?	juv.	?	66.2	25.0	16.0	25.0	29.2	Specimen "a", Cat. Birds, vol. 23, p. 113
180a	?	juv.	"Galapagos"	73.0	25.0	16.8	24.0	30.5	Specimen "b", Cat. Birds, vol. 23, p. 113
	?	ad.	"Galapagos"	68.5	23.5	16.2	24.0	30.5	Specimen "e", Cat. Birds, vol. 23, p. 137

26. Gallinula chloropus cachinnans Bangs

Gallinula galeata Ridgway, 1897, p. 621 (Albemarle Id.).—Rothschild & Hartert, 1899, p. 186 (Albemarle Id.); 1902, p. 412.—Snodgrass & Heller, 1904, p. 257 (Albemarle Id.).—Gifford, 1913, p. 16 (Albemarle and Chatham islands).
Gallinula chloropus cachinnans Bangs, 1915, p. 96.

HABITAT.—Parts of temperate North America, Central America, West Indies, and Galapagos Archipelago. In the Galapagos Archipelago reported thus far only from Albemarle and Chatham islands, where it is not uncommon.

The Academy expedition collected two male birds (nos. 336, 337) (see Gifford, *loc. cit.*). These, compared with North American skins, are noticeably lacking in any olivaceous tinge to the upper parts, just as Ridgway (*loc. cit.*) describes the three Galapagos specimens that he examined, but in two others at hand from the Stanford University collection (see Snodgrass & Heller, *loc. cit.*), the upper parts are conspicuously olive brown, in one of them to as extreme a degree as in any North American bird that I have seen. There is thus no feature common to these four birds whereby they can be distinguished from California-taken specimens, of which there are fifteen comparable adults available.

27. Hæmatopus palliatus galapagensis Ridgway

Hæmatopus palliatus Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).—Sundevall, 1871, p. 125.—Salvin, 1876, p. 502.
Hæmatopus galapagensis Ridgway, 1886, p. 331 (Chatham Id.; orig. descr.); 1887, p. 325; 1890, p. 116 (James Id.); 1897, p. 621 (Albemarle, Hood, Chatham, Indefatigable, James, and Bindloe islands).—Sharpe, 1896, p. 116.—Rothschild & Hartert, 1899, p. 186; 1902, p. 412.—Snodgrass & Heller, 1904, p. 262.—Gifford, 1913, p. 47.
Hæmatopus palliatus galapagensis Ridgway, 1919, p. 39.—Murphy, 1925, p. 9 (characters and relationships).

HÆMATOPUS GALAPAGENSIS Ridgway

Type.—United States National Museum, no. 101319; ad., sex?; Chatham Island; August 16, 1884; Dr. Wm. H. Jones; orig. no. 64.

HABITAT.—Apparently throughout the greater part of the Galapagos Archipelago, though not reported thus far from the outlying northern islands, Culpepper and Wenman.

The Academy expedition collected 44 specimens (nos. 1887-1930).

The differences between *Hæmatopus p. galapagensis* and *H. p. frazari* (of Lower California) are slight. The Galapagos bird is darker colored dorsally and it has a heavier foot (an average character). The resemblances here are of note, considering how meager are the indications in the Galapagos avifauna of affinities toward the west coast of North America. Murphy (1925, pp. 6, 11) points out that the Atlantic form of the Oystercatcher (*palliatus*) crosses to the Pacific side in the Panama region, as indicated by the white-marked primaries of birds from that section, and considering the strong West Indian complexion borne by the aquatic avifauna of the Galapagos it might well have been predicted that the Oystercatcher, too, would be of the Atlantic strain. The fact remains that in the Galapagos birds the primaries bear no white marks along the quills, and that they are closely similar to the Lower California form.

28. Squatarola squatarola (Linnæus)

Squatarola squatarola Ridgway, 1897, p. 626 (Albemarle Id., August); 1919, p. 72.—Rothschild & Hartert, 1899, p. 187 (Charles Id., November).—Snodgrass & Heller, 1904, p. 261 (Albemarle Id., February).

Squatarola helvetica Gifford, 1913, p. 53 (Albemarle, Charles, Chatham, Hood, Indefatigable, and James islands).

Habitat.—Cosmopolitan; a transient visitor to the Galapagos.

The Academy expedition collected one specimen, upon Albemarle Island, March 7, 1906 (no. 1959).

29. Charadrius semipalmatus Bonaparte

Hiaticula semipalmata Gould, 1841, p. 128 (Galapagos Archipelago).

Ægialitis semipalmata Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).—Salvin, 1876, p. 501.—Ridgway, 1897, p. 628 (Albemarle Id.).—Rothschild & Hartert, 1899, p. 186 (Chatham, Charles, Albemarle, Jervis, and Indefatigable islands, July 29 to Dec. 3).—Snodgrass & Heller, 1904, p. 261 (Albemarle and Narborough islands).

Ægialeus semipalmatus Sharpe, 1896, p. 250.—Gifford, 1913, p. 53 (Abingdon, Albemarle, Bindloe, Charles, Chatham, Indefatigable, James, Jervis, and Narborough islands, July 17 to April 25).

Charadrius semipalmatus Ridgway, 1919, p. 116.

Habitat.—Breeds in Arctic and sub-arctic North America, migrating to southern South America in winter. Apparently a fairly common winter visitant to the Galapagos Archipelago.

The Academy expedition collected seven specimens in the Galapagos and three upon Cocos Island (nos. 1963-1972).

30. Arenaria interpres interpres (Linnæus)

Strepsilas interpres Gould, 1841, p. 132 ("Galapagos Archipelago"). —Sclater & Salvin, 1870, p. 323 (Indefatigable and Bindloe islands).—Salvin, 1876, p. 502.
Arenaria interpres Ridgway, 1890, p. 116 (Hood Id.); 1897, p. 625. —Sharpe, 1896, p. 92.—Rothschild & Hartert, 1899, p. 187.—Snodgrass & Heller, 1904, p. 261.—Gifford, 1913, p. 46.
Arenaria interpres interpres Ridgway, 1919, p. 45.

HABITAT.—Breeds in the Arctic regions. Occurs in the Galapagos Archipelago as an abundant visitant, numerous during fall, winter and spring; occasional non-breeding individuals are seen during the summer.

The Academy expedition collected 31 specimens, including two from Cocos Island (nos. 1853-1883.)

31. Pisobia bairdii (Coues)

Heteropygia bairdi Rothschild & Hartert, 1899, p. 188 (Barrington Id., October 6, 1897, one bird).—Gifford, 1913, p. 57.
Tringa bairdii Snodgrass & Heller, 1904, p. 258.
Pisobia bairdi Ridgway, 1919, p. 279.

HABITAT.—The arctic coast of North America in summer; southward into South America in winter.

Occurrence in the Galagapos Archipelago is known only through the record by Rothschild & Hartert (*loc. cit.*).

32. Pisobia minutilla (Vieillot)

Pelidna minutilla Gould, 1841, p. 131 ("Galapagos Archipelago").
Tringa minutilla Sclater & Salvin, 1870, p. 323 (Indefatigable Id.). —Salvin, 1876, p. 504.—Ridgway, 1897, p. 631.—Rothschild & Hartert, 1899, p. 188 (Charles and Barrington islands).—Snodgrass & Heller, 1904, p. 258.
Limonites minutilla Sharpe, 1896, p, 548.—Gifford, 1913, p. 56 (Abingdon, Albemarle, Barrington, Charles, Indefatigable and James islands).
Pisobia minutilla Ridgway, 1919, p. 294.

HABITAT.—Arctic North America in summer; southward into South America in winter.

Apparently a not uncommon visitant to the Galapagos Archi-

pelago. The Academy expedition collected three specimens, on Charles, Abingdon and Albemarle island, respectively (nos. 1998, 1999, 2003).

33. Crocethia alba (Pallas)

Calidris arenaria Sclater & Salvin, 1870, p. 323 (Bindloe Id.).—Salvin, 1876, p. 503.—Ridgway, 1897, p. 629 (Albemarle and Bindloe islands).—Rothschild & Hartert, 1899, p. 187 (Albemarle, Chatham, Hood, Abingdon, Jervis and Bindloe islands).—Gifford, 1913, p. 56 (nine islands).
Calidris alba Ridgway, 1919, p. 308.

Habitat.—Circumpolar, breeding only in the far north. Southward over most of the world in migrations and in winter, when it occurs commonly on the Galapagos Islands.

Three specimens were collected by the Academy expedition (nos. 1994-1996).

34. Tringa solitaria Wilson

Helodromas solitarius Rothschild & Hartert, 1899, p. 188 (Chatham Id., October 12, 1897, two specimens).—Snodgrass & Heller, 1904, p. 259.—Gifford, 1913, p. 55.
Tringa solitaria cinamomea Ridgway, 1919, p. 363.

Habitat.—Northern North America in summer, southward into South America in winter.

Occurrence in the Galapagos Archipelago is known only through the record by Rothschild & Hartert (*loc. cit.*).

35. Catoptrophorus semipalmatus inornatus (Brewster)

Symphemia semipalmata Gifford, 1913, p. 55.
Catoptrophorus semipalmatus inornatus Ridgway, 1919, p. 319.

Habitat.—North America in summer, southward into South America in winter.

Birds seen or collected by the Academy expedition on Abingdon and Albemarle islands afford apparently the only records of occurrence upon the Galapagos (Gifford, *loc. cit.*). The one specimen collected (no. 1980), in winter plumage, accords in its measurements with Ridgway's (*loc. cit.*) diagnosis of the subspecies *inornatus*.

36. Heteroscelus incanus (Gmelin)

Totanus fuliginosus Gould, 1841, p. 130 ("Galapagos Archipelago").
Totanus brevipes Sclater & Salvin, 1870, p. 323 (Indefatigable and Abingdon islands).
Heteroscelus incanus Salvin, 1876, p. 503.—Ridgway, 1919, p. 367.
Heteractitis incanus Ridgway, 1890, p. 116; 1897, p. 632.—Sharpe, 1896, p. 453.—Rothschild & Hartert, 1899, p. 188.—Snodgrass & Heller, 1902, p. 511 (Cocos Id.); 1904, p. 259.—Gifford, 1913, p. 55.

TOTANUS FULIGINOSUS Gould

Type.—British Museum, no. 37.2.21.263; [♀]; "Galapagos"; date?; received from Burnett and Fitzroy.

Heteroscelus incanus in winter plumage.

HABITAT.—Breeds in Alaska. In winter southward along Pacific coasts of America and Asia to the south Pacific islands and to the Galapagos.

The Academy expedition collected nine specimens, including one from Cocos Island and one from Clipperton Island (nos. 1981-1989).

37. Actitis macularia (Linnæus)

Actitis macularia Snodgrass & Heller, 1904, p. 260 (Albemarle Id., January).—Ridgway, 1919, p. 372.
Tringoides macularius Gifford, 1913, p. 56 (Abingdon and Albemarle islands).

HABITAT.—North America in summer, southward into South America in winter.

Occurrence of this species in the Galapagos Archipelago is known only from the observations of Snodgrass & Heller (*loc. cit.*), and of Gifford (*loc. cit.*).

38. Numenius hudsonicus Latham

Numenius hudsonicus Sclater & Salvin, 1870, p. 323 (Indefatigable).—Salvin, 1876, p. 504.—Sharpe, 1896, p. 364.—Ridgway, 1897, p. 633.—Rothschild & Hartert, 1899, p. 189.—Snodgrass & Heller, 1904, p. 260.—Gifford, 1913, p. 54.
Phæopus hudsonicus Ridgway, 1919, p. 402.
Numenius borealis Salvin, 1883, p. 429 (see Rothschild & Hartert, 1899, p. 189).

HABITAT.—Breeds in boreal America. Occurs in the Galapagos Archipelago as a common winter visitant.

The Academy expedition collected four specimens, three on Albemarle, one on Cocos Island (nos. 1976-1979).

39. Himantopus mexicanus (Müller)

Himantopus nigricollis Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).—Salvin, 1876, p. 502.

Himantopus mexicanus Ridgway, 1890, p. 116 (James Id.); 1919, p. 442.—Sharpe, 1896, p. 321.—Rothschild & Hartert, 1899, p. 189 (Indefatigable, Albemarle, and Chatham islands); 1902, p. 412.—Snodgrass & Heller, 1904, p. 258 (Albemarle, James, Seymour and Hood islands).—Gifford, 1913, p. 54, pl. 1, fig. 2.

? *Himantopus mexicanus* Ridgway, 1897, p. 633.

Habitat.—Southern North America and northern South America.

Presumably resident in the Galapagos Archipelago, where it has been reported from the following islands: James, Albemarle, Narborough, Indefatigable, Seymour, Chatham, Hood, and Charles. The Academy expedition collected two adult males and one adult female, all on Albemarle (nos. 1973-1975).

The Black-necked Stilt appears here to afford an example of an island form in an early stage of differentiation from the ancestral mainland stock. Our few specimens were so obviously short-legged as compared with California birds as to impel me to measure other Galapagos skins when opportunity offered. These were not many, but so far as they go they also exhibit the character of a short tarsus (see table). The slight overlapping in tarsal measurements shown in the males, as between the Galapagos and California series, is afforded by just one peculiarly short-legged California specimen, found after search through more skins than are included in this table. There is apparently a shortening of the tibia of Galapagos birds also, but this proved impossible to measure accurately. Further comparisons should be made with South American mainland specimens, which I have not been able to do.

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Himantopus mexicanus*

Number of specimens	Locality	Wing	Tail	Culmen	Tarsus	Middle toe with claw
10 males	California	224.7 (218.0-235.0)	70.5 (68.0-73.0)	64.5 (60.0-67.5)	115.7 (105.0-120.0)	42.6 (40.0-45.0)
8 males	Galapagos	214.2 (185.0-228.0)	71.1 (69.0-73.0)	62.9 (60.0-65.0)	100.8 (93.5-109.0)	41.8 (39.0-44.0)
10 females	California	212.8 (204.0-220.0)[1]	70.0 (63.0-73.5)	62.8 (58.2-69.0)	104.5 (99.0-116.0)	40.5 (39.0-43.0)
4 females	Galapagos	191.1 (184.0-200.0)	65.6 (60.0-68.0)	60.2 (60.0-60.5)[2]	89.2 (84.0- 93.0)	39.8 (38.0-40.8)

[1] Six specimens
[2] Two specimens

40. Lobipes lobatus (Linnæus)

Phalaropus lobatus Snodgrass & Heller, 1904, p. 257 ("off the southeast point of Narboro", March 29).
Phalaropus hyperboreus Gifford, 1913, p. 57.
Lobipes lobatus Ridgway, 1919, p. 424.

Habitat.—Circumpolar, breeding in the far north of both hemispheres; in winter south of the equator.

According to Gifford (*loc. cit.*) an abundant visitant to the Galapagos Archipelago.

41. Steganopus tricolor Vieillot

Steganopus tricolor Gifford, 1913, p. 57 (Albemarle Id., November 3, 1905).—Ridgway, 1919, p. 431.

Habitat.—Parts of temperate North America; south in winter to extreme southern South America.

Known to occur in the Galapagos Archipelago only as reported by Gifford (*loc. cit.*), who records capture of three specimens (nos. 2010-2012) by the Academy expedition.

42. Stercorarius pomarinus (Temminck)

Stercorarius pomarinus Rothschild & Hartert, 1899, p. 192 (Albemarle Id., December 15, 1897, one specimen).—Snodgrass & Heller, 1904, p. 236.
Stercorarius pomatorhinus Gifford, 1913, p. 46.
Coprotheres pomarinus Ridgway, 1919, p. 681.

Habitat.—Circumpolar, breeding in the far north of both hemispheres. In winter southward to points below the equator.

Known from the Galapagos Archipelago apparently only from one record, by Rothschild & Hartert (*loc. cit.*).

43. Larus fuliginosus Gould

Larus fuliginosus Gould, 1841, p. 141 (James Id.; orig. descr.).—Sclater & Salvin, 1870, p, 323 (Indefatigable and Abingdon islands).—Sundevall, 1871, p. 125 (Charles and Indefatigable islands).—Salvin, 1876, p. 505, pl. 87.—Saunders, 1878, p. 184 (monograph); 1896, p. 222.—Ridgway, 1890, p. 116 (Indefatigable, James and Chatham islands); 1897, p. 635.—Rothschild & Hartert, 1899, p. 189; 1902, p. 413.—Snodgrass & Heller, 1904, p. 237.—Gifford, 1913, p. 42.
Blasipus fuliginosus Ridgway, 1919, p. 656 (descr., adult and young, meas., etc.).

LARUS FULIGINOSUS Gould

Cotype.—British Museum (no catalogue number); ad., sex?; Galapagos Archipelago; Sir. W. Burnett and Captain Fitzroy. (Apparently specimen "a" of the Catalogue of Birds, vol. 25, p. 222.)

Cotype.—British Museum [55.12.19.218]; ad., sex?; Galapagos; C. Darwin. (Apparently specimen "b" of the Catalogue of Birds, *loc. cit.*)

While there is no exact locality upon the labels of these specimens, Darwin (*in* Gould, 1841, p. 141) says: "My specimen was killed at James Island".

HABITAT.—Galapagos Archipelago.

The Academy expedition collected 107 specimens (nos. 1735-1841).

44. Larus pipixcan Wagler

Larus franklinii Snodgrass & Heller, 1904, p. 237 (Narborough, March, one specimen).
Larus franklini Gifford, 1913, p. 42 (Chatham, February 10; Albemarle, March 6).
Chroicocephalus franklinii Ridgway, 1919, p. 641.

HABITAT.—North-central North America in summer, south as far as the west coast of South America in winter.

First reported from the Galapagos Archipelago by Snodgrass & Heller (*loc. cit.*). The Academy expedition collected two specimens (nos. 1733, 1734), comprising the sum total of additional records up to the present time.

45. Creagrus furcatus (Neboux)*

Creagrus furcatus Salvin, 1876, p. 506 (the second known specimen, from Dalrymple Rock, Chatham Id.).—Ridgway, 1890, p. 117 (Chatham Id; crit.); 1897, p. 638; 1919, p. 659.—Snodgrass & Heller, 1904, p. 237.—Gifford, 1913, p. 35.
Xema furcata Saunders, 1896, p. 165.—Rothschild & Hartert, 1899, p. 190; 1902, p. 412.
Xema furcatum Saunders, 1878, p. 210 (monograph); Streets, 1912, p. 233 (actions and appearance).

**Larus furcatus* Neboux (1840, p. 290) was ascribed to "Monterey" (California), on the basis of a specimen collected during the voyage of the "Venus." The vessel touched at the Galapagos and there is reason to believe that this gull may have been collected there rather than at Monterey. (See Grinnell, Pac. Coast Avifauna, no. 11, 1915, p. 175.)

Habitat.—The Galapagos Archipelago. One or two stragglers have been found on the adjacent coast of South America and Panama.

The Academy expedition collected 108 specimens (nos. 1625-1732).

46. Sterna fuscata crissalis (Lawrence)

Sterna fuliginosa Rothschild & Hartert, 1899, p. 191 (Culpepper and Wenman islands); 1902, p. 413.—Snodgrass & Heller, 1904, p. 239.—Gifford, 1913, p. 19 (Culpepper, Wenman, and Crossman islands).
Sterna fuscata crissalis Ridgway, 1919, p. 519.

Habitat.—Pacific coast of Mexico and Central America, southward to the Galapagos Archipelago.

47. Anous stolidus galapagensis Sharpe

Megalopterus stolidus Gould, 1841, p. 145, part ("Galapagos Archipelago").
Anous stolidus Sundevall, 1871, p. 125.—Salvin, 1876, p. 504.—Ridgway, 1890, p. 116 (Chatham Id.).—Gifford, 1913, p. 24.
Anous galapagensis Sharpe, 1879, p. 469 (Dalrymple Rock, Chatham Id.; orig. descr.).—Salvin, 1883, p. 430 (Charles Id.).—Stone, 1894, p. 117.—Saunders, 1896, p. 143.—Ridgway, 1897, p. 642.
Anous stolidus galapagensis Rothschild & Hartert, 1899, p. 191; 1902, p. 413.—Snodgrass & Heller, 1904, p. 239.—Ridgway, 1919, p. 551.

Anous galapagensis Sharpe

Type.—British Museum, no. 50.1.31.14; im., sex?; Dalrymple Rock, Chatham Island; no date; received from Kellett and Wood. A poorly made skin with one wing missing.

Habitat.—The Galapagos Archipelago.

The Academy expedition collected 85 specimens (nos. 1426-1510).

48. Gygis alba (Sparrman)

Gygis alba Gifford, 1913, p. 32.
Gygis alba candida ? Ridgway, 1919, p. 559.

Habitat.—Intertropical portions of Pacific, Indian, and southern Atlantic oceans.

The statement by Gifford (*loc. cit.*) of one seen off Tower Island,

September 14, 1906, appears to be the only record for the Galapagos Archipelago.

Genus Nesopelia Sundevall

Nesopelia Sundevall, Met. Nat. Avium Disp. Tent., ii, 1873, 99. Type *Zenaida galapagoensis* Gould. (For generic characters and for detailed descriptions of subspecies see Ridgway, Birds of North and Middle America, VII, 1916, pp. 372-376.)

49. Nesopelia galapagoensis galapagoensis (Gould)

Zenaida galapagoensis Gould, 1841, p. 115, pl. 46 (orig. descr.; "Galapagos Archipelago").—Sclater & Salvin, 1870, p. 323 (Indefatigable and Bindloe islands).—Ridgway, 1890, p. 116.
Zenaida galapagensis Salvin, 1876, p. 499.
Columba galapagensis Sundevall, 1871, p. 125 (James Id.).
Nesopelia gallopagoensis Sundevall, 1873, p. 99. [Not seen by me. H.S.S.]
Nesopelia galapagoensis Salvadori, 1893, p. 390.—Ridgway, 1897, p. 614.—Gifford, 1913, p. 6, part.
Nesopelia galapagoensis galapagoensis Rothschild & Hartert, 1899, p. 183; 1902, p. 411.—Snodgrass & Heller, 1904, p. 262.—Ridgway, 1916, p. 373.

Zenaida galapagoensis Gould

Cotype.—British Museum, no. 81.2.18.84; (♀?); "Galapagos"; no date; C. Darwin.*

This is a small, dull colored bird, apparently a female. Gould's plate appears to be made from a male, which may have been mounted and later destroyed. The skin in the British Museum may be assumed to be one of several specimens upon which the species was based.

Habitat.—The Galapagos Archipelago, where recorded from all the principal islands except Culpepper and Wenman (occupied by another subspecies).

50. Nesopelia galapagoensis exsul Rothschild & Hartert

Nesopelia galapagoensis exsul Rothschild & Hartert, 1899, p. 184 (Culpepper and Wenman islands; orig. descr.).—Snodgrass & Heller, 1904, p. 263.—Ridgway, 1916, p. 375.—Hartert, 1927, p. 9 (particulars of type specimen, in Rothschild Museum).
Nesopelia galapagoensis Gifford, 1913, p. 6, part (Culpepper and Wenman islands).

Nesopelia galapagoensis exsul Rothschild & Hartert

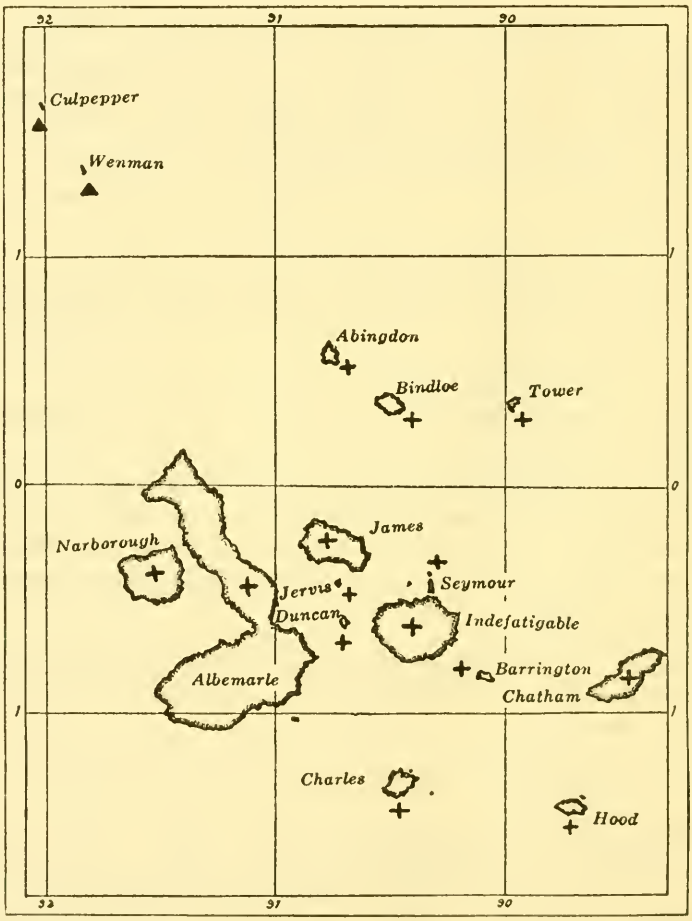
Type.—Rothschild Museum; ♂ ad.; Culpepper Island; July 27.

*Ex Eyton collection and Zoological Society collection. N.B.K.

1897; F. P. Drowne (Webster-Harris expedition); orig. no. 180.

Habitat.—Culpepper and Wenman islands, Galapagos Archipelago.

The Academy expedition collected 226 specimens of this species (including *galapagoensis* 206, *exsul* 20), catalogued, mixed together, under the inclusive numbers 31-256.



▲ Nesopelia galapagoensis exsul

+ Nesopelia galapagoensis galapagoensis

Fig. 3. Map showing distribution of subspecies of *Nesopelia galapagoensis*. Symbols indicate islands where recorded.

SPECIMENS OF *Nesopelia galapagoensis* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

	Island	Adult male	Adult female	Young male	Young female	Sex undetermined
Nesopelia g. exsul	Culpepper	3	1			
Nesopelia g. exsul	Wenman	10	4	2		
Nesopelia g. galapagoensis	Abingdon	2	5	1	1	1
Nesopelia g. galapagoensis	Bindloe		1			
Nesopelia g. galapagoensis	Tower		1			
Nesopelia g. galapagoensis	James		4			
Nesopelia g. galapagoensis	Jervis	4	11			1
Nesopelia g. galapagoensis	Narborough	1				
Nesopelia g. galapagoensis	Duncan	33	8			
Nesopelia g. galapagoensis	Seymour		7			
Nesopelia g. galapagoensis	Indefatigable	11	20	12	10	
Nesopelia g. galapagoensis	Barrington	12	4			
Nesopelia g. galapagoensis	Chatham	1	2			
Nesopelia g. galapagoensis	Hood	11	16		1	
Nesopelia g. galapagoensis	Gardner-near-Hood	6	1			
Nesopelia g. galapagoensis	Charles	3	1	2	9	
Nesopelia g. galapagoensis	Gardner-near-Charles	2	1			

51. Coccyzus melacoryphus Vieillot

Coccyzus melanocoryphus Ridgway, 1889, p. 113 (Chatham and Charles islands); 1897, p. 581.—Rothschild & Hartert, 1899, p. 174.—Snodgrass & Heller, 1904, p. 268.—Gifford, 1919, p. 195 (life history).

Coccyzus melacoryphus Rothschild & Hartert, 1902, p. 403 (life history).—Ridgway, 1916, p. 35.—Cory, 1919, p. 338.

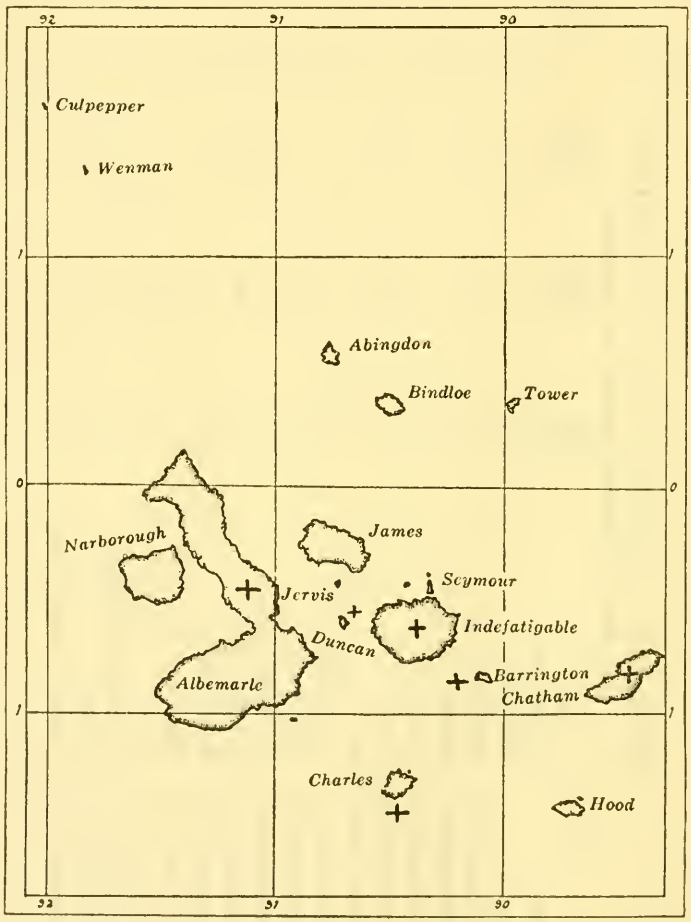


Fig. 4. Map showing distribution of *Coccyzus melacoryphus* in the Galapagos Islands. Symbols indicate islands where recorded.

Habitat.—Of widespread distribution on the South American mainland, from Colombia south to Argentina and Peru. Has

been found on the following islands of the Galapagos Archipelago: Albemarle, Duncan, Indefatigable, Barrington, Chatham, Charles.

The Academy series consists of 55 specimens (nos. 2990-3044), as listed in the accompanying table. These were collected during all the months from January to October, inclusive, and as birds were seen also in December (Gifford, 1919, p. 195), the species may be assumed to be a permanent inhabitant of the Galapagos. Rothschild & Hartert (1902, p. 404) point out that it is apparently resident, and also that this is the only Galapagos land bird that is not peculiar to the Archipelago. They remark that it is "somewhat rare and apparently a recent immigrant", the recent arrival being presumably, and justifiably, implied from the close resemblance of island and mainland specimens.

Through the courtesy of Dr. Frank M. Chapman, I received the loan of ten skins of *Coccyzus melacoryphus* from the South American mainland, collected at points in Colombia and Ecuador. The resemblance between these mainland birds and island birds is of the closest; they are practically indistinguishable. Ridgway (1897, p. 581) comments upon the heavier bill of an adult male from Charles Island, but this character is not borne out in our series. The island birds do seem to have on the average slightly longer wing and tail, which is contrary to what might be expected, but the difference is not trenchant. As regards color and markings, I receive the impression that some mainland birds have the bluish tinge on the top of the head somewhat brighter in hue and more sharply defined than in any island specimens, but here, too, the variation is too vague and uncertain to justify anything more than passing comment.

SPECIMENS OF *Coccyzus melacoryphus* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

Island	Adult male	Adult female	Immature male	Immature female	Sex not ascertained
Albemarle	2	2	1	1	
Barrington		1			
Chatham	6	6	1	2	
Charles	5	5	10	12	1

MEASUREMENTS IN MILLIMETERS OF *Coccyzus melacoryphus* FROM THE SOUTH AMERICAN MAINLAND

Museum	No.	Sex Age	Locality	Wing	Tail	Culmen	Depth of bill at base	Width of mandible at base	Tarsus	Outer anterior toe with claw	White spot on outer tail feather
Am. Mus. N. H.	133193	♂ ad.	Dabeiba, Antioquia, Colombia	112.5	133.5	24.5	9.0	9.5	26.5	25.0	18.0
Am. Mus. N. H.	133194	♂ ad.	Dabeiba, Antioquia, Colombia	112.5	135.0	24.0	....	9.5	25.0	23.5	16.2
Am. Mus. N. H.	107304	♂ ad.	Caldar, Cauca, Colombia	109.0	132.5	22.8	8.5	9.2	24.0	22.5	16.2
Am. Mus. N. H.	116012	♂ im.	La Murelia, Caqueta, Colombia	109.2	131.5	22.2	8.5	9.0	24.5	23.8	.....
Am. Mus. N. H.	179082	♂ im.	Avila, E. Ecuador	114.2	132.0	22.0	8.2	8.0	24.5	22.5	.....
			Average	111.5	132.9	23.1	8.5	9.0	24.9	23.5	16.8
Am. Mus. N. H.	108866	♀ ad.	Palmira, Cauca, Colombia	116.0	139.0	24.2	9.2	9.5	27.0	24.2	16.2
Am. Mus. N. H.	133195	♀ ad.	Dabeiba, Antioquia, Colombia	117.5	143.5	23.2	8.5	9.0	25.5	24.2	15.0
Am. Mus. N. H.	179083	♀ ad.	Avila, E. Ecuador	115.5	135.0	23.0	8.2	9.0	25.0	25.2	17.5
Am. Mus. N. H.	179085	♀ im.	Avila, E. Ecuador	117.0	135.5	24.8	8.2	9.2	24.5	24.2	.....
Am. Mus. N. H.	179086	♀ im.	Avila, E. Ecuador	114.0	132.5	23.5	9.0	8.5	26.2	24.2	.....
			Average	116.0	137.1	23.7	8.6	9.0	25.6	24.4	16.2

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Coccyzus melacoryphus* FROM THE GALAPAGOS ISLANDS

Number of specimens	Island	Wing	Tail	Culmen	Depth of bill at base	Width of mandible at base	Tarsus	Outer anterior toe with claw	White spot on outer tail feather
				MALES					
6	Chatham	113.9 (110.5-117.5)	134.5 (130.0-140.5)[1]	24.2 (22.5-25.5)	8.8 (8.2- 9.2)	8.8 (8.5-9.0)	26.5 (25.0-27.5)	23.8 (23.0-25.0)[1]	19.3 (17.0-22.5)[1]
7	Charles	114.3 (111.2-117.0)	139.0 (133.2-145.5)	24.2 (23.0-26.0)[2]	9.2 (8.5-10.5)	8.9 (8.0-9.2)	26.8 (25.0-28.5)	23.0 (22.0-24.0)	20.8 (19.5-23.5)[3]
2	Albemarle	116.8-118.5	140.2-148.0	21.8-23.0	8.0-8.5	8.2- 8.5	26.5-27.0	23.0-26.5	19.0-20.5
				FEMALES					
6	Chatham	116.4 (112.2-120.0)	136.1 (131.5-145.0)[2]	23.4 (22.0-24.5)	8.7 (8.5- 9.2)	8.6 (8.5-9.0)	26.1 (25.0-27.5)	23.3 (22.5-24.0)	19.6 (18.0-22.0)[1]
5	Charles	117.0 (111.0-122.0)	142.1 (137.0-146.2)	23.7 (23.0-25.0)	9.1 (8.5-10.2)	8.9 (8.8-9.0)	27.2 (26.0-28.0)	23.9 (22.2-25.0)	19.7 (18.0-23.5)
2	Albemarle	120.0-121.0	141.0-144.0	22.5-25.0	8.0- 8.5	8.0-8.2	26.0-26.2	23.5-26.0	18.0-19.5
1	Barrington	118.5	140.2	22.5	9.0	9.0	27.2	24.5	20.0

[1] 5 specimens
[2] 4 specimens
[3] 6 specimens

Coccyzus ferrugineus Gould

Coccyzus ferrugineus Gould, 1843, p. 105 (Cocos Id.); 1844, p. 46, pl. 29.—Sclater, 1870, p. 167 (monogr.).—Shelley, 1891, p. 303.—Townsend, 1895, p. 124.—Snodgrass & Heller, 1902, p. 517.—Carriker, 1910, p. 563.—Ridgway, 1916, p. 34.—Gifford, 1919, p. 195 (habits).

COCCYZUS FERRUGINEUS Gould

Type.—British Museum, no. 55.12.19.372. A dismounted bird with glass eyes and wired legs.

HABITAT.—Cocos Island, Costa Rica.

The Academy series consists of four adult birds, one of these being the head only of the specimen (nos. 2986-2989). This is apparently an extremely rare bird in collections. Gould (1843, p. 105; 1844, pl. 29) described and figured the species from a single specimen taken on the voyage of the "Sulphur". Townsend (1895, p. 124) collected two birds, and Snodgrass & Heller (1902, p. 517), one, and these, together with our own series, appear to be, if not all that have actually been obtained, all that have been mentioned in any published reports.

MEASUREMENTS IN MILLIMETERS OF *Coccyzus ferrugineus*

Museum	Number	Sex Age	Locality	Date	Wing	Tail	Culmen	Depth of bill at base	Width of mandible at base	Tarsus	Outer anterior toe with claw	White spot on outer tail feather
C. A. S.	2988	♂ ad.	Cocos Id.	Sept. 8, 1905	133.2	161.2	25.2	10.5	10.0	28.2	24.5	37.0
C. A. S.	2986	♂ ad.	Cocos Id.	Sept. 7, 1905	131.0	158.0	25.0	10.0	9.8	28.2	26.5	32.0
C. A. S.	2987	♀ ad.	Cocos Id.	Sept. 11, 1905	133.0	160.0	24.0	10.2	10.0	28.5	25.2	33.0
C. A. S.	2989	— ad.	Cocos Id.	Sept. 6, 1905	.....	.....	25.5	10.2	10.0	.....	.....	.....

52. Tyto punctatissima (Gray)

Strix punctatissima Gray, *in* Gould, 1841 (= July, 1839), p. 34, pl. 4 (James Id.).—Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).—Salvin, 1876, p. 494 (Indefatigable Id.).—Ridgway, 1897, p. 583.—Rothschild & Hartert, 1899, p. 175; 1902, p. 405 (Albemarle Id.; Chatham Id.?).—Snodgrass & Heller, 1904, p. 266 (2 specimens, Albemarle and Seymour; description of nesting burrows and egg).—Gifford, 1919, p. 194 (Narborough, Albemarle, Indefatigable; habits, food, etc.).
[*Striz flammea*] *y. Strix punctatissima* Sharpe, 1875, p. 297.
Tyto punctatissima Ridgway, 1914, p. 616.
Tyto alba punctatissima Hartert, 1929, p. 96.

STRIX PUNCTATISSIMA Gray

Type.—British Museum, no. 37.2.21.244; (probably a female, from its dark color); "Galapagos"; no date; received from Sir W. Burnett and Captain Fitzroy.

According to Darwin (*in* Gould, 1841, p. 34) only one specimen of this owl was obtained during the visit of the "Beagle" to the Galapagos, this one being shot by Captain Fitzroy upon James Island in October.

HABITAT.—The Galapagos Archipelago, where, so far as known, it is restricted to the large central islands. Specimens have been taken on James, Indefatigable, Seymour, and Albemarle. There is a definite sight record from Narborough, and there is an uncertain sight record from Chatham.

DESCRIPTION.—*Adult male* (Indefatigable Island). General color above, on back and upper surface of wings, dark gray, vermiculated with white, and varied with small elongated white spots which are bordered with black. Edge of facial ruff, sides of neck and middle portion of feathers on top of head, ochraceous-buff. Primaries and secondaries with indistinct dusky cross bars; exposed edge of primaries ochraceous-buff; primaries, secondaries, and tertials with fairly sharply defined whitish terminal or sub-terminal spots. Tail whitish below, gray above, tinged with ochraceous, crossed by five dusky bars. Facial ring pure white, tinged with dark brown in front of eye, bordered by a sharply defined dark brown ring. Breast pure white, upper breast immaculate, lower breast with small blackish (mostly sagittate) markings. On the flanks these markings are heavier, with some irregular cross bars, and with a faint vinaceous tinge to the feathers. Under tail coverts pure white with a few small grayish spots. Bill dull yellowish (in dried skin).

Adult female (Indefatigable Island). Much darker throughout than is the male. Upper parts almost black, varied with black and white spots as in the male. Lower parts dark brown, with small black spots (cross bars on feathers of upper breast, roundish spots a little lower down, and mostly sagittate or triangular on

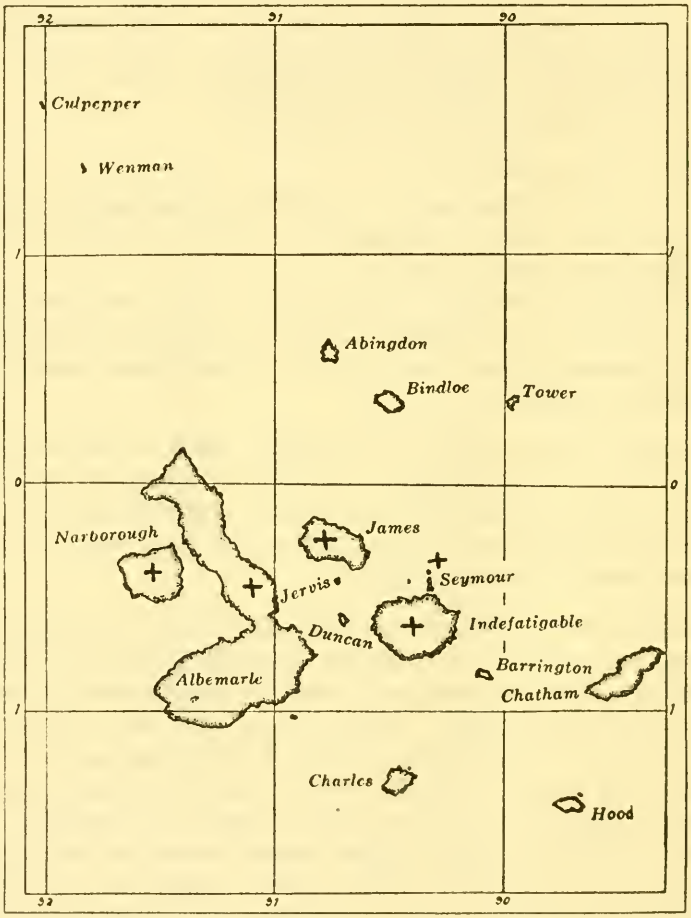


Fig. 5. Map showing distribution of *Tyto punctatissima*. Symbols indicate islands where recorded.

abdomen and flanks); facial ring strongly tinged with vinaceous.

It may aid the above inadequate description of a complicated plumage to say that in pattern and markings this species is essentially like the better known North American Barn Owl (*Tyto alba*

pratincola), but that the Galapagos species is much less rufescent in color. If the two were of the same size (*punctatissima* is much the smaller) they might pass as red (*pratincola*) and gray (*punctatissima*) color phases of the same form. The distinguishing character given by Ridgway (1914, p. 602) for *punctatissima*, in his "key to the species of *Tyto*", namely, "under parts barred with dusky", is almost non-existent. It does not occur at all in adult males from Indefatigable, and to only a slight degree in some females. The female *punctatissima* is much darker brown below and much more heavily marked than is the female *pratincola*, and dorsally it is much blacker, as compared with the strong rufescent tinge of *pratincola*, again suggesting a color phase difference as is described above. The term "color phase" is used here, of course, merely to convey an idea of the sort of color differences that distinguish the two forms, not to imply close specific relationship.

We have fairly adequate series from Albemarle and Indefatigable islands, and the differences between the two lots might be considered as sufficient for subspecific separation. Four adult males from Indefatigable are pure white below and almost immaculate, with small black spots scattered over breast and belly, whereas three from Albemarle have the under parts grayish, sometimes tinged slightly with vinaceous, and with fairly heavy triangular spots, irregular cross bars, or irregular U-shaped markings. Dorsally the Albemarle birds are dark colored, the white spots (conspicuous in the Indefatigable series) reduced to such mere specks that the upper parts appear almost uniformly black. There are comparable differences in the series of females. Our one specimen from James Island, whence came the type specimen of *punctatissima*, is like the Albemarle series, so that if a new name is to be used it should be applied to the Indefatigable bird. At present I see no need of such procedure.

There are fairly well defined sexual differences in this species, about the same, I believe, as in the North American form. In each case the male is paler colored, almost purely white-breasted below, the female much darker and more rufescent. In either form I doubt if the adult male is ever other than white-breasted, or if the adult female ever assumes as pure white a plumage. In our series of *punctatissima* there are several specimens which, by this color standard, might be supposed to belong to the opposite

sex to that indicated upon the label, but, here, just as in similar cases in the North American form, the suspicion arises that the sex might not have been correctly ascertained. It is a point deserving of careful attention from field collectors securing specimens of any form of this genus of owls. (See Hartert, 1929, p. 96.)

This is one of the rarest and least known of the Galapagos birds, though its discovery dates back to the first ornithological exploration of the islands. Fitzroy obtained one specimen upon James Island, which served as the type. Next, Habel collected two birds, one certainly, perhaps both, upon Indefatigable. Sclater and Salvin (1870, p. 323) list one of Habel's birds as from Indefatigable, the other as from an unknown island. Later Salvin (1876, p. 494) gives both as from Indefatigable. Curiously, in Salvin's paper, under "habitat," Abingdon is entered, while farther on in the text the statement is explicitly made that Habel did not find this owl upon Abingdon. Rothschild & Hartert (1899, p. 175) contribute only a dubious sight record from Chatham Island. Their statement in full reads as follows: "Only Darwin and Habel seem to have procured specimens of this owl, while neither Townsend nor Baur & Adams met with it. Harris believes that he heard it several times, and that he saw it, on Chatham Island, but unfortunately no specimen was procured." A few years later, however, the same authors (Rothschild & Hartert, 1902, p. 405) are able to cite a specimen collected upon Albemarle, August 28, 1900. Snodgrass & Heller (1904, p. 266) collected two "immature specimens", upon Albemarle and Seymour islands, respectively.

Apparently, from the above statements, there were just six specimens of this species extant in collections prior to the Academy expedition, which collected 23, upon James, Albemarle, and Indefatigable. Gifford (1919, p. 194), besides detailing particulars of capture of this series, remarks that "Mr. Beck reported them in the elevated humid, fertile portions of southern Narborough in early April." None was collected upon that island.

Specimens of *Tyto punctatissima* in the Collection of the California Academy of Sciences

Island	Adult male	Adult female
James		1
Albemarle	3	5
Indefatigable	5	9

MEASUREMENTS IN MILLIMETERS OF *Tyto punctatissima*

Museum	Number	Sex	Locality	Collector	Date	Wing	Tail	Culmen from cere	Tarsus	Middle toe without claw
C. A. S.	2935	♂	Indefatigable	J. S. Hunter	July 16, 1906	216.0	100.0	18.5	53.5	26.0
C. A. S.	2936	♂	Indefatigable	J. S. Hunter	July 16, 1906	225.0	102.0	18.8	53.0	26.2
C. A. S.	2938	♂	Indefatigable	J. S. Hunter	July 16, 1906	204.5	97.2	18.2	52.5	25.5
C. A. S.	2937	♂	Indefatigable	E. W. Gifford	June 17, 1906	212.0	100.5	18.0	50.0	24.5
C. A. S.	2949	♂	Indefatigable	R. H. Beck	Nov. 10, 1905	210.0	101.2	18.5	65.5	26.0
				Average		213.5	100.2	18.4	53.1	25.6
C. A. S.	2941	♂	Albemarle	J. S. Hunter	Apr. 18, 1906	219.0	108.0	18.5	57.0	25.0
C. A. S.	2939	♂	Albemarle	J. S. Hunter	Aug. 24, 1906	212.0	97.0	18.2	54.0	27.0
C. A. S.	2943	♂	Albemarle	J. S. Hunter	Aug. 25, 1906	217.0	101.0	19.2	52.0	24.0
				Average		216.0	102.0	18.6	54.3	25.3
C. A. S.	2945	♀	Indefatigable	J. S. Hunter	Jan. 16, 1906	208.0	97.0	17.0	58.0	26.2
C. A. S.	2951	♀	Indefatigable	J. S. Hunter	June 16, 1906	218.0	103.0	17.5	57.5	25.0
C. A. S.	2952	♀	Indefatigable	E. W. Gifford	July 11. 1906	212.0	100.5	19.8	55.2	26.2
C. A. S.	2957	♀	Indefatigable	E. W. Gifford	July 11, 1906	221.0	106.2	19.5	52.0	27.0
C. A. S.	2946	♀	Indefatigable	E. W. Gifford	July 12, 1906	212.0	101.5	19.2	51.2	26.0
C. A. S.	2948	♀	Indefatigable	J. S. Hunter	July 16, 1906	220.0	99.2	18.2	57.0	25.0
C. A. S.	2940	♀	Indefatigable	R. H. Beck	Nov. 10, 1905	200.0	102.0	18.5	52.0	26.5
C. A. S.	2944	♀[1]	Indefatigable	R. H. Beck	Nov. 10, 1905	218.0	102.0	18.5	56.0	27.0
C. A. S.	2955	♀	Indefatigable	J. S. Hunter	Nov. 14, 1905	218.0	104.2	18.5	57.0	25.5
				Average		214.1	101.7	18.5	55.1	26.0
C. A. S.	2956	♀[2]	Albemarle	E. W. Gifford	Apr. 6, 1906	232.0	113.0	18.8	58.0	27.5
C. A. S.	2954	♀	Albemarle	J. S. Hunter	Aug. 25, 1906	220.0	102.0	18.5	55.5	27.5
C. A. S.	2950	♀	Albemarle	J. S. Hunter	Aug. 30, 1906	218.0	102.0	19.5	52.5	25.5
C. A. S.	2953	♀	Albemarle	J. S. Hunter	Sept. 3, 1906	228.0	103.5	18.2	58.0	26.0
C. A. S.	2942	♀	Albemarle	J. S. Hunter	Apr. 18, 1906	204.0	99.5	19.0	57.0	27.0
				Average		220.4	104.0	18.8	56.2	26.7
C. A. S.	2947	♀	James	J. S. Hunter	Jan. 3, 1906	222.0	103.2	18.5	56.0	25.0

[1] "Length 290.0 Extent 780.0" (collector's measurements)
[2] "Length 339.0 Extent 850.0" (collector's measurements)

53. Asio galapagoensis (Gould)

Otus (*brachyotus*) *galapagoensis* Gould, 1837, p. 10 (inferentially from the Galapagos Islands; no habitat indicated).

Otus galapagoensis Gould, 1841 (= Jan., 1839), p. 32, pl. 3 (James Id.).—Sclater & Salvin, 1870, p. 323 (Indefatigable Id.).

Asio galapagensis Salvin, 1876, p. 493 (Indefatigable Id.).—Gifford, 1919, p. 193 (Abingdon, Albemarle, Barrington, Champion, Charles, Gardner-near-Charles, Chatham, Duncan, Hood, Indefatigable, Seymour, and Tower; habits).

[*Asio accipitrinus*] *y. Asio galapagensis* Sharpe, 1875, p. 238 (in list of specimens).

Asio galapagoensis Ridgway, 1897, p. 585 (Tower, Hood, Albemarle, Bindloe; reprint of original description; habitat; synonymy; crit.); 1914, p. 668.—Rothschild & Hartert, 1899, p. 175 (Culpepper, Duncan, Barrington, Chatham); 1902, p. 405 (Albemarle and Hood. "Length [in flesh] 15 in., width [spread] 38 in. Eyes orange.").—Snodgrass & Heller, 1904, p. 267 (Barrington and Duncan; habits; measurements; descr. nest and eggs).

Asio galapagoensis galapagoensis Cory, 1918, p. 18.

OTUS GALAPAGOENSIS Gould

Type.—British Museum, no. 55.12.19.153; (adult male; see Darwin, *in* Gould, 1841, p. 33); Galapagos; (no date); collected by C. Darwin. Purchased from Zoological Society.

This specimen is entered as "juv. st." in the Catalogue of Birds, but it is unquestionably adult.

HABITAT.—The Galapagos Archipelago, where definitely reported from the following islands: Culpepper, Abingdon, Bindloe, Tower, James, Duncan, Albemarle, Indefatigable, Seymour, Barrington, Chatham, Hood, Charles, Champion, Gardner-near-Charles.

The Academy series consists of 23 specimens (nos. 2912-2934), apparently all adult. This is a small, dark colored species, of general distribution, practically throughout the Archipelago, and showing no evident tendency toward differentiation upon different islands. Such color variation as occurs is mainly in the shade of the brown ground color of the lower parts, and cannot be correlated with localities. As compared with the mainland *Asio flammeus*, the smaller size and the streaked leg markings of *galapagoensis* appear to be the best differentiating characters. *Galapagoensis* is decidedly darker on the average, but selected specimens of *flammeus* may be found that are as dark as some pale colored island birds. Ridgway's (1914, p. 668) statement: "outer

webs of outer primaries with the buff spaces decidedly smaller than the brown interspaces," is not borne out in our series. The usual thing is for the buff spaces to be the broader at the base of the primary and to diminish in size toward the tip. The amount

Fig. 6. Map showing distribution of *Asio galapagoensis*. Symbols indicate islands where recorded.

of streaking upon leg and toes is variable. but it is present to some extent upon every specimen. One specimen collected upon Charles Island, May 24, is renewing the rectrices, which are about

half-grown; the flight feathers look old and worn. Another (Champion Island, October 3) has the outermost primary on the right wing partly grown; on the left wing it is just beginning to appear. These partly emerged feathers apparently indicate the completion of the molt in this individual, judging from the fresh, clean aspect of the plumage in general.

Specimens of *Asio galapagoensis* in the Collection of the California Academy of Sciences

Island	Adult male	Adult female
Tower		2
James	1	1
Duncan		1
Albemarle	1	1
Indefatigable	1	3
Barrington	1	
Chatham		2
Hood	4	1
Charles	3	
Champion	1	

MEASUREMENTS IN MILLIMETERS OF *Asio galapagoensis*

Museum	Number	Sex	Locality	Collector	Date	Wing	Tail	Culmen from cere	Tarsus[1]	Middle toe without claw[1]
C. A. S.	2917	♂	Charles	J. S. Hunter	May 24, 1906	227.0		19.0	45.0	28.5
C. A. S.	2925	♂	Charles	J. S. Hunter	June 2, 1906	271.0	144.0	18.5	48.0	29.5
C. A. S.	2929	♂	Charles	J. S. Hunter	June 2, 1906	272.0	140.0	18.5	46.5	29.2
C. A. S.	2934	♂	Champion	E. W. Gifford	Oct. 3, 1905	280.0	141.0	19.0	52.0	32.5
			Average			275.0	141.7	18.7	47.9	29.9
C. A. S.	2922	♂	Hood	J. S. Hunter	Oct. 2, 1905	275.0	144.0	20.0	46.5	29.8
C. A. S.	2926	♂	Hood	J. S. Hunter	June 26, 1906	284.0	140.5	19.0	44.0	28.0
C. A. S.	2912	♂	Hood	R. H. Beck	June 28, 1906	273.0	135.5	20.0	46.0	30.5
C. A. S.	2927	♂	Hood	E. W. Gifford	June 30, 1906	270.0	135.0	20.0	46.0	30.5
			Average			275.5	138.7	19.7	45.6	29.7
C. A. S.	2928	♂	Barrington	J. S. Hunter	Oct. 23, 1905	280.0	137.5	17.5	44.0	30.5
C. A. S.	2915	♂	Indefatigable	R. H. Beck	Nov. 27, 1905	277.0	135.0	17.5	47.0	28.0
C. A. S.	2920	♂	Albemarle	J. S. Hunter	Aug. 10, 1906	280.0	140.5	20.0	48.0	31.0
C. A. S.	2919	♂	James	J. S. Hunter	Jan. 4, 1906	268.0	136.0	18.2	49.0	28.0
C. A. S.	2918	♀	Chatham	J. S. Hunter	July 6, 1906	282.0	144.0	19.0	47.0	32.5
C. A. S.	2933	♀	Chatham	J. S. Hunter	July 6, 1906	280.0	139.0	19.0	44.0	31.0
C. A. S.	2930	♀	Hood	R. H. Beck	Sept. 25, 1905	282.0	134.0	19.2	48.0	34.0
C. A. S.	2931	♀	James	J. S. Hunter	Dec. 28, 1905	275.0	145.0	18.5	49.0	32.0
C. A. S.	2913	♀	Duncan	R. H. Beck	Dec. 8, 1905	280.0	148.0	18.5	48.0	31.0
C. A. S.	2932	♀	Albemarle	J. S. Hunter	Aug. 10, 1906	285.0	148.0	19.5	47.0	31.0
C. A. S.	2914	♀	Tower	E. W. Gifford	Sept. 15, 1906	285.0	149.0	20.0	44.0	33.0
C. A. S.	2923	♀	Tower	E. W. Gifford	Sept. 15, 1906	270.0	137.0	19.0	43.0	32.0
C. A. S.	2921	♀	Indefatigable	J. S. Hunter	Nov. 28, 1905	278.0	143.0	20.0	48.0	32.0
C. A. S.	2924	♀	Indefatigable	J. S. Hunter	Nov. 28, 1905	272.0	134.0	20.0	48.0	34.0
C. A. S.	2916	♀	Indefatigable	J. S. Hunter	July 16, 1906	280.0	143.0	19.2	47.0	32.0
			Average			276.7	140.0	19.7	47.7	32.7

[1] Exact accuracy can not be claimed for this measurement, the parts being obscured by dense feathering.

54. Myiarchus magnirostris (Gray)

Myiobius magnirostris Gray, *in* Gould, 1841 (= July, 1839), p. 48, pl. 8 (Chatham Island).

Eribates magnirostris Ridgway, 1893, p. 606; 1907, p. 606.—Gifford, 1919, p. 200 (life history).—Hellmayr, 1927, p. 187.

Myiarchus magnirostris Sclater & Salvin, 1870, p. 323.—Sundevall, 1871, pp. 125-127.—Salvin, 1876, p. 493.—Sclater, 1888, p. 262.—Ridgway, 1890, p. 113; 1897, p. 569.—Rothschild & Hartert, 1899, p. 172; 1902, p. 402 (description of nests).—Snodgrass & Heller, 1904, p. 269.

MYIOBIUS MAGNIROSTRIS Gray

Type.—British Museum, no. 56.3.15.10; ad., sex?; Chatham Island; C. Darwin. A date upon the label, "1/4/37", is obviously erroneous as regards time of capture, as Darwin's visit to the Galapagos was in 1835.

DESCRIPTION.—For detailed description of adult and young see Ridgway, 1907, p. 606.

HABITAT.—The Galapagos Islands.

The Academy series consists of 170 specimens (nos. 3414-3583). The species occurs practically throughout the archipelago, having been found upon all the islands of any size except the northernmost, Culpepper. It is rare upon the nearest adjoining island, Wenman, where it was found (in September) apparently for the first time by the Academy expedition (Gifford, 1919, p. 201). Rothschild & Hartert (1899, p. 172) report a specimen "caught on the vessel off Wenman Island."

The specimens in our series were collected during every month except April, and the species is, of course, permanently resident upon at least the larger islands. The recorded occurrences upon and near Wenman suggest some wandering from island to island even though there be no regular migratory movement, something that is as yet unproved.

Eggs were found late in January and during March (Gifford, 1919, p. 203). There are birds in juvenal plumage on hand collected May 25, May 26, and June 1. Adults taken during February on Hood Island are rather worn and faded in appearance though some taken during the same month on other islands are still in fairly good condition. The annual molt seems to be practically finished early in June; the post-juvenal molt must linger in some cases until a month later.

Rothschild & Hartert (1899, p. 172) comment upon the relatively small size of their few specimens from Chatham Island, an observation that is borne out by our more abundant material (see table, p. 87). The difference is slight, however, and the largest Chat-

ham Island birds fall within the range of variation found upon some of the other islands; altogether, subspecific division does not seem justifiable. Color differences are not apparent between series from different islands.

I can not follow Ridgway (1893, p. 606; 1907, p. 606) in the recognition of the genus *Eribates*, erected for this one species,

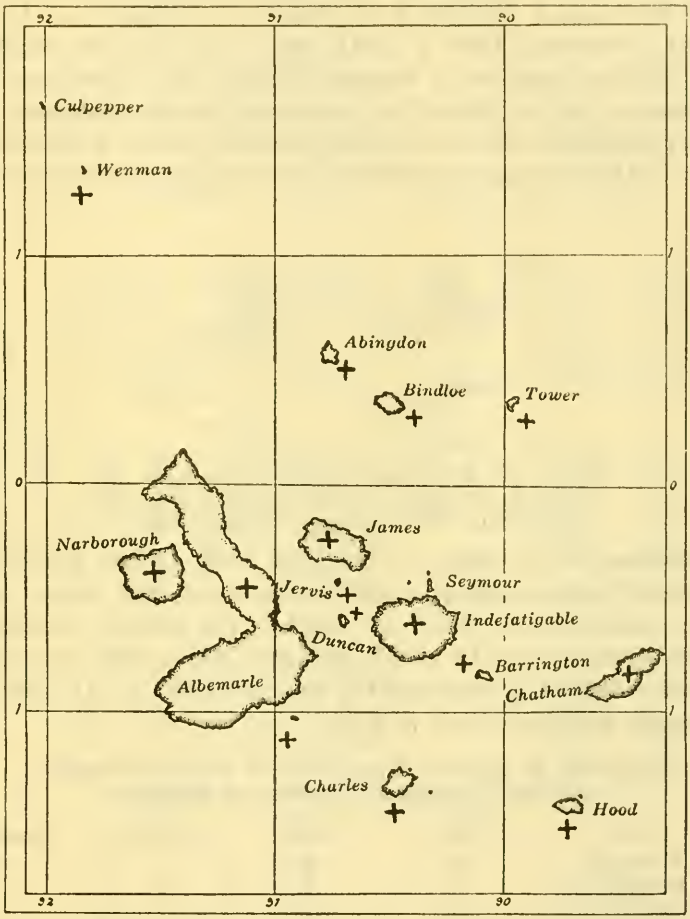


Fig. 7. Map showing distribution of *Myiarchus magnirostris*. Symbols indicate islands where recorded.

which seems to me to be *Myiarchus*-like beyond any question. The generic characters adduced as separating *Eribates* from *Myiarchus* are "tarsus relatively much longer (a little less than one-third as long as wing, about equal to length of bill from rictus), lateral outlines of bill not contracted terminally, and tenth (outermost) primary much shorter (shorter than secondaries)." The long tarsus

is a readily appreciable feature (at least as compared with North American species of *Myiarchus*, all that I have had available), but the other characters described are to my eye too nebulous for dependence. The three features cited, it seems to me, are none of them developed to a degree to justify the generic separation of the species.

In the original description of *Nesotriccus ridgwayi*, of Cocos Island (Townsend, 1895, p. 124), there is at least the implication of close relationship between *Eribates* and *Nesotriccus*, an implication that is reflected in even more positive statements in later publications (see, for example, Hellmayr, 1927, p. 188, footnote). The supposed resemblance between these two species is

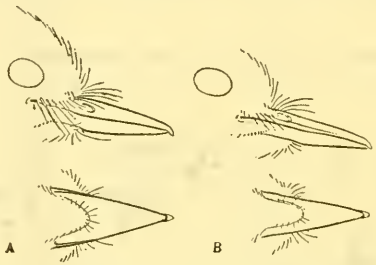


Fig. 8. a, Myiarchus magnirostris, male (no. 3461), Chatham; b, Nesotriccus ridgwayi, male (no. 3381), Cocos. Natural size.

non-existent to me, while, on the other hand, toward *Myiarchus*, regarding which nothing is said, *magnirostris* has obvious and close resemblance in nearly all details. The affinities of *magnirostris* seem to me to lie clearly with *Myiarchus*. This conclusion was also reached by Rothschild & Hartert (1899, p. 171) and by Snodgrass & Heller (1904, p. 269).

Specimens of *Myiarchus magnirostris* in the Collection of the California Academy of Sciences

Island	Adult male	Adult female	Sex not ascertained	Juvenal
Abingdon	2	1		
Bindloe	1	1	2	
Tower		1		
James	3	2		
Jervis	1			
Duncan	4	1		
Albemarle	11	7	2	
Brattle	2			
Indefatigable	27	13	5	
Barrington	7	1	4	
Chatham	14	13		
Hood	4	4		
Charles	25	7	2	3

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Myiarchus magnirostris*

MALES

Number of specimens	Island	Wing	Tail	Culmen	Tarsus	Middle toe with claw
2	Abingdon	67.0-70.2	59.8-64.2	13.2-15.5	21.0-22.0	13.0-13.0
1	Bindloe	71.0	66.5	14.2	22.2	13.0
3	James	72.5 (71.8-73.5)	67.7 (67.0-68.5)	15.1 (14.2-15.5)	22.1 (21.2-22.8)	13.7 (13.2-14.2)
1	Jervis	67.0	62.0	15.8	21.8	13.0
4	Duncan	71.0 (70.0-72.0)	64.9 (63.5-66.0)	15.2 (14.5-16.0)	22.2 (22.0-22.5)	13.3 (13.0-14.0)
10	Albemarle	70.7 (67.5-73.5)	64.8 (60.5-67.5)	15.0 (14.5-16.0)	22.2 (21.5-23.0)	14.0 (13.5-14.5)
2	Brattle	66.5-70.5	63.0-65.0	14.0-15.0	22.0-23.0	14.5-15.0
10	Indefatigable	71.0 (70.0-72.2)	66.2 (63.5-69.8)	14.7 (13.5-15.2)	21.7 (21.0-22.8)	13.3 (12.5-14.0)
7	Barrington	70.2 (68.2-71.5)	65.2 (63.0-67.5)	15.1 (14.5-15.5)	21.5 (20.5-22.0)	13.3 (13.0-13.8)
10	Chatham	68.1 (65.0-70.2)	62.2 (59.0-65.5)	14.1 (13.2-15.0)	21.1 (19.5-22.5)	13.4 (13.0-14.0)
4	Hood	73.2 (71.0-74.5)	67.1 (65.0-68.5)	14.9 (14.2-15.2)	21.3 (20.5-21.8)	14.1 (13.8-14.8)
10	Charles	72.1 (69.2-73.5)	65.8 (63.5-67.8)	15.5 (14.8-16.0)	22.0 (21.5-22.5)	14.8 (14.2-15.2)

FEMALES

1	Abingdon	67.2	60.8	13.5	21.0	13.0
1	Bindloe	66.2	60.2	14.5	21.5	12.2
1	Tower	65.0	59.5	14.5	20.8	12.8
2	James	69.0-71.0	65.0-65.0	14.8-15.5	20.5-21.0	13.0-14.0
1	Duncan	65.0	59.2	15.0	21.5	13.2
7	Albemarle	66.8 (66.2-67.8)	60.7 (59.2-62.5)	14.1 (13.5-14.8)	21.4 (20.5-22.5)	13.3 (13.0-13.8)
10	Indefatigable	67.7 (67.0-68.5)	63.4 (61.5-65.5)	14.4 (13.8-15.0)	21.4 (20.5-23.0)	13.3 (12.5-14.2)
1	Barrington	67.5	61.0	15.2	22.0	12.8
10	Chatham	65.3 (63.0-66.5)	59.3 (55.5-61.5)	14.3 (13.8-14.8)	20.5 (19.5-21.2)	13.4 (13.0-14.0)
4	Hood	69.7 (69.5-70.0)	64.7 (64.2-65.0)	14.6 (14.0-15.0)	21.0 (20.5-21.5)	13.5 (13.2-14.2)
8	Charles	68.2 (64.5-71.2)	62.1 (58.2-63.8)	14.8 (14.2-15.5)	21.8 (21.0-23.0)	13.9 (13.5-14.5)

Genus Pyrocephalus Gould

Pyrocephalus Gould, Zool. Voy. "Beagle," iii, 1841 (= July, 1839), 44. Types, "*Pyrocephalus parvirostris* (Gould) and *Muscicapa coronata* (Auct.)" = *Muscicapa rubinus* Boddært.

55. Pyrocephalus nanus nanus Gould

Pyrocephalus nanus Gould, 1841 (= July, 1839), p. 45, pl. 7 (orig. descr.; "Galapagos Archipelago").—Sclater & Salvin, 1870, p. 323, part (Bindloe Id.).—Sundevall, 1871, p. 125, part (James Id.).—Salvin, 1876, p. 492, part; 1883, p. 424 (Charles Id.).—Sharpe, 1877, p. 66.—Sclater, 1888, p. 214, part.—Ridgway, 1890, p. 112, part (James, Charles, and Abingdon islands); 1897, p. 572; 1907, p. 478.—Rothschild & Hartert, 1899, p. 172, part; 1902, p. 403 (Barrington and Albemarle islands).—Gifford, 1919, p. 197.

Pyrocephalus nanus nanus Snodgrass & Heller, 1904, p. 270, part.

Pyrocephalus rubinus nanus Hellmayr, 1927, p. 93, part.

Pyrocephalus carolensis Ridgway, 1894, p. 365 (orig. descr.; Charles Id.); 1897, p. 576.

Pyrocephalus abingdoni Ridgway, 1894, p. 367 (orig. descr.; Abingdon Id.); 1897, p. 578.

Pyrocephalus nanus abingdoni Snodgrass & Heller, 1904, p. 271 (Abingdon and Bindloe islands).

Pyrocephalus nanus Gould

Cotype.—British Museum (no catalogue number); ♂ ad.; Galapagos Islands; Charles Darwin. (Specimen "a'" of the Catalogue of Birds.)

Cotype.—British Museum, no. 55.12.19.198; ♀ ad.; Galapagos; C. Darwin. (Specimen "b'" of the Catalogue of Birds.)

Cotype.—British Museum (no catalogue number); ♀ ad.; Galapagos; C. Darwin. (Specimen "c'" of the Catalogue of Birds.)

Specimen "d'" of the Catalogue of Birds (entered as one of the types of *P. nanus*) is an example of *Pyrocephalus dubius.* There are also four specimens received from Burnett and Fitzroy that may or may not be considered as cotypes of *P. nanus.* [The date, "January 4, 1837", that is upon the labels of the first two specimens listed above, is when the birds were presented to the Zoological Society. N.B.K.]

Pyrocephalus carolensis Ridgway

Cotype.—United States National Museum, no. 115926; ♂ ad.; Charles Island; April 8 (1888); U. S. Fish Commission, Voyage of the Albatross, 1887-88.

Cotype.—United States National Museum, no. 115928; (♀?; sex not indicated on label); Charles Island; April 8 (1888); U. S. Fish Commission, Voyage of the Albatross, 1887-88.

Cotype.—United States National Museum, no. 115927; ♂ im.; Charles Island; April 8 (1888); U. S. Fish Commission, Voyage of the Albatross, 1887-88. Nos. 115926, 115928, now bear red "type labels."

PYROCEPHALUS ABINGDONI Ridgway

Type.—United States National Museum, no. 116134; ♂ ad.; Abingdon Island; April 16 (1888); U. S. Fish Commission, Voyage of the Albatross, 1887-88.

DESCRIPTION.—Approximate size, color and markings generally as in other species of *Pyrocephalus* (see Ridgway, 1907, p. 471). *Adult male:* Pileum and under parts brilliant red. In the brightest specimens the pileum is close to "spectrum red" (Ridgway), the under parts to "scarlet-red"; there is considerable variation in the intensity of these colors. Lores, auricular region, back, wings and tail, sooty blackish (fresh plumage) to sooty brownish (faded plumage), with, in fresh plumage, occasional faint grayish margins to feathers of any part. *Adult female:* Upper parts (including pileum, sides of head, back, wings and tail) brownish, in freshest and darkest state close to "raw umber." Chin, throat and malar region almost pure white, abruptly defined against the brownish cheeks and the yellowish under parts. From the upper breast posteriorly the under parts are yellow or buffy-yellow, ranging in different individuals from "baryta yellow" to "buff yellow". Upper breast, occasionally sides of breast, with fine but distinct longitudinal dusky streaks. In just one specimen these streaks are lacking. *Immature male*: Generally similar to adult female but brighter yellow below and with slightly heavier streaks on breast. In other stages, possibly of immaturity, the lower parts are pale red, in varying intensity, with dusky streaks on breast, and with pileum partly red, the red feathers dusky tipped. *Juvenal* (both sexes): Generally similar to adult female, but with brownish feathers of upper parts (pileum, dorsum, wing coverts, flight feathers and rectrices) margined with buff, cinnamon or whitish, and with breast, sides and flanks more heavily and extensively streaked.

Habitat.—The greater part of the Galapagos Archipelago. Reported from the following islands: Wenman, Abingdon, Bindloe, James, Jervis, Duncan, Albemarle, Narborough, Barrington, and Charles.

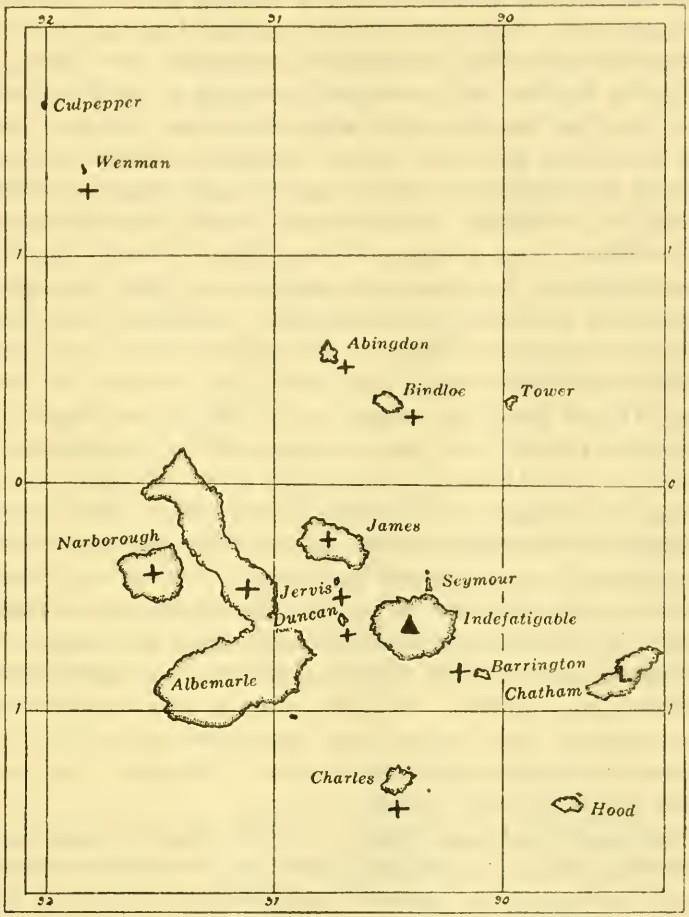
In the Academy catalogue specimens of *Pyrocephalus nanus nanus* and *P. n. intercedens* are entered, intermixed, under numbers 3045-3267. There are 182 specimens of *nanus* in the collection.

Pyrocephalus nanus Gould (1841, p. 45, pl. 7) was described from the "Galapagos Archipelago," no particular island being specified. The female figured in Gould's colored plate is of rather a brighter, clearer shade of yellow than is usual in the form to which I am restricting the name *nanus*, though it can be closely matched by selected specimens. In that particular it is more nearly like *intercedens*, but it is figured with a streaked breast, which that subspecies has not.

Ridgway (1894) restricted the name *nanus* to the bird of James Island, naming in addition several other forms, of which I can recognize *intercedens* of Indefatigable Island. Rothschild & Hartert (1899, p. 172) refuse recognition to *intercedens*, which I can understand after examining their James Island series, more extensive than our own. Of eight adult males from James in the Rothschild collection one is like *intercedens;* of five females, one is almost unmarked below (as in *intercedens*) and all display a slight leaning toward the color of that form. Our own birds from James Island (including four adult males and five adult females) are essentially like those from Charles. On the whole it would seem that James Island birds are intermediate in appearance between those of Albemarle and Charles on the one hand, and those of Indefatigable (*intercedens*) on the other, though nearer the former. I therefore use the name *nanus* for the form occupying all of the northern and western islands as well as Charles Island, with James Island as type locality but not occupied by birds showing the best manifestation of subspecific characters. With this preliminary disposal of names, I am using our extensive Charles Island series of 127 skins, including all the variation (seasonal, age, etc.) that is represented in part from other islands, as a basis for comparison with all the other series.

Charles Island *nanus*, compared with *intercedens* of Indefatigable Island, presents the following characters: The male bird (from Charles Island) is of a brighter shade of red. The female has

the yellow of the under parts of a more buffy shade, and with few exceptions has the breast and sides sharply, sometimes heavily, streaked with dusky.



+ Pyrocephalus nanus nanus

▲ Pyrocephalus nanus intercedens

L Pyrocephalus dubius

Fig. 9. Map showing distribution of *Pyrocephalus nanus nanus*, *P. n. intercedens*, and *P. dubius*. Symbols indicate islands where recorded.

Going north from Charles Island, birds from the other islands, as illustrated in our series, present the following features. Dun-

can: Seven specimens, all in excessively worn plumage but apparently the same as on Charles. Albemarle: The vermilion flycatcher of this island was referred to *intercedens* by Ridgway (1896, p. 575), but judging from the series at hand it does not belong to that subspecies. Male birds are intermediate between those from Charles and those from Indefatigable, but nearer the former. Of four adult females, one resembles *intercedens* in shade of yellow below, but has an extensively white throat and streaked breast; three are almost pure white below, streaked on breast and flanks. Juveniles from Albemarle differ from the same stage from Charles in being of a brighter yellow below, Charles birds being more buffy. There is no specimen of *intercedens* at hand entirely in juvenal plumage, but those with remnants of that plumage are very similar to young from Albemarle. Altogether, the *Pyrocephalus* from Albemarle Island is intermediate between *intercedens* of Indefatigable and *nanus* of Charles, but is nearer the latter. James: Of the four adult males, two are bright red, exactly like birds from Charles, and two are orange below, brighter on the throat. Eleven additional specimens, in worn and faded plumage, are sparsely streaked or nearly immaculate below. They are most nearly like Charles Island birds. Jervis: Three specimens, in very worn plumage, are apparently like those from Charles. Bindloe: The four adult males are paler than the brightest from Charles, but can be matched with some specimens from that island. The two females are nearly like those from Charles, but brighter yellow, less buffy, on the belly. Abingdon: One immature male, in very worn plumage, pale colored and unstreaked below. No comparisons can be based on this specimen. Wenman: One female, exactly like those from Charles.

Three males and one female from Barrington Island in the Rothschild collection are of the *nanus* type. This is rather curious in that Barrington lies between Indefatigable (habitat of *intercedens*) and Chatham (habitat of *dubius*), nearer the former, and is much farther distant from Charles, the nearest island occupied by *nanus*.

To sum up: Our series shows two well marked extremes, in the birds from Indefatigable and from Charles Island, respectively, *intercedens* from Indefatigable, *nanus* from Charles. Birds from the several other islands listed above are either exactly like those from Charles or are somewhat intermediate toward the form upon

Indefatigable. These intermediates are all most nearly like the bird upon Charles, and the whole aggregation should go under the same name, *nanus*. Our series of *Pyrocephalus* does not afford grounds for the recognition of the forms *carolensis* (Ridgway, 1894, p. 365) from Charles Island, or *abingdoni* (Ridgway, *loc. cit.*, p. 367) from Abingdon and Bindloe. It would not be surprising, though, if, with series from all the other islands as extensive as those here available from Indefatigable and Charles, slight average differences were to be seen that are not now apparent.

Plumage stages, as illustrated in our series, are as follows. Half-grown nestlings were taken on February 28, and others in juvenal plumage up to May 28. Specimens taken early in June are undergoing the post-juvenal molt. During the second week in May and for three weeks following, there are adults just finishing the annual molt, and male birds (presumably immature) molting into the red plumage. From early July until latter October birds are at their best. Females and immature males show the effects of wear and fading more quickly than the red males, and such wear shows markedly before the end of November. From December until the next molt, which probably begins early in March (there is a dearth of specimens taken in January, February and March), most specimens are in very worn plumage. There are parti-colored males, collected in February and March, that do not seem to be molting. These have much red on breast and belly, and they have on the top of the head feathers that are partly red and partly (tipped with) dusky.

56. Pyrocephalus nanus intercedens Ridgway

Pyrocephalus intercedens Ridgway, 1894, p. 366 (orig. descr.; Indefatigable Id.); 1897, p. 575.—Hartert, 1922, p. 385 (particulars of type specimen, in Rothschild Museum).
Pyrocephalus nanus Rothschild & Hartert, 1899, p. 172, part, crit.—Ridgway, 1907, p. 478, part.
Pyrocephalus nanus nanus Snodgrass & Heller, 1904, p. 270, part.
Pyrocephalus rubinus nanus Hellmayr, 1927, p. 93, part.

PYROCEPHALUS INTERCEDENS Ridgway

Cotype.—Rothschild Museum; ♂ ad.; Indefatigable Island; August 5, 1891; Dr. G. Baur; orig. no. 418.

Ridgway indicated no type specimen, but based his description upon three skins (adult male, adult female, and immature male) in the Baur collection, with comments upon still others in the U.

S. National Museum. Of the three Baur skins the adult male is the only one I found in the Rothschild collection. As it bears a red "type label" of the U. S. National Museum it was evidently regarded by Ridgway as the type specimen.

Description.—*Adult male:* Generally similar to *nanus* but with the red areas of a slightly different (paler and more orange) shade. *Adult female:* Upper parts brownish, about as in *nanus* but (especially on the head) with a slight suffusion of yellow. A fairly distinct yellowish streak from the nostril over and behind the eye. Lower parts yellowish, close to "apricot yellow" in the brightest individuals, paling in others to whitish with a faint yellow suffusion. The throat is always paler than the rest of the lower parts, sometimes whitish, but never with a well defined whitish area as in *nanus*. Lower parts usually immaculate, occasionally with faintly indicated dusky streaks on sides of breast. *Juvenal:* Generally like adult female, but (as in *nanus*) with feathers of upper parts, wings and tail, margined with buffy or whitish. Breast streaked, but not so heavily and extensively as in young *nanus*. There are male birds in (assumedly) immature stages about as in *nanus*.

Habitat.—Indefatigable Island.

Described by Ridgway in 1894 (p. 366) from Indefatigable Island, a range that was later extended to include Albemarle Island (Ridgway, 1897, p. 575). Differentiating characters, compared with *P. nanus*, of James Island, and "*carolensis*," of Charles Island, included differences in shade of red of adult males, and in color and markings, principally on the lower parts, in the females. The adult female of *intercedens* was described as follows: "Above deep hair brown, the pileum strongly tinged with yellow; superciliary stripe, extending from nostrils to posterior angle of eye (broadest anteriorly), light buff-yellowish; malar region, chin, and throat very pale maize yellow; rest of under parts light chrome or deep naples yellow" (Ridgway, 1897, p. 575). The existence of this form has been discredited by later writers. Rothschild & Hartert (1899, p. 172), and Snodgrass & Heller (1904, p. 270), deny recognition to *intercedens*, and Ridgway, himself, later (1907, p. 478) places the name in synonymy under *nanus*.

Our collection contains 41 from Indefatigable Island. The adult males are of a different shade of red than those from other islands, and our series of females certainly displays the characters

ascribed to *intercedens* by Ridgway (*loc. cit.*). In the Academy collection, comparisons are best made with the series of *nanus* from Charles Island, as having the most extensive representation of any of the islands. In the adult males the difference in color is such as to be readily apparent on side by side comparison of single birds or of series. In *intercedens* the red of pileum and underparts is paler, more of an orange shade; even when the paler colored specimens of *nanus* are chosen for comparison there is an appreciable difference between the two in the shade of red. In the male *intercedens* more white shows through the red on the chin and throat.

In adult females the difference in color below is readily apparent. In *intercedens* the underparts are of a clearer yellow, a color that in the more highly marked specimens extends with but a slight paling almost to the bill. There is very little white on the chin. Even in the paler-colored individuals there is not the rather abruptly white chin and throat that characterizes the female of *nanus*. The underparts are immaculate, or with but a few slight flecks of dusky on the breast. In *nanus* the chin and throat are white, slightly or not at all tinged with yellowish, and this whitish area is generally rather sharply defined against the yellowish breast; breast and sides are of a slightly more buffy yellow than in *intercedens*, and are marked with sharply defined dusky shaft streaks. One specimen of *nanus* (no. 3158) has the under parts well-nigh immaculate, as in *intercedens* but of a different shade; another (no. 3142) has the underparts colored as in pale examples of *intercedens*, but the throat is extensively white and the breast lightly streaked. Differences in the immature plumages of *intercedens* and *nanus* seem to parallel those in the adult female, though the available series of young *intercedens* is too limited to fully demonstrate this.

Snodgrass & Heller (1904, p. 270) had no specimens from Indefatigable, basing their objection to the recognition of *intercedens* upon their series from Albemarle. In this I can agree with them, as the Albemarle bird, judging from our series, is not *intercedens*, but their argument has no bearing upon the status of the form on Indefatigable.

The use of the trinomial, *Pyrocephalus nanus intercedens*, may be criticized, as obviously there is no geographical continuity between the ranges of the forms *nanus* and *intercedens*. It seems

to me, however, that it is best to treat the two as subspecies, as has been done generally with similarly differentiated island forms in our North American list. For one thing, there is individual intergradation, affecting one character or another, between the two. Obviously, also, *nanus* and *intercedens* are far more nearly alike, more nearly related, than either is toward *Pyrocephalus dubius*, of Chatham Island, and a false idea would be conveyed by using the binomial for each of the three forms. On the other hand, I do not feel that I can follow Hellmayr (1927, p. 93), who treats both *nanus* and *dubius* as subspecies of the mainland species *Pyrocephalus rubinus*. In degree of difference, in constancy of characters, and in geographical distribution, it seems to me that *rubinus*, *nanus* and *dubius* meet the requirements for specific distinction.

57. Pyrocephalus dubius Gould

Pyrocephalus dubius Gould, 1841 (= July, 1839), p. 46 (orig. descr.; "Galapagos Archipelago".—Ridgway, 1894, p. 368; 1897, p. 579; 1907, p. 480.—Rothschild & Hartert, 1899, p. 173; 1902, p. 403.—Rothschild, 1902a, p. 47 (nest and eggs).—Snodgrass & Heller, 1904, p. 272.—Gifford, 1919, p. 198 (life history).

Pyrocephalus minimus Ridgway, 1890, p. 113, in text.

Pyrocephalus nanus Salvin, 1876, p. 492, part.—Sclater, 1888, p. 214, part.

Pyrocephalus rubinus dubius Hellmayr, 1927, p. 93.

PYROCEPHALUS DUBIUS Gould*

Cotype.—British Museum, no. 37.5.13.210; ♀ ad.; (Galapagos); Gould. (Specimen "e'", under *P. nanus*, in Catalogue of Birds.)

Cotype.—British Museum, no. 55.12.19.184; ♀ ad.; Galapagos; C. Darwin. (Specimen "d'", under *P. nanus*, in Catalogue of Birds.)

?*Cotype.*—British Museum, no. 37.2.21.299; ♂ ad.; Galapagos; Burnett and Fitzroy.

PYROCEPHALUS MINIMUS Ridgway

Type.—United States National Museum, no. 115961; ♂ ad.; Chatham Island: April 5 (1888); U. S. Fish Commission, Voyage of the Albatross.

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*Mr. Kinnear supplies the following additional facts, with his own ideas, on the matter of the type or types of *P. dubius*.—"No. 55.12.19.184 is Gould's type, which came to the British Museum from the Zoological Society. No. 37.5.13.210 is wrongly entered as the type of *dubius* in the Catalogue of Birds (specimen e'); it was purchased from Gould and according to the Register came from 'Brazil'.

"There are two specimens from Burnett and Fitzroy (not types) with particulars as follows: 37.2.21.397, ♂ juv., Chatham Id., original no. 400; 37.2.21.399, ♂, Charles Id., original no. 404. *Dubius* is not supposed to occur anywhere except on Chatham, but Fitzroy was very careful and all, or nearly all, of his birds have the original numbers." N.B.K.

DESCRIPTION.—*Adult male:* Similar to *nanus* in color pattern, but decidedly smaller and with red of lower parts decidedly paler (approximately "peach red" in the brightest individuals). *Adult female:* Upper parts generally brownish (close to raw umber), whole top of head strongly suffused with buffy, and with a broad buffy streak from the nostril over and behind the eye. Lower parts immaculate, close to "orange buff" in the darkest individuals. As in the other forms of *Pyrocephalus* there are males, presumably immature, that are indistinguishable from the female, and others with the lower parts mixed buffy and red in varying degrees. *Juvenal:* Sexes alike. Generally similar to adult female but dusky upper parts (pileum, dorsum, wing coverts and flight feathers) with feathers margined or tipped with rusty cinnamon. Outer web of outer rectrices and tips of the others cinnamon rufous. Below faintly yellowish, immaculate on throat and middle of abdomen. Breast, sides and flanks with fine dusky streaks lengthwise of feathers. (Described from three young in the Rothschild Museum.)

HABITAT.—Chatham Island.

Our series includes the following specimens: Adult (red) males, 24; females, 39; immature males, 31; sex undetermined, 12. Total 106 (nos. 3268-3373). They were collected on the following dates: January 25, 27, 29; February 8, 22, 23; July 5, 6, 7; September 8, 10; October 16, 17, 18.

Dubius is sufficiently removed from *nanus* to be treated as a distinct species. The male *dubius* varies in the shade of red of the lower parts so that the brightest colored specimens of *dubius* are closely similar to the palest of *nanus*, and intergradation between the two might be considered to exist to that extent. This, however, is hardly a fair criterion to apply. In measurements, and in color of female and immature there appears to be no overlapping. The male *dubius* is in shade of red more nearly like *nanus* than like *intercedens*.

The immature male, in general like the female, differs slightly from the mode in that sex in paler ventral coloration and in having some striation on the breast. Such breast markings in the female are either altogether wanting or are very faintly indicated. There are presumably immature males collected during the first two weeks in July (soon after the time of the annual and the post-juvenal molts) that are in the female plumage throughout, barring the slight variation above indicated. There are other males taken

at the same time that are partly red below and on the pileum. This may mean that the male bird requires two years to acquire its brightest plumage, going, after the post-juvenal molt, into the female plumage, after the next annual molt into a parti-colored plumage, and after the third molt into the bright red plumage of the fully mature bird. Or it may mean that some individuals molt from juvenal into this parti-colored plumage and some into female plumage, all assuming the fully mature, red plumage in the second year. I am inclined to take the latter view, though there are no such specimens available as would serve to corroborate it. No molting examples of *dubius* were collected, and no juveniles. In an account of the habits of the bird, Gifford (1919, p. 200) remarks that "birds in plumage intermediate between red and buff were rare." They should be common if this were a stage regularly gone through by all males.

In the female, besides the distinctively ochraceous-buff color of the lower parts, so different from the color in *nanus* and *intercedens*, there is a buffy suffusion on the pileum, comparable to the red crest in the male, a distinctly marked area such as is not seen in the other forms.

SPECIMENS OF *Pyrocephalus* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

Name	Island	Adult male	Adult female	Immature male	Sex undetermined	Young
Pyrocephalus n. nanus	Wenman		1			
Pyrocephalus n. nanus	Abingdon			1		
Pyrocephalus n. nanus	Bindloe	4	1		1	
Pyrocephalus n. nanus	Albemarle	10	5	2		6
Pyrocephalus n. nanus	James	4	5	4	2	
Pyrocephalus n. nanus	Jervis	1	2			
Pyrocephalus n. nanus	Duncan	3	2	2		
Pyrocephalus n. nanus	Charles	40	27	26	6	27
Pyrocephalus n. intercedens	Indefatigable	19	8	9	5	
Pyrocephalus dubius	Chatham	24	39	31	12	

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Pyrocephalus nanus nanus*, *P. n. intercedens* AND *P. dubius*

Number of specimens	Sex	Name	Island	Wing	Tail	Culmen	Tarsus	Middle toe and claw
10	♂	Pyrocephalus n. nanus	Charles	63.6 (62.5-66.0)	53.4 (51.5-55.0)	12.0 (11.5-12.2)	18.1 (17.5-18.2)	13.7 (12.2-15.0)
10	♂	Pyrocephalus n. intercedens	Indefatigable	62.6 (60.2-64.0)	53.0 (51.5-55.0)	12.2 (11.0-13.0)	18.4 (17.5-19.0)	13.8 (13.0-14.5)
10	♂	Pyrocephalus dubius	Chatham	57.1 (56.0-58.0)	48.3 (47.5-49.2)	11.2 (10.8-11.8)	16.8 (16.0-17.0)	12.4 (12.0-12.8)
10	♀	Pyrocephalus n. nanus	Charles	61.6 (60.5-63.5)	52.8 (51.0-54.0)	11.6 (11.2-12.0)	18.3 (17.8-19.0)	13.2 (13.0-13.5)
8	♀	Pyrocephalus n. intercedens	Indefatigable	61.0 (60.0-64.0)	52.4 (49.0-55.5)	11.8 (11.0-12.2)	18.1 (17.0-19.0)	13.3 (13.0-13.8)
10	♀	Pyrocephalus dubius	Chatham	55.1 (54.0-56.2)	48.5 (47.2-50.0)	10.9 (10.0-12.0)	16.3 (16.0-17.0)	11.7 (11.2-12.0)

Genus Nesotriccus Townsend

Nesotriccus Townsend (C. H.), Bull. Mus. Comp. Zool., XXVII, No. 3, July, 1895, 124. (Type, *N. ridgwayi* Townsend.)

Nesotriccus ridgwayi Townsend

Nesotriccus ridgwayi Townsend, 1895, p. 124, pl. (Cocos Id.).—Snodgrass & Heller, 1902, p. 518.—Ridgway, 1907, p. 482.—Gifford, 1919, p. 242.

Nesotriccus ridgwayi Townsend

Type.—United States National Museum, no. 131691; ♂ ad.; Cocos Island, Pacific Ocean; February 28, 1891; C. H. Townsend.

Description.—For detailed description see Ridgway, 1907, p. 482.

Habitat.—Cocos Island, Costa Rica.

The Academy series includes 35 specimens, all adults, collected September 4 to 13, 1905 (nos. 3379-3413). Ridgway gives a detailed description of the adult male, the female being then unknown. Our series includes both sexes, which are exactly alike in color and markings. As remarked under *Myiarchus magnirostris,* I do not consider *Nesotriccus ridgwayi* as being closely related to that species, as it has been regarded by others. It seems to me that its nearest affinities must lie in some other direction.

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Nesotriccus ridgwayi*

Number of specimens	Sex	Wing	Tail	Culmen	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
17	♂	60.3 (58.0-64.5)	55.2 (52.5-57.2)[1]	15.0 (14.8-15.2)[2]	3.6 (3.2-3.8)	6.2 (6.0-6.5)[3]	21.2 (20.2-22.2)	13.8 (13.2-14.8)
13	♀	58.0 (55.5-60.0)	52.3 (51.0-54.0)	14.3 (13.8-15.0)[3]	3.6 (3.5-3.8)[4]	5.6 (5.2-6.2)	19.9 (19.0-20.5)	13.3 (13.0-13.8)

[1] 15 specimens
[2] 16 specimens
[3] 12 specimens
[4] 11 specimens

58. Progne modesta (Neboux)

Hirundo modesta Neboux, 1840, p. 291 (Charles Island).—Sundevall, 1871, p. 125.
Progne modesta Gould, 1841 (= July, 1839), p. 39, pl. 5.—Ridgway, 1897, p. 505; 1904, p. 43.—Snodgrass & Heller, 1904, p. 347.
Hirundo concolor Gould, 1837, p. 22 (Galapagos Archipelago).
Progne concolor Salvin, 1876, p. 476.—Sharpe, 1885, p. 176.—Ridgway, 1890, p. 105.—Rothschild & Hartert, 1899, p. 152; 1902, p. 386.—Gifford, 1919, p. 205 (life history).

HIRUNDO MODESTA Neboux

Type.—Museum National d'Historie Naturelle, Paris; ♀; "La Venus, 1839, I. Galapagos (Neboux)."

Data supplied by J. Berlioz, who writes me as follows: "I find in our collection only a single specimen of Swallow brought by "La Venus" from the Galapagos Islands. This specimen, mounted but still in rather good condition, bears naturally no original label, as most of the birds of those older times, but only a collection label. There can be little doubt that it is really the type of Neboux's *Hirundo modesta*, as, in the list of specimens brought by Neboux in 1839 and still preserved in our old registers, there is only one Swallow mentioned."

HIRUNDO CONCOLOR Gould

Type.—British Museum, no. 60.1.16.54; (♂ ad.); Galapagos; no date; "Beagle".*

A dismounted bird with glass eyes and wired legs; in fair condition.

HABITAT.—The central and southern islands of the Galapagos Archipelago. Reported thus far from the following islands: James, Albemarle, Duncan, Daphne, Seymour, Indefatigable, Barrington, Chatham, Charles, and Hood.

The Academy series consists of 56 specimens (nos. 3588-3643), as listed in the accompanying chart, not a sufficient number, or from enough places to demonstrate the existence of any variation between birds from different islands.

Presumably immature males collected during March, April and May, show small patches of glossy black feathers scattered through the otherwise brownish body plumage. Two birds marked as males that were collected later in the year, in August, are of uni-

*Ex Gould's collection; probably purchased from the Zoological Society. N.B.K.

formly brownish body color, as are the females, and it is possible that in these two the sex is wrongly indicated. The specimens in our series were taken in February, March, April, May, August,

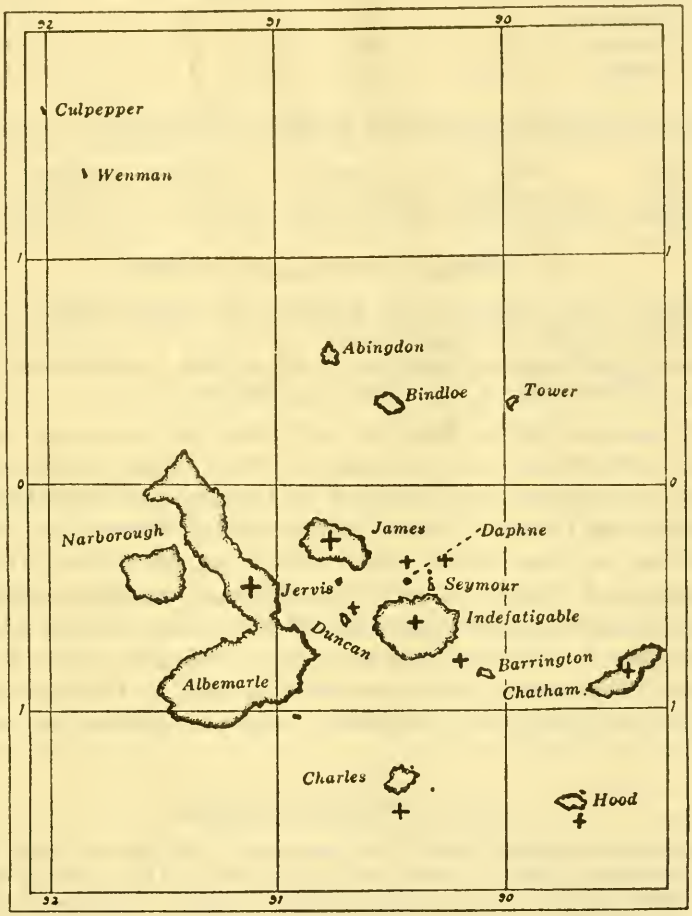

Fig. 10. Map showing distribution of *Progne modesta*. Symbols indicate islands where recorded.

October and November, and the species was seen, besides, in January, September, and December (Gifford, 1919, p. 205). It is not known to migrate from the Galapagos at any season.

Specimens of *Progne modesta* in the Collection of the California Academy of Sciences

Island	Adult male	Immature male	Female
Albemarle	16	9	21
Seymour			3
Indefatigable			1
Chatham	1		1
Charles	2	1	1

Measurements in millimeters (average, minimum and maximum) of *Progne modesta*

Number of specimens	Island	Wing	Tail	Culmen	Tarsus	Middle toe with claw
10 males	Albemarle	124.9 (121.0-128.0)	63.2 (60.0-65.2)	10.0 (9.5-10.2)	11.1 (10.8-11.5)	14.0 (13.5-14.5)
10 females	Albemarle	120.5 (115.0-123.5)	59.0 (51.8-62.5)	9.3 (9.0-10.2)	11.0 (10.5-11.5)	14.5 (13.5-15.0)

59. Hirundo erythrogaster Boddært

Hirundo rustica erythrogastra Rothschild & Hartert, 1899, p. 152 (Charles and Chatham islands).

Hirundo erythrogaster Snodgrass & Heller, 1904, p. 348 (Hood Id.). —Gifford, 1919, p. 205 (Cocos Id.; Charles Id.).

A transient species that, like the Bob-o-link, is of more than casual occurrence in the Galapagos. "Five skins of the North American swallow were procured in October and November on Charles and Chatham Islands" (Rothschild & Hartert, *loc. cit.*). "In May we saw several individuals flying about over Hood" (Snodgrass & Heller, *loc. cit.*). The Academy expedition collected three specimens, an immature male, 40 miles south of Cocos Island, September 1, 1905; an immature male, "25 miles from Cocos Island," September 2, 1905, and an adult male, on Charles Island, October 12, 1905 (nos. 3585-3587). (See also Gifford, *loc. cit.*).

Genus Nesomimus Ridgway

Nesomimus Ridgway, Proc. U. S. Nat. Mus., XII, Feb. 5, 1890, 102, footnote. Type, *Orpheus melanotis* Gould. (For generic characters and for detailed descriptions of species see Ridgway, 1907, pp. 244-257.)

The genus *Nesomimus* is peculiar to the Galapagos Islands, where it is (or has been) found on all of the larger islands and on most of the smaller ones. Only one form (species or subspecies) occurs upon any one island. Of the more recent students of the genus, Rothschild & Hartert (1899, pp. 142-147) recognize five species, *trifasciatus*, *macdonaldi*, *adamsi*, *melanotis*,

and *parvulus*, with six subspecies under *melanotis* and two under *parvulus*, making eleven forms in all; Snodgrass & Heller (1904, pp. 358-372) recognize five species, *trifasciatus*, *macdonaldi*, *adamsi*, *melanotis*, and *personatus*, with four subspecies under *melanotis* and four under *personatus*, again eleven forms; and Ridgway (1907, pp. 244-257) recognizes the same eleven forms as Snodgrass & Heller, but regards them all as distinct species. Snodgrass & Heller relegate to synonymy one form, *N. parvulus affinis*, that was recognized by Rothschild & Hartert, and they describe one additional form, *N. melanotis dierythrus*.

In my own study of the genus, here presented, I have felt compelled to adopt a nomenclature and a systematic treatment that are somewhat different from any of those just mentioned. I recognize the species *trifasciatus*, *macdonaldi*, *melanotis* (= "*adamsi*"), and *parvulus* (= *melanotis* of most authors), with the last named divided into the following seven subspecies, *barringtoni*, *bauri*, *parvulus*, *bindloei*, *personatus*, *wenmani*, and *hulli*, ten forms in all. *Nesomimus affinis* Rothschild (1898, p. 53) is relegated to the synonymy of *N. parvulus parvulus*, in which I follow Snodgrass & Heller (1904, p. 370) and Ridgway (1907, p. 256). *Nesomimus melanotis dierythrus* is also here placed in the synonymy of *parvulus*. One new subspecies is here described, *Nesomimus parvulus wenmani*, from Wenman Island.

Nesomimus is a homogeneous group, obviously nearly related to the mainland genera of Mimidæ, but it is not possible to designate any one form of *Nesomimus* as most closely related to a mainland species, and to trace any course of increasing divergence from this starting point or from any other. With this in mind I can appreciate Ridgway's (1907) logically correct treatment in regarding each form as a separate species, for each is resident in its island habitat, there are no two forms upon any one island, and there is no question of overlapping ranges. I can not bring myself, though, to place such widely different forms as *trifasciatus*, *macdonaldi*, *melanotis*, and *parvulus* on exactly the same basis as the slightly differentiated variants of the *parvulus* group.

Differentiating color characters that have been used in the genus *Nesomimus* pertain to blotches and spots on the breast; color of upper surface and whether streaked or not; white spots on wing coverts and tertials, at tips of primaries and secondaries, at tips of rectrices; relative distinctness of nuchal collar, and of

dusky submalar streak; color of pileum, ear coverts, sides of neck, sides of breast, flanks, and rump. Some of these features, oft-quoted, are really useless in differentiating species and subspecies. Even those of taxonomic significance are variable to such a degree that it is possible to take any one character and trace it from an extreme of development in one species, through various lessening degrees in other species, and finally to where it is present in some individuals and absent in others in subspecies where this character dwindles to the vanishing point. In this sense, all of the forms of *Nesomimus* might be regarded as subspecies of one species. As a matter of fact, there are gaps between certain of the forms that render it perfectly reasonable to recognize them as distinct species, though closely related and distinguished only by the different extent of development of the same characters. On the other hand, on the islands occupied by what I regard as subspecies of *parvulus*, there is in each case individual variation that overlaps every differentiating character that has been adduced as distinguishing any given form from its nearest neighbor and nearest relative (I believe the terms are here equivalent). The extremes, even, are so slightly different that it seems to me perfectly reasonable to treat them all as subspecies, a treatment that is thus admittedly based on intergradation through individual variation and on degree of difference, and disregarding the fact that in these sedentary island forms there can be no actual contact or overlapping of habitats between the different subspecies. Should it be insisted upon that insular isolation implies specific difference between all of the described forms, I can see no reason for not going a step farther and recognizing as specifically different the birds of every island, whether or not their differences are visible to our eyes. In the case of *Nesomimus* there are certain described forms that may be distinguished by any one at a glance, there are others that may be recognized by any intelligent layman after having had the characters pointed out to him, and there are still others that present minute average differences that can be appreciated only by the specialist and by him only after most careful study. Would it be illogical, in still other cases where the birds from different islands are, to our eyes, alike, to assume that their actual separation warrants the same nomenclatural treatment that is adopted in the last mentioned case?

As a matter of fact, of course, we do not feel like giving names to what we cannot define. Hence, in the admittedly difficult matter of the nomenclatural treatment to be afforded island forms, I prefer here to base such treatment upon degree of differences and upon the extent of individual intergradation, regardless of the actual isolation of individuals upon islands. So, in *Nesomimus* I feel able to recognize four rather sharply defined species, with, under one of these species, seven slightly differentiated subspecies.

I do not sympathize with attempts to indicate close relationship between birds on widely separated islands, as has been done, for example, in the lumping together of Wenman and Barrington birds under one name. It can be seen, *reductio ad absurdam*, in the chart published by Beebe (1924, pl. 13, opp. p. 72) showing supposed relationships of the species of *Nesomimus*. That author is not to blame for accepting as he did the explicit statements of those who have studied these birds, but the fact is that the characters forming the basis of this emphatic and startling diagram are by no means the trenchant, conspicuous features that one would naturally suppose them to be. It must be borne in mind that the different forms of *parvulus* are so closely similar in appearance as, in some cases, to be distinguished at all only by the closest scrutiny. Characters used to distinguish them, indicated on the diagram cited, are some of them non-existent, in other cases barely discernible, in still others present or absent in varying degree within series from all the different islands. My material for the most part shows resemblances between neighboring forms, but the relative position of the islands of the Galapagos Archipelago is not such as to suggest any linear arrangement of species and subspecies.

The specimens available in the present study total 790 skins, 660 in the Academy collection, 130 from Stanford University Museum. Besides adults, all of the forms except *hulli* and *wenmani* are represented in juvenal plumage, and the young birds, in general show differences that closely parallel those seen in adults. Young *trifasciatus* is dark colored, extensively spotted below and with the spots on the breast tending to form a blotch on each side. Young *macdonaldi*, compared with young *trifasciatus*, is paler colored and larger, with noticeably long bill; a restricted portion of the breast is spotted and the flanks streaked, throat and abdomen are immaculate; rectrices show scarcely a trace of white tips. Young *melanotis* is pale colored, the spots

below more sparsely scattered than in *trifasciatus* and *macdonaldi*, the rectrices conspicuously white-tipped, the bill small. Young *parvulus* and young *barringtoni* differ as do adults. The former is dark colored, heavily spotted below, except on throat and belly, with short terminal tail spots, and with small bill. Young *barringtoni* (only one specimen available) is pale colored, with small spots on upper breast only, with extensive white tips to the rectrices and with long bill.

It is a difficult matter to trace plumage changes in this series, for there is an almost total lack of molting birds. In juvenal plumage, the one young example of *trifasciatus* was taken on February 26. Of *macdonaldi*, young collected from June 23 to July 2 are full grown and beginning the post-juvenal molt. Of *melanotis*, nestlings were collected on January 25, and full grown young up to February 23. Of *parvulus*, juvenal plumaged birds were taken from March 5 to May 1. The one juvenal specimen of *barringtoni* is dated July 9. It thus appears that *Nesomimus* may be found in juvenal plumage over half the year, on one island or another, and our series shows this plumage on specimens of one form (*parvulus*, from Albemarle) taken over a period of two months. From the degree of wear and fading shown on different specimens taken on the same island, at the same time, it appears that the period of molt in adults is also long drawn out. Of *trifasciatus*, the most worn and faded specimens were taken on October 3, but there are perfectly fresh-plumaged birds in greater number, and one that is molting, that were collected on the same day. The same sort of variation is shown on other of the islands. Apparently *Nesomimus* has one complete molt per year, but the duration of this molt, in different individuals, extends over a long period of time. It seems for the most part to take place in April and May; June and July specimens are the freshest and cleanest. September and October birds, represented by large series, are mostly good clean-plumaged specimens, but, as a rule, without the first bloom of newly acquired feathers. January and February specimens on the average show a more worn condition, and those taken in March and April are among the most shabby. In all the series, though, there is no such uniformity of change and no such limited period of change as are seen in North American birds.

An unfortunate defect in the series lies in the fact that in collecting these birds the "adult" and "immature" stages were

not differentiated as can so easily be done from the character of the skull, sometimes for two months or more after the juvenal plumage is discarded and old and young are outwardly almost alike. It might very well prove to be the case here, as has been demonstrated in other species, that differences ascribed to "individual variation," would yield to an orderly arrangement according to age. The occasional spotting on the breast of forms of *Nesomimus* that are ordinarily immaculate is one character that may be suspected to persist in some immature birds. I find some

Fig. 11. Tail of *Nesomimus macdonaldi*, showing variation that may be due to age; male, no. 3738; natural size. All of the rectrices on the right side and one on the left appear to have been lost in some way other than by the regular molt. They have been replaced by feathers of greater length and breadth (presumably adult plumage), as compared with the remaining old (presumably immature) feathers on the left side, which are much worn and would soon be molted.

specimens with narrower rectrices than others (see fig. 11) another feature suggesting immaturity, but lacking the clue afforded by positive data regarding skull structure I have not been able to work out any definite order of slightly different plumages.

The accompanying "Key" is not submitted as a means of identifying closely similar subspecies. The different forms of *Nesomimus* are segregated upon different islands, sometimes one species or subspecies upon several islands, but never more than one form

upon any one island. Hence, locality alone is sufficient data for nominal identification. The "Key" aims to present in shape to be readily grasped the features that are used to characterize the birds from the different islands. Overlapping of characters in neighboring subspecies occurs to such an extent as to preclude the possibility of constructing for the identification of these subspecies a "Key" that will serve for every specimen of a given form. Presented in this shape, however, it is easier to grasp the manner of variation that obtains in the genus than it is by means of detailed descriptions that compare, feature by feature, different forms that are variously situated, near to or far from, one another. It should be understood that in the case of closely similar subspecies, distinguished by slight size difference, comparison of females of the larger with males of the smaller subspecies, will result is an apparent overlapping of characters such as will not appear by comparison of specimens all of the same sex.

KEY TO THE SPECIES AND SUBSPECIES OF *Nesomimus*

(Measurements given are of male birds)

a. Breast marked laterally with brown patches, or crossed by dusky spots, or with partly concealed dusky spots or blotches

b. Auricular region usually whitish; breast with a large patch of dusky on each side, median portion with smaller spots extending across; outer rectrices with poorly defined whitish tips.....*Nesomimus trifasciatus*

bb. Auricular region dusky.

c. Bill larger (culmen 30.2—34.5 mm.); spotting on breast distinct; outer rectrices usually not tipped with whitish .....*Nesomimus macdonaldi*

cc. Bill smaller (culmen 22.2-23.5 mm.); spotting on breast indistinct or obsolete; outer rectrices with sharply defined white tips.....*Nesomimus melanotis*

aa. Breast pure white, usually entirely unmarked

b. Bill smaller (culmen 18.2-22.0, usually less than 21 mm.) .....*Nesomimus parvulus parvulus*

bb. Bill larger (culmen usually more than 21 mm.)

c. Paler above

d. Larger (wing 113.5—118.0 mm.); maxillary streak distinct.....*Nesomimus p. bauri*

dd. Smaller (wing 103.5-111.0 mm.); maxillary streak absent or faintly indicated.....*Nesomimus p. barringtoni*

cc. Darker above

e. Wing bars narrower; dorsal coloration extremely dark

f. Bill larger (culmen 24.0—26.0 mm.)..... .....*Nesomimus p. personatus*

ff. Bill smaller (culmen 21.0—24.5 mm.)..... .....*Nesomimus p. bindloei*

ee. Wing bars broader; slightly paler dorsally.

g. Maxillary streak absent or faintly indicated .....*Nesomimus p. wenmani*

gg. Maxillary streak distinct.....*Nesomimus p. hulli*

SPECIMENS OF *Nesomimus* IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES AND (FIGURES IN PARENTHESES) IN THE STANFORD UNIVERSITY COLLECTION

Name	Island	Male	Female	Young	Sex undetermined
Nesomimus p. hulli	Culpepper	5 (3)	3 (2)		
Nesomimus p. wenmani	Wenman	6	3		
Nesomimus p. personatus	Abingdon	19 (2)	9 (2)	1	
Nesomimus p. bindloei	Bindloe	18 (2)	16 (4)	(2)	4
Nesomimus p. bindloei	James	10 (2)	8 (1)	(9)	(3)
Nesomimus p. bindloei	Jervis	19	12		
Nesomimus p. parvulus	Daphne	1			
Nesomimus p. parvulus	S. Seymour	8 (4)	3 (4)	1 (2)	(1)
Nesomimus p. parvulus	Indefatigable	55 (2)	34 (1)	2	5 (1)
Nesomimus p. parvulus	Albemarle	22 (13)	19 (13)	22 (2)	1
Nesomimus p. parvulus	Narborough	4 (7)	2 (8)		
Nesomimus p. bauri	Tower	12 (1)	7 (5)	(3)	(1)
Nesomimus p. barringtoni	Barrington	54	16	1	2
Nesomimus melanotis	Chatham	69 (3)	55 (1)	4 (2)	5
Nesomimus macdonaldi	Hood	28 (4)	22 (5)	15 (3)	1
Nesomimus macdonaldi	Gardner-near-Hood	7	6		1
Nesomimus trifasciatus	Gardner-near-Charles	14	14		1
Nesomimus trifasciatus	Champion	8	4	1	1

Measurements in millimeters (average, minimum and maximum) of species and subspecies of *Nesomimus*

MALES

Number of specimens	Name	Island	Wing	Tail	Culmen	Tarsus	Middle toe and claw	White spot on outer rectrix
5	Nesomimus p. hulli	Culpepper	110.9 (109.0-112.5)	99.5 (98.0-101.5)	24.0 (23.5-24.5)	34.5 (33.0-36.2)	25.9 (25.5-26.5)	17.7 (17.0-18.5)
6	Nesomimus p. wenmani	Wenman	110.9 (108.2-112.5)	105.1 (95.0-110.0)	23.6 (22.5-24.8)	34.7 (34.0-36.0)	26.0 (25.0-27.0)	19.5 (16.2-22.0)
10	Nesomimus p. personatus	Abingdon	109.6 (105.5-112.5)	101.2 (94.0-109.0)	25.2 (24.0-26.0)	35.9 (34.0-38.0)	25.9 (25.0-27.0)	21.6 (18.0-24.2)
10	Nesomimus p. bindloei	Bindloe	108.0 (102.2-115.0)	101.1 (93.5-115.0)	23.8 (22.0-24.5)	34.5 (33.0-36.0)	24.8 (23.5-27.0)	20.7 (17.5-22.2)
10	Nesomimus p. bindloei	James	111.1 (101.0-119.2)	106.0 (95.0-115.2)	22.2 (21.0-23.5)	36.3 (33.8-38.5)	25.8 (24.0-27.0)	21.8 (18.5-24.5)
10	Nesomimus p. bindloei	Jervis	109.4 (104.0-112.8)	105.8 (98.5-111.2)	22.9 (22.0-24.5)	35.3 (35.0-36.0)	24.8 (24.0-25.2)	20.3 (16.0-23.2)
8	Nesomimus p. parvulus	S. Seymour	110.2 (108.0-112.0)	105.3 (100.0-110.0)	21.5 (21.0-22.0)	35.3 (34.5-37.0)	25.6 (24.8-26.2)	21.8 (19.5-24.5)
10	Nesomimus p. parvulus	Indefatigable	108.5 (100.0-115.5)	104.0 (90.2-117.0)	20.3 (19.5-21.2)	35.6 (33.0-37.0)	25.1 (24.0-26.0)	23.0 (17.0-28.0)
10	Nesomimus p. parvulus	Albemarle	110.3 (107.5-115.5)	107.6 (102.0-115.0)	19.9 (19.0-21.0)	37.3 (35.5-39.0)	25.0 (23.2-25.8)	20.5 (17.0-23.5)
3	Nesomimus p. parvulus	Narborough	108.0 (102.5-112.5)	101.7 (98.0-104.2)	19.1 (18.2-20.0)	34.7 (34.2-35.0)	23.8 (23.5-24.5)	16.1 (15.0-18.2)
10	Nesomimus p. bauri	Tower	115.7 (113.5-118.0)	107.7 (99.0-111.5)	26.2 (24.0-27.5)	35.8 (35.0-36.5)	25.3 (24.0-26.2)	20.6 (17.5-22.2)
10	Nesomimus p. barringtoni	Barrington	109.1 (103.5-111.0)	106.7 (100.0-110.0)	26.0 (25.2-26.5)	34.1 (32.1-35.2)	24.3 (23.2-25.0)	24.1 (22.0-27.0)
10	Nesomimus melanotis	Chatham	111.7 (109.0-117.0)	103.3 (96.5-110.2)	23.0 (22.2-23.5)	38.0 (37.0-40.0)	26.8 (26.0-27.2)	22.9 (18.0-25.5)
10	Nesomimus macdonaldi	Hood	124.0 (121.0-127.0)	113.9 (112.0-116.5)	32.8 (30.2-34.5)	38.6 (38.0-39.0)	28.7 (28.0-30.0)	
7	Nesomimus macdonaldi	Gardner-near-Hood	121.8 (118.0-122.5)	111.9 (110.0-114.5)	31.9 (31.2-32.5)	37.2 (35.0-38.5)	27.3 (26.5-29.0)	
10	Nesomimus trifasciatus	Gardner-near-Charles	123.2 (118.5-126.0)	113.8 (106.0-120.5)	27.7 (25.5-29.5)	40.3 (39.5-42.0)	27.6 (26.5-28.5)	
8	Nesomimus trifasciatus	Champion	121.1 (117.0-125.0)	112.1 (107.0-116.0)	26.6 (25.5-27.5)	40.8 (40.0-42.0)	27.4 (27.0-28.0)	

FEMALES

5	Nesomimus p. hulli	Culpepper	103.4 (101.5-104.5)	92.9 (91.5- 94.5)	23.9 (22.5-24.8)	33.6 (32.0-35.0)	24.7 (23.0-25.2)	15.6 (14.0-17.0)
3	Nesomimus p. wenmani	Wenman	101.9 (98.2-104.5)	95.2 (90.0-100.0)	23.5 (22.2-25.0)	33.3 (32.5-34.5)	24.1 (23.5-24.5)	18.4 (16.8-21.0)
10	Nesomimus p. personatus	Abingdon	102.1 (100.0-104.2)	95.4 (88.0-103.0)	24.4 (23.5-25.2)	34.7 (33.5-36.2)	24.5 (23.2-25.5)	21.8 (20.0-23.0)
10	Nesomimus p. bindloei	Bindloe	101.1 (97.5-106.5)	95.0 (89.0-100.5)	23.1 (22.2-24.0)	33.2 (31.2-36.8)	23.3 (21.8-25.0)	20.4 (17.0-23.0)
9	Nesomimus p. bindloei	James	104.3 (96.5-110.0)	99.1 (94.0-106.0)	22.8 (21.8-24.5)	35.2 (33.4-37.0)	24.3 (23.0-26.5)	19.3 (15.0-24.0)
10	Nesomimus p. bindloei	Jervis	100.3 (96.5-105.0)	94.8 (91.0- 99.8)	22.4 (22.0-23.0)	33.5 (32.2-34.8)	23.7 (22.5-25.0)	18.9 (14.0-22.0)
7	Nesomimus p. parvulus	S. Seymour	102.1 (101.0-104.2)	96.0 (92.0-101.0)	21.0 (20.0-22.0)	34.1 (33.0-35.5)	24.0 (23.5-25.0)	20.9 (20.0-22.0)
10	Nesomimus p. parvulus	Indefatigable	102.3 (97.2-111.0)	98.0 (90.5-108.5)	21.0 (20.0-23.0)	34.4 (32.5-36.5)	24.0 (23.0-26.2)	21.3 (18.0-23.5)
10	Nesomimus p. parvulus	Albemarle	101.5 (97.2-104.2)	96.1 (91.5-102.0)	19.6 (18.5-20.0)	35.5 (34.2-37.0)	24.2 (23.0-25.0)	17.5 (14.2-20.0)
10	Nesomimus p. parvulus	Narborough	100.7 (96.5-105.5)	96.0 (89.2-102.0)	20.1 (19.0-21.0)	34.5 (33.0-36.0)	23.4 (21.5-24.8)	15.8 (14.0-17.5)
10	Nesomimus p. bauri	Tower	109.0 (105.0-110.8)	102.6 (93.5-106.5)	26.1 (24.5-27.0)	34.1 (33.5-35.2)	23.9 (22.0-25.0)	18.7 (17.0-20.5)
10	Nesomimus p. barringtoni	Barrington	104.1 (100.0-109.5)	100.5 (97.2-103.2)	26.5 (25.5-28.5)	33.2 (31.8-34.8)	23.7 (22.0-25.0)	23.4 (20.0-26.0)
10	Nesomimus melanotis	Chatham	102.9 (98.5-107.2)	93.8 (88.0-100.0)	22.0 (21.0-23.0)	36.2 (35.5-38.5)	24.2 (22.2-26.0)	20.7 (19.0-24.0)
10	Nesomimus macdonaldi	Hood	114.3 (112.5-117.5)	102.0 (95.0-106.0)	30.4 (29.5-32.0)	36.1 (35.0-37.0)	26.9 (26.2-28.0)	
6	Nesomimus macdonaldi	Gardner-near-Hood	112.6 (110.0-115.5)	99.4 (94.5-103.5)	30.3 (29.8-31.5)	36.7 (36.0-37.5)	25.8 (25.0-26.8)	
10	Nesomimus trifasciatus	Gardner-near-Charles	117.8 (114.0-121.2)	110.9 (101.5-115.0)	27.2 (25.5-28.0)	38.4 (37.0-40.0)	26.2 (24.5-28.0)	
3	Nesomimus trifasciatus	Champion	112.3 (111.0-114.0)	98.7 (98.0- 99.5)	25.7 (25.5-26.0)	38.7 (38.2-39.5)	25.7 (25.5-26.0)	

60. Nesomimus trifasciatus (Gould)

Orpheus trifasciatus Gould, 1837d, p. 27 (orig. descr.; "from the Galapagos").

Mimus trifasciatus Gray, 1841 (= Nov., 1839), p. 62, pl. 16 (Charles Id.).—Sclater, 1859, p. 345.—Salvin, 1876, p. 471.—Sharpe, 1881, p. 346.

Nesomimus trifasciatus Ridgway, 1897, p. 483; 1907, p. 247.—Rothschild & Hartert, 1899, p. 143.—Snodgrass & Heller, 1904, p. 358.

ORPHEUS TRIFASCIATUS Gould*

Cotype.—British Museum, no. 38.2.21.401; ad., sex?; Galapagos.

Cotype.—British Museum, no. 55.12.19.225; ad., sex?; Galapagos; Darwin.

HABITAT.—Formerly on Charles Island, where it now appears to be extinct; Gardner Island, near Charles; Champion Island, near Charles.

There are at hand 43 specimens in the Academy collection (nos. 3661-3703), collected on Gardner-near-Charles, October 3, 1905, and on Champion, October 3, 1905, and February 26, 1906.

As regards the three southernmost forms, *trifasciatus*, *macdonaldi*, and *melanotis*, there has been general acceptance of their standing as distinct species. *Trifasciatus* (from Charles Island and adjoining islets) is set apart by many trenchant characters of color and markings, among which may be mentioned dark brown coloration, unstreaked upper surface, whitish auricular region, patches of dusky at sides of breast, and, according to previous writers, dark brown iris. Of variants of these characters, the auricular region mostly whitish as a rule, is often streaked with dusky and in some instances is mostly dusky. From the dusky pectoral patches disconnected spots tend to form two lines across the breast; occasionally this is varied by round spots evenly spread over the same area, much as in young birds. Dusky submalar streaks, generally well marked, are sometimes barely indicated. Mostly solid brown above, some fresh plumaged birds do show, in paler margins to dark-colored dorsal feathers, a slight approach toward the streaked condition of the other forms.

Most of the birds collected on October 3 are in relatively unworn plumage, but curiously enough, there are a few taken the same day, in which wear and fading have proceeded to such a

*Data given above were copied by myself from the labels of the two specimens. Mr. Kinnear gives me another version, from Museum registers, as follows:

British Museum, no. 37.2.21.401; ♂ ad.; Charles Island; Burnett and Fitzroy.

Type.—British Museum, no. 55.12.19.225; ad., sex?; Charles Island; Darwin; ex Zoological Society's collection.

degree as to have nearly obliterated all distinctive features of color and markings. Those taken on February 26 are mostly rather badly worn, and presumably the annual molt would begin very shortly thereafter. The one young bird collected, taken February 26, is in juvenal plumage throughout, with wing and tail feathers full grown. Throat and breast are spotted, flanks streaked, and of the lower surface only the center of the abdomen and the lower tail coverts are unmarked. There is a tendency for the spots at the sides of the breast to coalesce into large blotches, as in the adult, and higher up the spots run together to form a line across the throat, a feature that is indicated, too, in

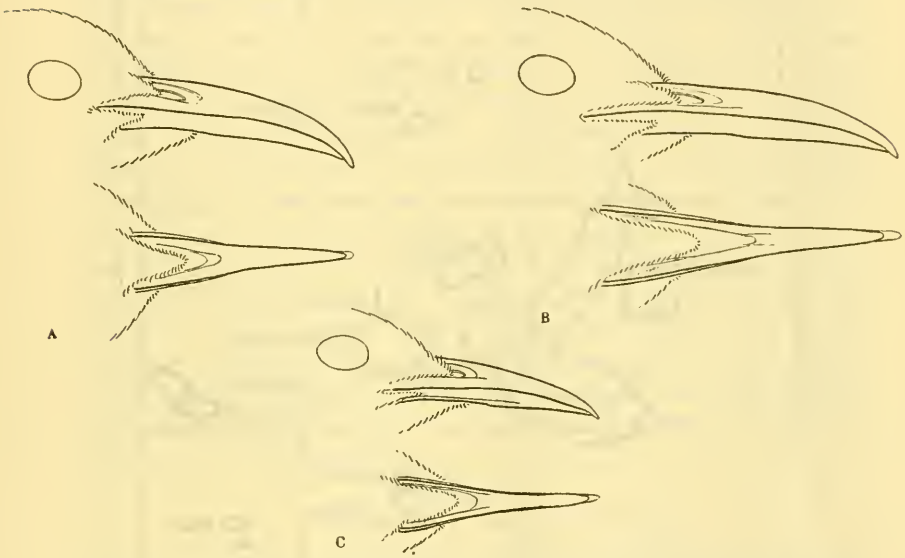

Fig. 12. a, Nesomimus trifasciatus, male (no. 3699), Gardner-near-Charles; b, Nesomimus macdonaldi, male (no. 3738), Hood; c, Nesomimus melanotis, male (no. 3802), Chatham. Natural size.

several adults. The juvenal rectrices are appreciably shorter and narrower than in the adult. A male bird collected on October 3 (no. 3677) is spotted below almost as extensively as the juvenile just described, and dorsally the two are closely similar also, but abrasion of the feathers on this bird is such as to show that the plumage had been worn many months, and the tail feathers are as in the adult. Several other specimens show spotting on the breast to a greater or less extent.

This series does not exhibit the transverse white markings on pileum and back used by Ridgway (1907, p. 245) in his "key to

the species of *Nesomimus*." In one or two birds there is an indication of light edgings to feathers on the pileum, and in several

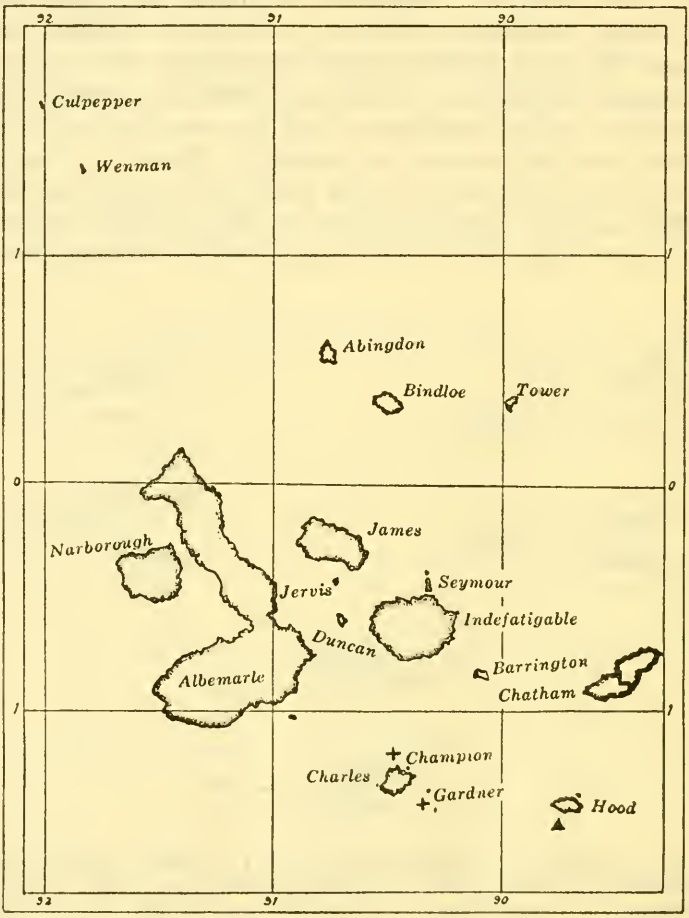

Fig. 13. Map showing present distribution of *Nesomimus trifasciatus*, *N. macdonaldi*, and *N. melanotis*. Symbols indicate islands where recorded.

others there are white feathers in various amount scattered over the entire crown. This tendency culminates in one bird which has

the top of the head mostly white, continuous with the white ear coverts. Rothschild & Hartert (1899, p. 143) mention a specimen with white feathers on the pileum.

Birds from Champion Island average slightly smaller in length of wing, tail and culmen, than those from Gardner (see table, p. 113) but I can not distinguish any difference in color and markings. None of the Champion Island birds, however, exhibits any white markings on the pileum.

It has been assumed without question that Darwin's types came from Charles Island, but while that may have been the case there is no positive evidence to that effect in any of his writings. Gardner Island, near Charles, was visited, if not by Darwin, by others from the *Beagle*, and upon Gardner as well as Champion the species has been found by subsequent visitors. I am informed by Mr. Joseph Slevin, Curator of Herpetology in this Academy (who has twice visited the Galapagos) that the northern coast of Charles, adjacent to Champion, at the time of his visit was not inhabited by dogs and cats (supposedly the exterminators of *Nesomimus* upon Charles), and there seems to be no reason why the mockingbirds should not have re-established themselves there. At any rate, their absence from that coast implies extremely sedentary habits, for Champion is not more than three quarters of a mile off shore. The Academy party in thirty-three days of collecting found none of the species upon Charles. There are other islands in the archipelago inhabited by dogs and cats where the mockingbirds have not disappeared.

61. Nesomimus macdonaldi Ridgway

Nesomimus macdonaldi Ridgway, 1890, p. 103 (orig. descr.; Hood Id.); 1897, p. 484; 1907, p. 248.—Rothschild & Hartert, 1899, p. 143; 1902, p. 381.—Snodgrass & Heller, 1904, p. 359.

NESOMIMUS MACDONALDI Ridgway

Type.—United States National Museum, no. 116066; ♂ ad.; Hood Island; April 7 (1888); U. S. Fish Commission, Voyage of Albatross, 1887-88.

HABITAT.—Hood Island and Gardner Island near Hood.

There are at hand 80 specimens in the Academy collection (nos. 3704-3783): Hood Island, September 25, 27 (1905), ten; October 2, fifteen; January 28, 31 (1906), two; February 1, 5, sixteen;

June 23, 28, 30, twenty-one; July 2, two. Gardner-near-Hood, September 28, 29, 30 (1905), twelve; February 3 (1906), one; June 27, one. From Stanford University Museum, 12 specimens, collected on Hood Island, May 13-18, 1899.

Macdonaldi, from Hood Island, east of Charles, is distinguished from all other species and subspecies by greater length of culmen. *Trifasciatus*, averaging smaller in this respect, approaches it closely in measurements of one or two individuals, but there is no actual overlapping in our series. *Trifasciatus* and *macdonaldi* are both appreciably larger in general size than any of the other forms, as reflected in length of wing and tail (see table of measurements). In coloration *macdonaldi* is grayish, streaked above; the auriculars are usually dusky, though sometimes mixed with whitish, just as in some examples of *trifasciatus*. The pectoral blotches, boldly exposed in *trifasciatus*, are in *macdonaldi* partly concealed under the feathers, though the area covered is plainly discernible, outlined by disconnected spots. Here again some adults are spotted entirely across the breast, somewhat as in the young. In the juvenal plumage the breast is heavily spotted, the flanks streaked, throat and abdomen immaculate; rectrices show hardly a trace of white tips. *Macdonaldi* has the least white spotting at the end of the rectrices of any form of the genus. In most cases these markings are almost entirely absent, in none are they sharply defined.

According to Gifford (1919, p. 209) the nesting season is mostly in February, when he found nests and eggs, but it must begin much earlier as there is a spotted young one in the series taken on January 28. Others in juvenal plumage were collected during the last two weeks in June and on July 2. As with the post-juvenal molt, the annual molt appears to be accomplished by different individuals over a long period of time. Birds exhibiting the last degree of feather wear and fading, were collected in February and in September, and fresh plumaged birds on practically the same dates. Molting adults were collected during June.

62. Nesomimus melanotis Gould

Orpheus melanotis Gould, 1837d, p. 27 (orig descr.; "from the Galapagos").

Mimus melanotis Gray, *in* Gould, 1841 (= Nov., 1839), p. 62, part, pl. 17 (Chatham).—Sclater, 1859, p. 345, part.—Sundevall, 1871, p. 124, part.

Nesomimus melanotis Ridgway, 1890, p. 102, part.
Nesomimus adamsi Ridgway, 1894, p. 358 (orig. descr.; Chatham Id.); 1897, p. 485; 1907, p. 249.—Rothschild & Hartert, 1899, p. 144; 1902, p. 381.—Snodgrass & Heller, 1904, p. 360.—Gifford, 1919, p. 210 (habits).—Hartert, 1920, p. 478 (particulars of type specimen, in Rothschild Museum).

ORPHEUS MELANOTIS Gould

**Cotype.*—British Museum; ad., sex? Evidently a "Beagle" specimen, but with no data. Specimen "b" of the Catalogue of Birds (vol. 6, p. 350).

NESOMIMUS ADAMSI Ridgway

Type.—Rothschild Museum; ♂ ad.; Chatham Island; June 13, 1891; Dr. G. Baur; orig. no. 694.

HABITAT.—Chatham Island.

One hundred and thirty-three specimens in the Academy collection (nos. 3784-3916), as follows: September 8, 10 (1905), twenty-six; October 16-18, thirty-three; January 25-29 (1906), nine; February 8-23, thirty-six; July 5-7, twenty-nine.

Careful reading of the description of *Orpheus melanotis* Gould (1837d, p. 27), and inspection of the plate (Gould, 1841, pl. 17) shows that the species treated under that name is the Chatham Island mockingbird and not the James Island bird, as has been generally assumed. Darwin ascribed the species to Chatham and James. In the British Museum I found two specimens in the "*melanotis*" series that came from the Beagle collection. One of these, specimen "a" of the Catalogue of Birds (vol. VI, p. 350), where it is entered as the type of the species, is a James Island bird. The other, specimen "b" of the same Catalogue, is of the Chatham Island species, with no exact data but obviously a "Beagle" specimen. Both birds had been mounted, and had been dismounted at the same time, from memoranda upon their labels. The important thing is that specimen "b" accords closely with Gould's description and plate of *melanotis*. Both the malar stripe and breast markings appear in the illustration, characters of the Chatham Island bird but not of the James Island species. These plates are supposed to be the exact size of the birds figured, and specimen "b" complies with this test perfectly (in bill measurement, for example), as specimen "a" does not. Altogether, it seems

*"I have found another specimen of the Chatham Island bird of Darwin's collecting, purchased by Eyton from the Zoological Society, and by us after his death. It is labeled by Eyton as *parvulus*. Reg. no. 81.2.18.80; Galapagos; C. Darwin." N.B.K.

obvious to me that Gould's description and illustration of *Orpheus melanotis* pertain to the Chatham Island mockingbird, and there is little doubt in my mind that specimen "b" above referred to is the actual bird that he had in hand and that his artist copied.

Restriction of the name *melanotis* to the Chatham Island bird leaves *Orpheus parvulus* Gould (1837d, p. 27), described from Albemarle, available as a specific name for the form occurring upon the northern and central islands. The James Island subspecies, to which the name *melanotis* has generally been applied, becomes *Nesomimus parvulus bindloei* (see p. 126).

Our series contains spotted young (nestlings) collected January 25, and full grown young February 22 and 23. None of the birds in this large series is in as badly worn plumage as are some from other islands. The most worn and faded specimens were taken during the third week in February, and July skins evidently represent the species at its best. Variation in this form is most evident in breast markings. Ordinarily the white breast is crossed by two shadowy bands, a mere indication of the dark markings that are so conspicuous on *trifasciatus* and *macdonaldi*. This condition varies, in the one direction, to almost purely white-breasted birds that are with difficulty to be distinguished in color from *bauri* of Hood Island, in the other to birds that have across the breast partly concealed dusky blotches practically as in *macdonaldi*, or else a broad band of smaller spots. Dorsally there is a little darkening with wear, freshly grown feathers having rather broad, light-colored margins that later on disappear in part or altogether. Fresh plumaged birds have practically no indication of a nuchal collar; with wear this feature becomes slightly apparent. Some of the observed variation, especially in breast marking, may be due to age. It may be that the more heavily spotted birds are in the plumage following the post-juvenal molt, the white-breasted birds in their second year or older, but this can not be ascertained from the data at hand.

Melanotis is in size and general appearance more nearly like the forms of *parvulus* on the islands north and west of Chatham, than like *trifasciatus* and *macdonaldi*, from the nearest islands to the south and southwest. It retains, however, distinct traces of the pectoral markings of the latter two species.

63. Nesomimus parvulus parvulus (Gould)

Orpheus parvulus Gould, 1837d, p. 27 (orig. descr.; "from the Galapagos").

Mimus parvulus Gray, *in* Gould, 1841 (= Nov., 1839, p. 63, pl. 18 (Albemarle).—Sclater, 1859, p. 345.—Salvin, 1876, p. 472.—Sharpe, 1877, p. 65; 1888, p. 350.
Nesomimus parvulus Ridgway, 1890, p. 102; 1897, p. 491; 1907, p. 256.—Rothschild & Hartert, 1902, p. 383.
Nesomimus parvulus parvulus Rothschild & Hartert, 1899, p. 146.
Nesomimus melanotis parvulus Snodgrass & Heller, 1904, p. 370 (Albemarle and Narborough).
Nesomimus affinis Rothschild, 1898a, p. liii (orig. descr.; Narborough Id.).—Hartert, 1920, p. 478 (particulars of type specimen, in Rothschild Museum).
Nesomimus parvulus affinis Rothschild & Hartert, 1899, p. 146.
Nesomimus melanotis Ridgway, 1890, p. 102, part; 1897, p. 489, part; 1907, p. 253, part.—Gifford, 1919, p. 212, part (habits).
Nesomimus melanotis melanotis Rothschild & Hartert, 1899, p. 145, part; 1902, p. 382.
Mimus melanotis Sclater & Salvin, 1870, p. 323, part.—Sundevall, 1871, pp. 124, 126, part.—Salvin, 1876, p. 471, part.
Nesomimus melanotis dierythrus Heller & Snodgrass, 1901, p. 74 (orig. descr.; Seymour Id.).—Snodgrass & Heller, 1904, p. 367 (Indefatigable and the Seymours).
Nesomimus dierythrus Ridgway, 1907, p. 254.

ORPHEUS PARVULUS Gould

Type.—British Museum, no. 55.12.19.93; ad., sex?; Albemarle Island; no date.

NESOMIMUS AFFINIS Rothschild

Type.—Rothschild Museum; ♂ ad.; Narborough Island; December 6, 1897; R. H. Beck (Webster-Harris expedition); orig. no. 2852.

NESOMIMUS MELANOTIS DIERYTHRUS Heller & Snodgrass

Type.—Leland Stanford Junior University, no. 4565; ♂ ad.; North Seymour Island (near Indefatigable); April 27, 1899; R. E. Snodgrass and E. Heller (Hopkins-Stanford Galapagos expedition); orig. no. 240.

HABITAT.—Albemarle, Narborough, and Indefatigable islands, the Seymour Islands (adjoining Indefatigable), Daphne Island, and perhaps Duncan Island.

One hundred and seventy-nine specimens*, as follows: Albemarle: October 31 (1905), three; November 1-3, thirteen; March 5-30 (1906), thirty-two; April 2, 12, 26, three; May 1-2, two;

*Specimens from Albemarle, Narborough, Indefatigable and adjoining islets, Jervis, and James, are catalogued, mixed together, under the following numbers: 3947—4104, 4251—4320.

August 11, 23, 24, 30, ten; September 3, one. Narborough: April 18, 1906, six. Indefatigable: October 25, 27, 28 (1905), eight;

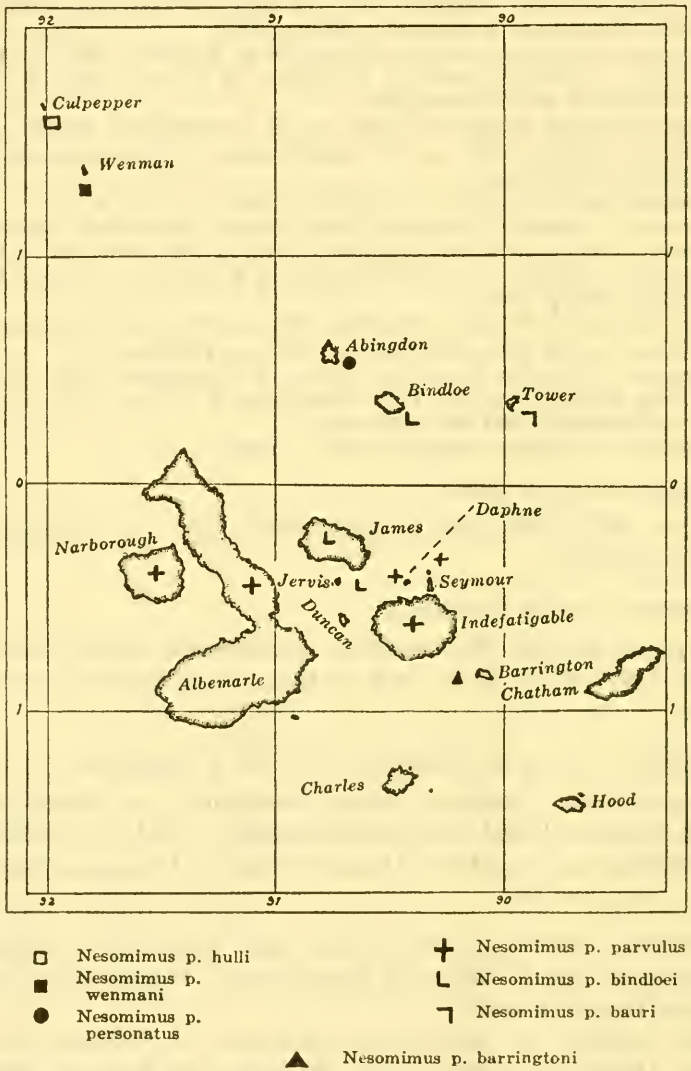

Fig. 14. Map showing distribution of subspecies of *Nesomimus parvulus*. Symbols indicate islands where recorded.

November 6-25, fifty-six; January 11-13 (1906), ten; July 11-24, twenty-two. Daphne (near Indefatigable): July 25 (1906), one.

South Seymour (near Indefatigable): November 21-22 (1905), seven; July 26 (1906), five.

There is but little question as to the propriety of recognizing as distinct species the three southernmost forms, *trifasciatus*, *macdonaldi*, and *melanotis*, but as regards the more northern forms, which I regard as all subspecies of *Nesomimus parvulus*, there have been about as many opinions as there are writers. I have already stated my objection to using a separate specific name for each island race. Snodgrass & Heller divided the forms that I am lumping under *parvulus* into two species, *Nesomimus personatus* and *N. melanotis*. "Along one line [*personatus*] the dark maxillary stripes have been retained and the back has taken on a dusky rather than a brown tone; along the other [*melanotis*] the brown tone of the back has been retained but the maxillary stripes are lost. The first branch includes the races inhabiting Tower, Abingdon, Bindloe and Culpepper; the second those races inhabiting Indefatigable, Barrington, Wenman, James, Albemarle and Narboro" (Snodgrass & Heller, 1904, pp. 361-362). I find myself utterly unable to distinguish the brown backed and black backed races thus differentiated and later described in detail in the report cited. In the series used by Snodgrass & Heller, now before me, such differences as appear in dorsal coloration, are, it seems to me, the effects of different degrees of wear and fading. Careful comparison of larger series, mostly in excellent plumage, both in mass effect and by individual specimens, does not, to my eye, disclose one iota of difference in this respect. As to the maxillary stripes, they form an extremely variable character, more evident on birds from some islands than on those from others but present or slightly indicated on some specimens of each series. I am, for these reasons, disregarding Snodgrass & Heller's major division of these forms.

Our six specimens from Narborough, representing the form *affinis* (Rothschild, 1898, p. liii), are in such worn and faded plumage as to be useless for color comparison. The more satisfactory series of fifteen skins from the Stanford University collection, however, enables me to corroborate Snodgrass & Heller (1904, p. 370; their findings based upon the same material) and Ridgway (1907, p. 256), in treating *affinis* as a synonym of *parvulus*.

The Indefatigable series at hand consists of birds in adult plumage, except one (taken July 13) that still shows a few juvenal

feathers. On several specimens, perhaps not fully adult, there are clusters of small spots on each side of the breast. The Albemarle series includes a number of spotted young, collected on dates ranging from March 5 to May 1.

The outstanding feature of *parvulus* is the small bill (see table of measurements), which serves sufficiently well to distinguish it from other nearly related subspecies. Although included by Snodgrass & Heller in those forms that lack maxillary stripes, I find these marks occasionally present in slight degree.

I am unable to distinguish the Indefatigable bird (*Nesomimus melanotis dierythrus* Heller & Snodgrass) from *parvulus* of Albe-

Fig. 15. a, Nesomimus parvulus bauri, male (no. 4211), Tower; b, N. p. barringtoni, male (no. 4118), Barrington; c, N. p. parvulus, male (no. 4295), Albemarle. Natural size.

marle Island. In the original description (Heller & Snodgrass, 1901, p. 74) *dierythrus* is compared with "*melanotis*" (James Island), in a later paper (Snodgrass & Heller, 1904, p. 367) with "*adamsi*" (Chatham Island). There is also the statement (*loc. cit.*, p. 370) that "*melanotis*" is intermediate in character between *dierythrus* and *parvulus*. The Academy series includes 64 skins from Albemarle, and 96 from Indefatigable, and I cannot, on the closest scrutiny, discover any character of color or markings to

distinguish between the two lots. In measurements, also, they are essentially alike (see table, p. 113). Heller & Snodgrass (1904, p. 367) state that *dierythrus* differs from "*adamsi*" "in never possessing any trace of maxillary stripes." There are specimens in our series that possess traces of such stripes, about as apparent as in some examples of *bauri*.

Twelve specimens from South Seymour (a tiny islet barely separated from Indefatigable at its northern extremity) are indistinguishable from the Indefatigable series. A male from Daphne (somewhat farther out) is darker than the average of *parvulus*, and with culmen (21 mm.) at the maximum of that form. Gifford (MS) saw a single *Nesomimus* on Duncan Island (midway between Indefatigable and Albemarle) on August 14, 1906. This was not during the breeding season, and sufficient time was spent on Duncan (December 1 to 17, 1905; August 14 to 16, 1906) to justify the conclusion that the species is of no more than occasional occurrence there. Rothschild & Hartert (1899, p. 145) comment upon the absence of *Nesomimus* from Duncan.

64. Nesomimus parvulus barringtoni Rothschild

Nesomimus carringtoni (typographical error, = *barringtoni*) Rothschild, 1898b, p. vii (orig. descr.; Barrington Island).—Hartert, 1920, p. 478 (particulars of type specimen, in Rothschild Museum).

Nesomimus melanotis carringtoni (*sic*) Rothschild & Hartert, 1899, p. 145.

Nesomimus melanotis barringtoni Snodgrass & Heller, 1904, p. 368, part (Barrington Island).

Nesomimus barringtoni Ridgway, 1907, p. 256, part (Barrington Island).

Nesomimus melanotis Gifford, 1919, p. 212, part (habits).

NESOMIMUS BARRINGTONI Rothschild

Type.—Rothschild Museum; ♂ ad.; Barrington Island; July 10, 1897; R. H. Beck (Webster-Harris expedition); orig. no. 1540.

HABITAT.—Barrington Island.

Seventy-three specimens, all from Barrington Island, as follows: October 20-24 (1905), sixty-three; July 9-10 (1906), ten. (C. A. S. nos. 4105-4176, 4186.) The series includes one spotted juvenile, full-grown as to size, collected on July 9.

Barringtoni (on Barrington Island) and *bauri* (Tower Island) are alike in general coloration, being relatively grayish-backed

(*bauri* slightly more so than *barringtoni*), and paler than the remaining *parvulus* subspecies. They are on islands that are widely separated north and south, but both of them east of the islands occupied by the other subspecies. The differences between *barringtoni* and *bauri* resolve themselves into the following: a slight difference of shade in dorsal coloration; wing length (103.5—111.0 mm. in *barringtoni*, 113.5—118.0 in *bauri*); length of terminal white spot on rectrices (22.0—27.0 mm. in *barringtoni*, 17.5—22.2 in *bauri*).

65. Nesomimus parvulus bindloei Ridgway

Nesomimus bindloei Ridgway, 1894, p. 358 (orig. descr.; Bindloe Id.); 1897, p. 492; 1907, p. 251.—Hartert, 1920, p. 478 (particulars of type specimen, in Rothschild Museum).

Nesomimus melanotis bindloei Rothschild & Hartert, 1899, p. 146; 1902, p. 383.

Nesomimus personatus bindloei Snodgrass & Heller, 1904, p. 365.

Mimus melanotis Gray, *in* Gould, 1841 (= Nov., 1839), p. 62, part. —Sclater, 1859, p. 345, part (James).—Sclater & Salvin, 1870, p. 323, part.—Sundevall, 1871, p. 124, part (James).—Salvin, 1876, p. 471, part.—Sharpe, 1881, p. 349, part.

Nesomimus melanotis Ridgway, 1890, p. 102, part; 1897, p. 489, part; 1907, p. 253.—Gifford, 1919, p. 212, part.

Nesomimus melanotis melanotis Rothschild & Hartert, 1899, p. 145, part; 1902, p. 382, part.—Snodgrass & Heller, 1904, p. 369.

NESOMIMUS BINDLOEI Ridgway

Cotype.—Rothschild Museum; ♂ ad.; Bindloe Island; September 5, 1891; Dr. G. Baur; orig. no. 690.

Cotype.—Rothschild Museum; ♀ ad.; Bindloe Island; September 5, 1891; Dr. G. Baur; orig. no. 691.

Cotype.—Rothschild Museum: ♂ (im.?); Bindloe Island, September 5, 1891; Dr. G. Baur; orig. no. 692.

There are five more skins in the same series in the Rothschild Museum, one collected September 4, four on September 5, all made up "ex spirits." Ridgway did not indicate any particular one as the type, merely mentioning "five specimens," but no. 690 now bears red "type labels" both from the Rothschild Museum and the United States National Museum, showing that Ridgway had so distinguished it before it passed out of his hands.

The ascription of the name *Orpheus melanotis* Gould to the Chatham Island mockingbird entails a change in the nomenclature of the James Island race, entitled *melanotis* in most of the litera-

ture. That form occurs upon James, Jervis and Bindloe islands without variation, so far as I can see. Ridgway (1894, p. 358) described *Nesomimus bindloei* as peculiar to Bindloe Island, but in view of the similarity of birds from the three islands mentioned, that name (apparently the only one available) should be used to cover this whole aggregation.

HABITAT.—James, Jervis and Bindloe islands.

Eighty-four specimens, as follows: Jervis: December 18-21 (1905), thirty-one. James: December 19-23 (1905), eleven; January 2-4 (1906), three; July 30-31, four. Bindloe: September 17-18 (1906), thirty-seven (C. A. S. nos. 4214-4250).

In the subspecies *bindloei*, *personatus*, *wenmani*, and *hulli* the differences are of the slightest and they are average differences that are not to be supposed to hold good in extreme degree in

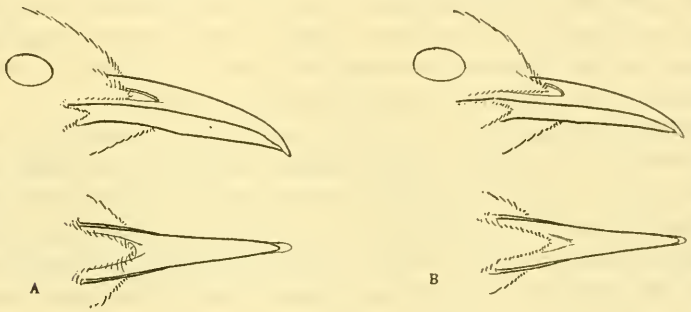

Fig. 16. a, Nesomimus parvulus personatus, male (no. 3926), Abingdon; b, N. p. bindloei, male (no. 4045), James. Natural size.

every specimen examined. A division may be made of, on the one hand, *bindloei* and *personatus*, with relatively darker back and narrower wing bars, on the other, *wenmani* and *hulli* with relatively less dark back and broader wing bars. *Bindloei* and *personatus* are the darkest of the northern races. The darkest specimen of *bindloei*, from James Island, is quite as dark colored and with as little sign of dorsal streaks as any specimen of *trifasciatus*.

Although *personatus* (Abingdon Island), and "*melanotis*" (James Island), were selected by Snodgrass & Heller as typifying two distinct "series", each including several subspecies, they are to my eye so nearly alike as to barely justify subspecific distinction.

An average difference in culmen measurement is all that I can see. Color differences ascribed fall down utterly; they seem to me to be due entirely to varying degrees of wear and fading. In the original description of *bindloei* and in later publications (by Ridgway, by Rothschild & Hartert, and by Snodgrass & Heller) comparisons are made with *bauri*, and the differences there are obvious enough, but in the series of Bindloe Island birds at hand I fail to discern even the slightest character separating them from the birds of James and Jervis islands. Ridgway (1907, pp. 245-246), in his "key to the species of Nesomimus," separates *bindloei* from the other species with unmarked breast by its "distinctly rufescent" rump, in which he follows Rothschild & Hartert (1899, pp. 146-147), who use this character similarly. With every desire to adopt this division of species, I find myself unable to appreciate this feature in the slightest degree. In the series before me from each of the three islands, Jervis, James, and Bindloe, there are some specimens with the rump slightly more rufescent than in others, but the difference is slight and there is as great a range of variation in the birds of one island as in another.

Individual variation in the series from the three islands is about the same and concerns the same features. In each series there are birds with the maxillary stripes absent, and others in which this marking appears to a slight degree, never conspicuously. In each, dorsal coloration varies between darker and lighter extremes to about the same degree, with the blackest backed individual from James; this feature is influenced by abrasion of the plumage. From Jervis and from Bindloe there are birds that show clusters of small spots upon the breast. The smaller series from James does not include any such individuals. There are no juvenal-plumaged specimens from any of the three islands. The most worn and faded specimens are December-taken birds.

66. Nesomimus parvulus personatus Ridgway

Nesomimus personatus Ridgway, 1890, p. 104 (orig. descr.; Abingdon Id.); 1897, p. 488; 1907, p. 252.
Nesomimus melanotis personatus Rothschild & Hartert, 1899, p. 144; 1902, p. 382.
Nesomimus personatus personatus Snodgrass & Heller, 1904, p. 363.
Nesomimus melanotis Gifford, 1919, p. 212, part.

NESOMIMUS PERSONATUS Ridgway

Type.—United States National Museum, no. 116098; ♂ ad.;

Abingdon Island; April 16 (1888); U. S. Fish Commission, Voyage of the Albatross, 1887-88.

HABITAT.—Abingdon Island.

Thirty specimens, collected on Abingdon Island, September 18-22, 1906 (nos. 3917-3946). A slightly differentiated race, so nearly like *N. p. bindloei* that the only difference I can detect between them is a slight average difference in length of culmen. *Personatus* has a longer bill. As regards dorsal coloration and presence or absence of submalar streak, the features upon which Snodgrass & Heller (1904) based their grouping of certain forms into a "*Nesomimus personatus* series" and "*Nesomimus melanotis* series," these characters fall down so lamentably in large series that the first mentioned is of no value even for subspecific differentiation, and the second of but very little. They are both valueless in distinguishing between the subspecies *personatus* and *bindloei*.

67. Nesomimus parvulus wenmani, new subspecies

Nesomimus melanotis melanotis Rothschild & Hartert, 1899, p. 145, part (Wenman Island); 1902, p. 382, part.
Nesomimus melanotis Gifford, 1919, p. 212, part.
Nesomimus melanotis barringtoni Snodgrass & Heller, 1904, p. 368, part (Wenman Island).
Nesomimus barringtoni Ridgway, 1907, p. 256, part (Wenman Island).

Type.—Male adult, no. 4177, Mus. Calif. Acad. Sci.; Wenman Island, Galapagos Archipelago; September 24, 1906; collected by E. W. Gifford; orig. no. 3606.

CHARACTERS: A slightly differentiated form of *Nesomimus parvulus*, most nearly like *bindloei*, *personatus*, and *hulli*. Distinguished from *bindloei* and *personatus* by slightly paler dorsal coloration and wider wing bars; from *hulli* by the much less apparent submalar streaks.

HABITAT.—Wenman Island.

Nine specimens, six males and three females, collected on Wenman Island, September 24, 1906 (C. A. S. nos. 4177-4185).

The Wenman Island *Nesomimus* has been referred to "*melanotis*" (= *bindloei*) by Rothschild & Hartert (1899, p. 145), and to *barringtoni*, of Barrington Island, by Snodgrass & Heller (1904,

p. 368), with comments in each case upon the peculiarity of distribution that places the one form upon these widely separated islands, with other species interposed between. I can concede the close resemblance to the James Island form, but I do not understand the ascription of Wenman Island birds to the subspecies of the far distant Barrington Island. In the series at hand from the two islands, length of culmen alone suffices to distinguish

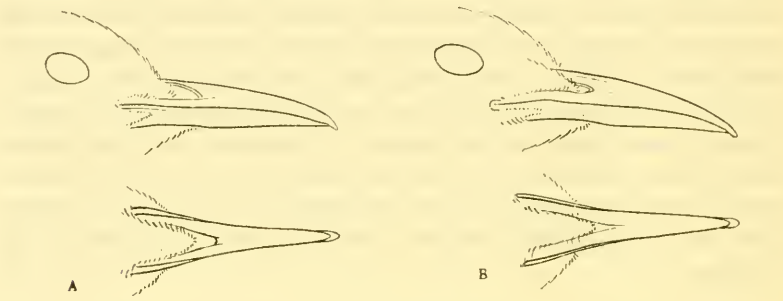

Fig. 17. a, Nesomimus parvulus wenmani, male (no. 4177, type), Wenman; N. p. hulli (no. 4187), Culpepper. Natural size.

them, and length of white spot on outer rectrices is another excellent differentiating character (see table of measurements).

Compared with birds from the nearby Culpepper Island (*hulli*), Wenman Island specimens are very closely similar. In *hulli* the submalar streaks are strongly in evidence, in *wenmani* they are usually absent, and when present at all are but faintly indicated.

68. Nesomimus parvulus hulli Rothschild

Nesomimus hulli Rothschild, 1898a, p. liii (orig. descr.; Culpepper Island).—Ridgway, 1907, p. 254.—Hartert, 1920, p. 478 (particulars of type specimen, in the Rothschild Museum).
Nesomimus melanotis hulli Rothschild & Hartert, 1899, p. 145.
Nesomimus personatus hulli Snodgrass & Heller, 1904, p. 365.
Nesomimus melanotis Gifford, 1919, p. 212, part (habits).

NESOMIMUS HULLI Rothschild

Type.—Rothschild Museum; ♂ ad.; Culpepper Island; July 27, 1897; R. H. Beck (Webster-Harris expedition); orig. no. 166.

HABITAT.—Culpepper Island.

There are thirteen specimens at hand, eight in the Academy collection, taken September 25, 1906 (nos. 4187-4194), and five

in the Stanford University collection, taken December 10, 1898. In all these birds the black submalar streak is fairly well defined; in several it is continued as a series of spots spreading over the breast on each side. The presence of the submalar streak, and the slightly paler dorsal color, are the best characters of *hulli*, as compared with *wenmani*. Rothschild & Hartert's (1899, p. 145) ascription of wider white tips to the primaries and secondaries of *hulli* is to some extent borne out in our series, but it is a slight difference and one that is quickly obscured by wear of the feathers.

69. Nesomimus parvulus bauri Ridgway

Nesomimus bauri Ridgway, 1894, p. 357 (orig. descr.; Tower Island); 1897, p. 492; 1907, p. 255.—Beck, 1904, p. 5, fig. (habits).—Hartert, 1920, p. 478 (particulars of type specimen, in Rothschild Museum).
Nesomimus personatus bauri Snodgrass & Heller, 1904, p. 362.
Nesomimus melanotis Gifford, 1919, p. 210, part (habits).

NESOMIMUS BAURI Ridgway

Cotype.—Rothschild Museum; ad., sex?; Tower Island; Sept. 2, 1891; Dr. G. Baur; orig. no. 695.

Cotype.—Rothschild Museum; ♀ad.; Tower Island; Sept. 2, 1891; Dr. G. Baur.

Cotype.—Rothschild Museum; ad.; sex?; Tower Island; no date; Dr. G. Baur; orig. no. 683.

All three made up "from spirits". No type specimen was designated by Ridgway, but no. 695 bears a Rothschild Museum and a U. S. National Museum red "type label".

HABITAT.—Tower Island.

Nineteen specimens collected September 14 and 15 (C. A. S. nos. 4195-4213); from the Stanford University Museum, 10 specimens, collected June 22, 23, 1899.

A well marked form distinguished by long culmen, pale coloration dorsally, and, in most cases, well defined dark maxillary stripes. Several birds show small flecks of dusky at the sides of the upper breast. In one or two the maxillary stripes are almost wanting.

70. Dendroica petechia aureola (Gould)

Sylvicola aureola Gould, 1841 (= Nov., 1839), p. 86, pl. 28 (orig. descr.; Galapagos Archipelago).
Dendrœca aureola Sclater & Salvin, 1870, p. 323.—Salvin, 1876, p. 473; 1883, p. 420.—Sharpe, 1877, p. 66; 1885, p. 282.
Dendroica aureola Ridgway, 1890, p. 105; 1897, p. 493.—Rothschild & Hartert, 1899, p. 147; 1902, p. 384 (nest and eggs.)—Snodgrass & Heller, 1902, p. 520 (Cocos Id.).
Dendroica petechia aureola Ridgway, 1902, p. 521.—Snodgrass & Heller, 1904, p. 356.—Chapman, 1917, p. 545 (crit.); 1926, p. 594.—Peters, 1927, p. 40 (monograph).
Dendrœca petechia Sundevall, 1871, p. 124.—Gifford, 1919, p. 216 (life hist.).
[*Dendrœca petechia*] f. *gallapagensis* Sundevall, 1869, p. 608.
Dendrœca petechia gallapagensis Gyldenstolpe, 1927, p. 30 (particulars of type specimen, in Royal Natural History Museum, Stockholm).

Sylvicola aureola Gould

Type.—British Museum, no. 56.3.15.10; ♂ ad.; Galapagos; C. Darwin.

[A date that is upon the label, "Jan. 4, 1839," indicates when the specimen was presented to the Zoological Society. N.B.K.]

Dendrœca petechia gallapagensis Sundevall

Type.—Royal Natural History Museum, Stockholm, no. 13905; ♂ ad.; Charles Island; May, 1852; "Eugenie" expedition.

Habitat.—Cocos Island and the Galapagos Islands.

The Academy series contains 201 specimens (nos. 4335-4535), as listed in the accompanying table. While not all of the islands are represented, the species was observed throughout the archipelago (Gifford, 1919, p. 216). It is apparently resident in the Galapagos, though I can find no explicit statement to that effect in any published writing; specimens in our series were collected practically throughout the year.

According to Gifford (*loc. cit.*), eggs are laid from the end of January until the middle of April. We have birds in juvenal plumage taken on Chatham, February 23, on Charles, March 2, and on Albemarle, March 12. An adult male collected on March 13 is in the midst of the annual molt, others taken toward the end of May have nearly finished the change. The sequence of plumages acquired is not yet understood (see Ridgway, 1902, pp. 516, 522) and our series of skins is not accompanied with data explanatory of the changes undergone. This much seems apparent, that the normal adult male has a chestnut pileum and

is heavily marked below with chestnut streaks, that the adult female is rather bright yellow, unmarked, below, and that the juvenal plumage is almost pure white below, tinged with brownish above.

There is, however, a grayish plumage that may or may not be an immature stage of the female; Ridgway (*loc. cit.*) believes that it is individual variation. In our series it is represented by many females taken at the right season to be in immature plumage, but there are February-taken females that are molting from a plain whitish to a yellow plumage. The few gray birds that are marked as males may, perhaps, have been wrongly so indicated, taken, as they were, at a season when the sexual organs are undeveloped and not easily distinguished.

There are a number of males in our series, taken mostly in May, that are about as follows in general appearance: Above (including pileum) plain olive green; back of neck and sides of neck grayish; throat almost pure white; rest of underparts yellowish, paler along the median line and on the lower tail coverts, dark greenish yellow on flanks. Breast and sides lightly but distinctly marked with longitudinal chestnut streaks. This, I believe, may be the normal immature male plumage, following the juvenal. A young male beginning the post-juvenal molt is apparently assuming this plumage, acquiring on the breast feathers that are pale yellowish, faintly marked with chestnut.

Among adult males there is a great variation in the brilliancy of the yellow ground color, in the extent of the chestnut ventral markings, and in the chestnut pileum. There are September birds (males), otherwise plain yellowish, with patches of newly growing chestnut-marked yellow feathers appearing on the breast, and chestnut feathers on the pileum, a strong indication of a partial pre-nuptial molt.

Only one or two of the islands are adequately represented in our series, but the specimens in hand carry no suggestion of differentiation into recognizable forms in different parts of the archipelago, either by color characters or measurements. The most that can be said is that the small series of adult males from Albemarle shows appreciably heavier chestnut markings below than in birds from any other island. Cocos Island specimens are like the mode from the Galapagos. While birds of this species are not regularly migratory, they seem in the Galapagos to pass freely from island to island. Gifford (1919, p. 219) says: "Of all the

Galapagos land birds, this warbler is met with most frequently away from the land," and he cites many instances. Such action would, of course, militate against the formation of distinguishable forms upon different islands.

I have not had available any representation of other forms of *Dendroica petechia* for comparison, so am accepting the conclusions of Chapman (1917, p. 545; 1926, p. 594) and Peters (1927, p. 40), both of whom regard *aureola* as confined to Cocos Island and the Galapagos Archipelago, and distinct from any mainland form.

Specimens of *Dendroica petechia aureola* in the Collection of the California Academy of Sciences

Island	Adult male	Adult female	Immature	Juvenal
Cocos	4	2	4	
Culpepper			3	
Bindloe			1	
James		2		
Jervis		1	1	
Albemarle	5	5	10	1
Duncan		1		
Indefatigable	13	2	4	
S. Seymour	1	1	1	
Chatham	40	25	5	1
Hood		2	5	
Gardner-near-Hood	2		1	
Charles	8	13	34	1
Champion			1	
Enderby			1	

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Dendroica petechia aureola*

Number of specimens	Island	Wing	Tail	Culmen	Tarsus	Middle toe with claw
		MALES				
4	Cocos	64.0 (62.2-65.2)	50.9 (49.2-52.2)	11.6 (11.2-12.0)	21.2 (20.5-22.0)	14.7 (14.2-15.0)
5	Albemarle	65.1 (63.8-66.2)	50.3 (49.0-51.5)	11.7 (11.0-12.5)	21.6 (21.0-22.0)	15.1 (15.0-15.2)
10	Indefatigable	65.5 (63.0-67.5)	50.8 (48.5-52.0)	11.8 (11.2-12.2)	21.3 (21.0-21.8)	15.1 (14.5-15.2)
10	Chatham	64.9 (62.0-66.2)	50.8 (48.5-52.5)	11.7 (11.5-12.2)	21.2 (21.0-21.5)	14.9 (14.5-15.2)
2	Gardner-near-Hood	65.5-65.5	50.2-52.0	10.8-11.5	21.5-21.5	14.0-15.0
8	Charles	65.9 (64.5-66.5)	51.7 (50.0-53.8)	11.9 (11.5-12.2)	21.2 (20.8-22.0)	14.8 (14.5-15.2)
		FEMALES				
2	Cocos	61.2-62.5	48.2-49.5	11.2-11.5	20.0-20.5	13.0-14.0
4	Albemarle	61.9 (58.2-65.0)	49.5 (46.2-51.5)	11.3 (11.0-12.0)	21.1 (21.0-21.2)	14.3 (14.0-15.0)
2	Indefatigable	63.5-65.0	52.0-52.0	11.0-11.5	21.0-21.5	15.0-15.0
10	Chatham	60.9 (58.0-63.8)	47.9 (45.2-50.0)	11.5 (11.0-12.0)	20.8 (20.5-21.2)	14.0 (13.5-14.5)
2	Hood	62.2-64.2	50.5-51.0	10.5-11.5	20.5-20.5	14.0-14.0
10	Charles	62.7 (61.5-63.5)	50.2 (48.5-51.0)	11.4 (10.5-12.0)	20.8 (20.2-21.2)	14.4 (13.5-15.0)

71. Dolichonyx oryzivorus (Linnæus)

Dolichonyx oryzivorus Gould, 1841, p. 106 (James Id.).—Salvin, 1876, p. 491.—Sclater, 1886, p. 331.—Ridgway, 1897, p. 567; 1902, p. 370.—Rothschild & Hartert, 1899, p. 171.—Snodgrass & Heller, 1904, p. 272.—Gifford, 1919, p. 257.

One bird, now in the British Museum, was collected by Darwin on James Island in October, 1835 (Gould, *loc. cit.*). "The Harris expedition obtained a young male on Charles and a female on Chatham Island, the former in November, the latter in October and several others were seen" (Rothschild & Hartert, *loc. cit.*).

The Academy expedition reported two birds that alighted on the ship at points between the Galapagos and the coast of Mexico, on September 28 and October 3, 1906, respectively (Gifford, *loc. cit.*). The first of these birds was collected, a female in fresh fall plumage (no. 8711).

The above occurrences are numerous enough to justify us in regarding the species as of something more than casual occurrence in the Galapagos. Apparently in the far reaching southward migration of the Bob-o-link there are every year individuals along the western margin of the movement that alight upon the islands. Presumably such migrants are birds that strike out due southward from the coast of Mexico.

Family Geospizidæ

A group of birds confined to the Galapagos Islands and Cocos Island, and, on the basis of external features, characterized as follows: "An assemblage of Passerine forms of small and medium size (wing 48.0 to 95.0 mm.). Wing rather short and rounded; tail rounded, much shorter than wing. Tarsus and toes long, outstretched feet extending beyond tip of tail. Rictal bristles obsolete. Bill extremely variable in relative length, depth, and width. Feathers on lower back and rump long, dense, and fluffy. Coloration unlike in adult male and female (except in *Cactospiza* and some forms of *Certhidea*), but with great variability on different islands in the number of males of any given form that ever attain 'adult' plumage. Color of bill varies seasonally and with age, being black or dusky in adults of both sexes during the breeding season, yellowish or otherwise light colored in adults at other seasons and in the young" (Swarth 1929, p. 31).

Included in this family group I recognize the genera *Geospiza*, *Platyspiza*, *Camarhynchus*, *Cactospiza*, *Pinaroloxias*, and *Certhidea*. My reasons for the recognition of the family Geospizidæ (of which the first five genera listed were formerly allotted to the Fringillidæ, the last, *Certhidea*, to the Cœrebidæ or to the Mniotiltidæ) are given in full in the paper just cited. Briefly, my conclusions were based upon Snodgrass's (1903) study of the anatomy of the birds, as regards internal features, and, as to externals, upon certain observed common features of proportion, plumage structure, peculiarities in variations in color of bill, and peculiarities in manner of acquisition of certain plumages. It may be added that insofar as breeding habits are known (and nests were found of all the genera by the Academy expedition), the nests all follow the same peculiar type of construction, being dome-shaped, covered structures, with the entrance at the side. Eggs at hand of *Geospiza*, *Platyspiza*, *Camarhynchus*, and *Certhidea*, are all very much alike in their general characteristics.

My course in establishing this family has called forth criticism (not published) from men whose opinions I value, the position they take being that the Geospizids are obviously of the Fringillidæ. It may be so, but after careful consideration of the assertion (no proof is offered) I am not convinced. In all previous treatments of these birds the fringilline aspect of the bill of some of the species has been given undue importance, just as the enormous

bill of *Geospiza magnirostris* has been uncritically assumed to imply "Coccothraustine" affinities. It seems to me clear beyond a doubt that the extremes represented by *Geospiza magnirostris* and the species of *Certhidea* are more closely related to each other than either is to any mainland form, in other words that those extremes have been produced since colonization of the islands. Even if their immediate common ancestor were of fringilline affinities, it seems to me that the group is now deserving of the rank I have ascribed to it. The "very large assemblage of species arbitrarily considered as forming a family Fringillidæ" (Ridgway, 1901, p. 24) is already so difficult of satisfactory definition that the addition to the group of still other forms previously ascribed to the Mniotiltidæ would seem to debar any definition at all. Even allowing the debatable nature of some aspects of the classification of the Geospizids, I believe that there is justification in the establishment of the family Geospizidæ. Such recognition is certainly in accord with the facts and principles stated by Ridgway (1901) in his discussion of avian classification (especially as regards the definition of families) in the introductory chapters of his monograph on American Fringillidæ. Any argument advanced against recognition of the family Geospizidæ applies with equal force to the generally accepted family of tanagers, Thraupidæ, and also, from the anatomical studies of Sushkin (1929, pp. 375, 379), to the Icteridæ and to the Hawaiian Drepanididæ.*

*When this publication was nearly through the press I found the following citation: "*Tiaris* is most intimately related to the famous Galapagoes finches, *Geospiza*, presenting one instance more of the affinities between the fauna of the Galapagoes and Antilles. [It is to be noted that *Certhidea* is a modified form of the same, Geospizine assemblage, and not Mniotiltine.]" (Sushkin, Auk, XLII, 1925, 261.) See pages 27-28, *antea*.

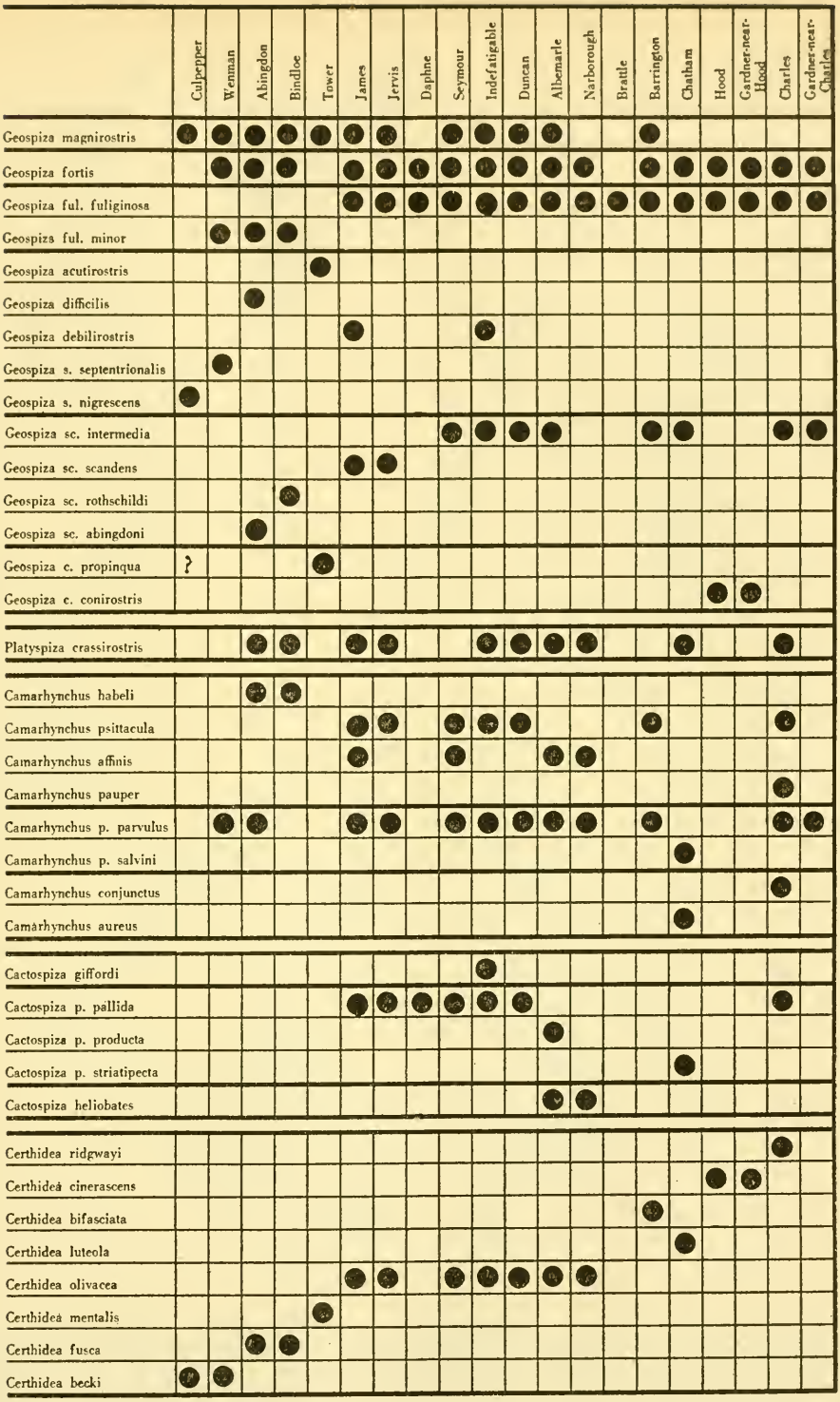

Fig. 18. Chart showing known distribution of the species of the Geospizidæ over the more important islands of the Galapagos Archipelago. Genera are separated by double lines. Closely related forms (species or subspecies) are segregated together between heavy lines. It will be noted that of the forms placed together between heavy lines, the only instances where two such forms occur upon any one island is in the case of *Camarhynchus psittacula* and *C. affinis* upon James and Seymour, due to the occurrence of stray individuals of *affinis* into the normal habitat of *psittacula*, and of *C. psittacula* and *C. pauper* upon Charles. With these exceptions the forms here listed together between heavy lines are complementary to one another in their distribution over the islands of the Archipelago, indicative of close, frequently subspecific relationship. In other words, the species and subspecies so segregated (ranging from one to eight in number) may be regarded as comprising fourteen units, some more or less sharply divided into species or subspecies, others not appreciably different upon different islands, forming the Geospizid population of the Galapagos.

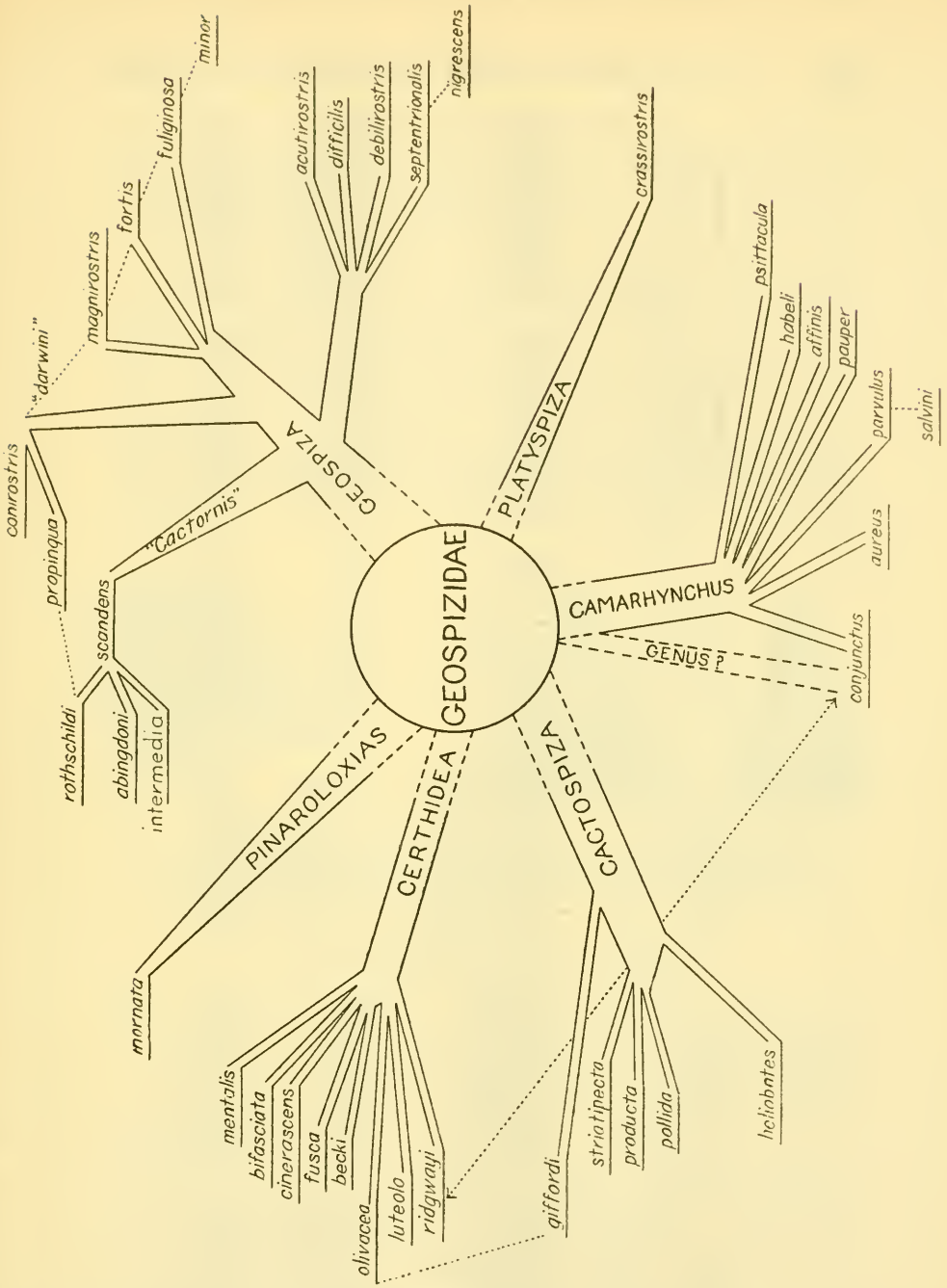

Fig. 19. Relationships of the species of the Geospizidæ. The family (Geospizidæ) is regarded as a tree-trunk, seen in cross-section from above. The main branches (genera) are here placed in relation to one another as they now seem, judging from resemblances; points of origin upon the trunk (relative distance from the beginning, at the ground) can not be determined from our point of view. The visible outward twigs (species and species), placed as nearly as may be in order of resemblances, form practically a circle. Dotted lines indicate intergradation or obvious resemblances. It is a debatable question whether *conjunctus* belongs upon the branch *Camarhynchus*, or represents a distinct genus.

Genera of Geospizidæ

Geospiza	Platyspiza	Camarhynchus	Cactospiza	Pinaroloxias	Certhidea
Sexes unlike	Sexes unlike	Sexes usually unlike	Sexes alike	Sexes unlike	Sexes usually alike
Size variable, from largest in family (wing 95 mm.) down to nearly the smallest (wing 55 mm.)	Size large (wing 80-88 mm.)	Size small and medium (wing 58-75 mm.)	Size medium (wing 64-77 mm.)	Size medium (wing 68 mm.)	Size small (wing 48-56 mm.)
Color: Perfect male plumage black, except under tail coverts. Female and immature in some species dusky, in some streaked	Color: Perfect male plumage usually with head and upper breast black; sometimes almost entirely black. Female and young streaked	Color: In most species, perfect male plumage with head and breast black; female and young streaked above and below, or nearly immaculate below. In two species no black marking. One species with chestnut on throat	Color: Plain gray, olivaceous or dusky. No conspicuous markings. One species with faint chestnut markings on throat	Color: Perfect male plumage black except under tail coverts. Female and immature streaked	Color: Brownish olivaceous or pale gray, in several species male has chestnut on throat and breast
Bill variable, from very large to small; "finch-like" or "starling-like"; culmen convex; gonys straight or slightly convex	Bill short, deep, and broad; culmen strongly convex; gonys straight	Bill variable, but usually short and stout; laterally compressed; culmen convex, usually strongly so; gonys slightly to strongly convex	Bill relatively slender, "tanager-like". Culmen convex; gonys slightly convex	Bill slender, sharp-pointed and decidedly decurved; culmen curved; gonys straight	Bill rather small, slender, and sharp-pointed; culmen slightly decurved; gonys straight or slightly convex
Tarsus relatively short; ratio of "middle toe with claw" to tarsus about 9 : 10	Tarsus relatively long; ratio of "middle toe with claw" to tarsus about 8 : 10	Tarsus relatively long; ratio of "middle toe with claw" to tarsus about 8 : 10	Tarsus intermediate in length; ratio of "middle toe with claw" to tarsus about 8.5 : 10	Tarsus relatively long; ratio of "middle toe with claw" to tarsus about 8 : 10	Tarsus relatively long; ratio of "middle toe with claw" to tarsus about 7 : 10

Genus Geospiza Gould

Geospiza Gould, Proc. Zool. Soc. London, part V, 1837a, p. 5. (Type, *Geospiza magnirostris* Gould.)

Cactornis Gould, Proc. Zool. Soc. London, part V, 1837a, p. 6. (Type, *Cactornis scandens* Gould.)

Geospizidæ of variable size, from the largest down to nearly the smallest in the family; coloration, in the high-plumaged male uniformly black, except that the under tail coverts are varied with white or buff, female and immature in some species dusky, in some streaked; bill variable, from very large to small, finch-like or starling-like in shape, culmen convex, gonys straight or slightly convex; tarsus relatively short, ratio of "middle toe with claw" to tarsus about 9 : 10. (See Ridgway, 1901, p. 489, for structural details.)

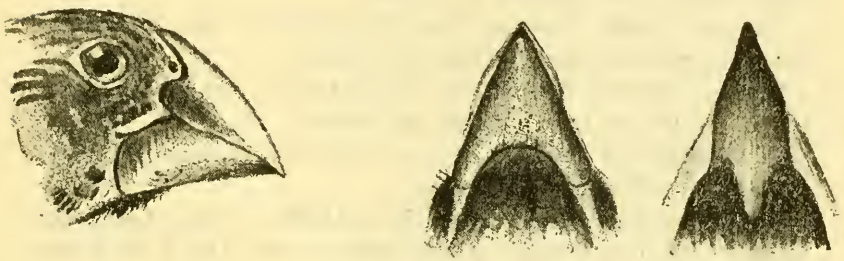

Fig. 20. Geospiza magnirostris, male; coll. British Museum, no. 37.2.21.402; natural size. One of Darwin's specimens, from which the species was named. Drawing by H. Grönvold.

72. Geospiza magnirostris Gould

Geospiza magnirostris Gould, 1837a, p. 5 (Galapagos Ids.; orig. descr.); 1841, p. 100, pl. 36.—Salvin, 1876, p. 479.—Sharpe, 1888, p. 7.—Ridgway, 1897, p. 512; 1901, p. 495.—Rothschild & Hartert, 1899, p. 154; 1902, p. 388.—Snodgrass & Heller, 1904, p. 332.—Rothschild, 1907, p. 11, pl. 3 (fig. 1).—Gifford, 1919, p. 224.

Geospiza strenua Gould, 1837a, p. 5 (Galapagos Ids.; orig. descr.); 1841, p. 100, pl. 37 ("James and Chatham Islands").—Sclater & Salvin, 1870, p. 323.—Sundevall, 1871, p. 124.—Salvin, 1876, p. 479, figs.—Sharpe, 1888, p. 8.—Ridgway, 1890, p. 105; 1897, p. 514; 1901, p. 496.—Rothschild & Hartert, 1899, p. 155; 1902, p. 388.—Snodgrass & Heller, 1904, p. 330.—Rothschild, 1907, pl. 3 (fig. 2).

Geospiza pachyrhyncha Ridgway, 1896, p. 293 (Tower Id.; orig. descr.); 1897, p. 516; 1901, p. 498.—Rothschild & Hartert, 1902, p. 388 (crit.).—Beck, 1904, p. 5 (habits).

Geospiza darwini Rothschild & Hartert, 1899, p. 158 (Culpepper Island; orig. descr.).—Ridgway, 1901, p. 500.—Snodgrass & Heller, 1904, p. 330.—Hartert, 1919, p. 152 (particulars of type specimen, in Rothschild Museum).
Geospiza conirostris darwini Rothschild & Hartert, 1902, p. 389.
Geospiza conirostris Gifford, 1919, p. 225, part.

GEOSPIZA MAGNIROSTRIS Gould

Cotype.—British Museum, no. 55.12.19.80; (♂ ad.; Galapagos Islands); Charles Darwin; received from Zoological Society of London.

Cotype.—British Museum, no. 55.12.19.113; (♀?; Galapagos Islands); Charles Darwin; received from Zoological Society of London. The above two specimens are the ones entered by Sharpe (1888, p. 8) as "types of species." The male now bears a red "type label." The additional five skins listed below seem to have valid claims to be regarded as cotypes.

Cotype.—British Museum, no. 37.2.21.402: (♂ ad.; Galapagos Islands); received from Burnett and Fitzroy.[1]

Cotype.—British Museum, no. 37.2.21.403; (sex?; Galapagos Islands); received from Burnett and Fitzroy.[2]

Cotype.—British Museum, no. ——; (sex?; Galapagos Islands); received from Burnett and Fitzroy.[3]

Cotype.—British Museum, no. 85.12.14.280. (♂ ad.; Galapagos Islands); Charles Darwin; Salvin-Godman coll. (ex T. C. Eyton coll.).

Cotype.—British Museum, no. 85.12.14.281; (♀ ; Galapagos Islands); Charles Darwin; Salvin-Godman coll. (ex T. C. Eyton coll.).

GEOSPIZA STRENUA Gould

Cotype.—British Museum, no. 55.12.19.18; (♂ ad.; Galapagos Islands); "October"; Charles Darwin; received from Zoological Society of London.

Cotype.—British Museum, no. 55.12.19.83; (♀?; Galapagos Islands); received from Zoological Society of London.

Cotype.—British Museum, no. 55.12.19.114; (♀?; Galapagos Islands); received from Zoological Society of London.

Cotype.—British Museum, no. 37.2.21.396; (♂ ad.; Galapagos Islands)[4]; Burnett and Fitzroy. The first three specimens listed

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[1] Charles Island. N.B.K.
[2] ♂ im. Charles Island. N.B.K.
[3] No. 37.2.21.398; ♀; Charles Island. N.B.K.
[4] Chatham Island. N.B.K.
Data supplied by Mr. Kinnear from sources other than the labels upon the skins.

above were indicated by Sharpe (1888, p. 9) as "types of species"; no. 55.12.19.18 is now distinguished with a red "type label."

GEOSPIZA PACHYRHYNCHA Ridgway

Cotype.—Rothschild Museum. (Specimen A, ♀?) Tower Island; Dr. Baur; ex spirits.

Cotype.—Rothschild Museum. (Specimen B, ♀?) Tower Island; Dr. Baur, no. 668.

Ridgway indicated no type specimen, but said (1896, p. 293) "type in Dr. Baur's collection"; and again (1901, p. 498, footnote) "Now in the Tring Museum collection". The above listed specimens are the only ones now in the Rothschild Museum, and neither has been labelled as the type. Ridgway's measurements were

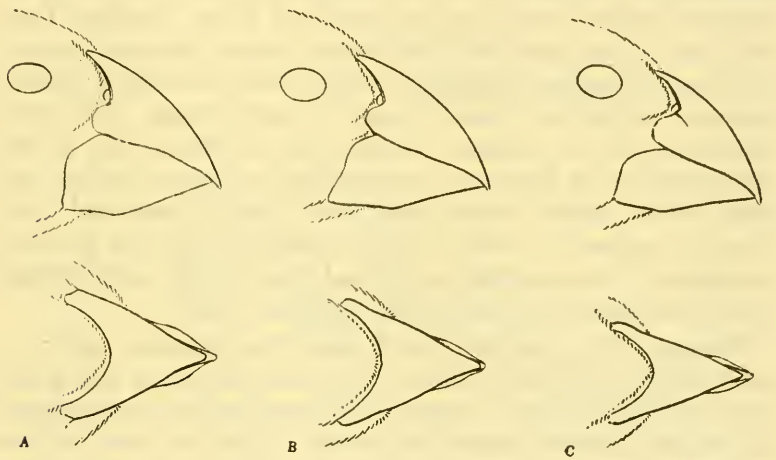

Fig. 21. Geospiza magnirostris (males): a (no. 5310), Tower; b (no. 5104), James; c (no. 5329), Jervis. Natural size.

from a drawing (see 1897, pl. LVII, fig. 9), made either from another specimen or as a composite of these two. Specimen A (so marked by myself on the label) matches the lateral drawing to a hair's breadth, but not the ventral view. Specimen B matches the ventral drawing perfectly, but not the lateral one. Rothschild & Hartert's figure (1899, pl. VI, fig. 8) is an accurate reproduction of the bill of specimen B.

GEOSPIZA DARWINI Rothschild & Hartert

Type.—Rothschild Museum; ♂ ad.; Culpepper Island; July 27, 1897; R. H. Beck (Webster-Harris expedition); orig. no. 157.

No type specimen was indicated in the original description, but the above, out of a series, has been distinguished with a red "type label."

Description.—The largest and the largest-billed of the Geospizidæ (see measurements, p. 151). *Adult male.*—Uniform black except that the under tail coverts are more or less broadly margined with white or pale buff. *Adult female.*—Dusky appearing, more or less mottled above and streaked below, under tail coverts and (to a varying extent) center of abdomen being immaculate dingy whitish. Feathers of upper parts generally black or dusky centered, edged with grayish or olive-green, these edgings so broad on rump and upper tail coverts as to almost entirely hide the central dusky marking. Ground color below paler on center of abdomen, darker (olivaceous) on sides and flanks. Feathers from chin over breast and sides with broad, central blackish streaks. Rectrices and remiges blackish or dusky, with narrow pale edgings. Greater, median and lesser coverts broadly edged with gray, olivaceous, or rusty brown. *Juvenal.*—Essentially similar to the adult female, but with the feather-edgings on upper surface and wing coverts rather broader and more sharply contrasted, producing a somewhat scale-like effect. Male birds, in a plumage presumably following the juvenal and worn for an undetermined period thereafter, are exactly like the adult female.

Variants.—The "perfect" adult male, as described above, is solid black except for the under tail coverts, but many individuals vary from this condition, displaying more or less of narrow edgings to the body feathers, above and below. From this state of near perfection there is further variation by extension of pale markings, to a streaked condition indistinguishable from the female. Solid black areas appear first about head, neck, and upper breast. Females from the same island vary from one extreme of heavy ventral streaking to the other of being nearly immaculate below. Streaked birds (male and female) from the northern islands are, on the average, distinctly darker and more heavily marked than those from the more southern ones.

Habitat.—Most of the Galapagos Archipelago, including all of the northern and central islands. Specifically known to occur upon the following: Culpepper, Wenman, Abingdon, Bindloe, Tower, James, Jervis, Albemarle, Narborough, Duncan, Indefatigable, Seymour, Barrington.

There are at hand 151 specimens* in the Academy collection and 35 in the Stanford University collection, taken at the following times: Culpepper, September 25; Wenman, September 24; Abingdon, June 24, 25, and September 18-22; Bindloe, June 20,

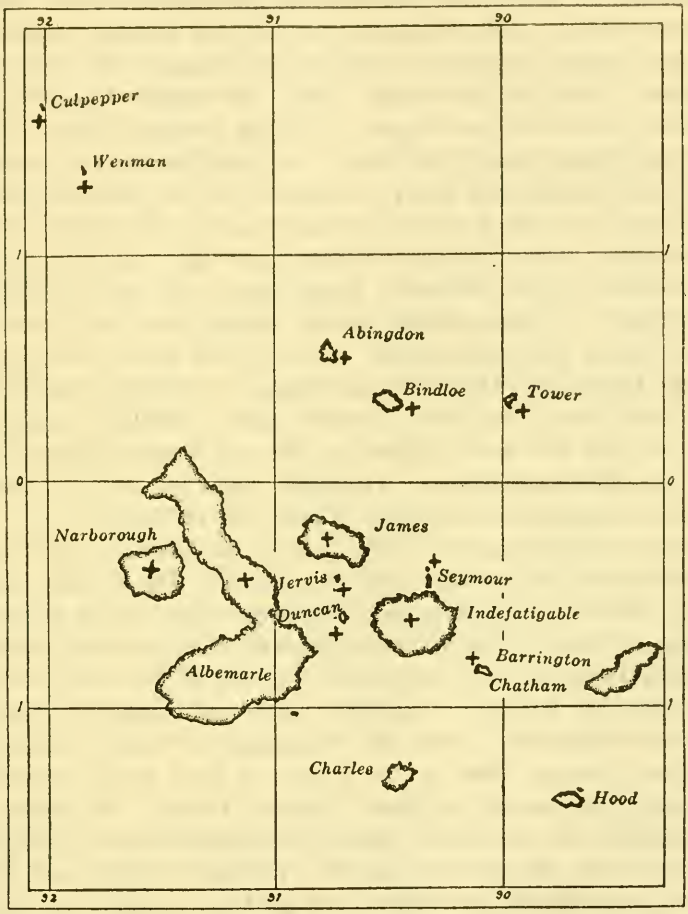

Fig. 22. Map showing distribution of *Geospiza magnirostris*. Symbols indicate islands where recorded.

21, and September 17; Tower, June 23, and September 14, 15; James, January, April, August and December; Jervis, December 18-21; Albemarle, March, April, August and November; Nar-

*Catalogued under the following numbers: 5099-5157, 5310-5335, 5337, 5481, 5488, 5550, 5551, 5953-6003, 6041, 6045, 6164, 6196, 6316, 6320, 6762, 6764-6766.

borough, January, March and April; Indefatigable, January, July and November; Seymour, November 21; Barrington, October 21.

Variation in bill color is as follows. Culpepper: Three black males, September 25, bill black. Wenman: Two black males, September 24, bill black; two females, bill light colored. Abingdon: One black male, September 19, and two females, September 22, bill black; remainder of September series (34) bill light colored. June 25, four black males, bill black; June 24, two streaked males and one female, bill light colored. Tower: June 23, three black males, bill black; one black male, one streaked male, two females, bill dusky. September 14, 15, one black male, bill black; two black males and two females, bill parti-colored; two streaked males and three females, bill light colored. Jervis: Of 20 black males, December taken, nearly all have bill black, in a few it is parti-colored; twelve females have bill black or dusky above, parti-color below. James: Four black males, April 21, 22, bill black. December and January, of 11 black males five have bill black, the others mostly dusky; streaked males and females have bill dusky above, or else are mostly light colored. In a streaked male taken on Albemarle April 14, and in a female taken on Indefatigable January 22, the bill is black.

Geospiza magnirostris was the first of the genus to be named, one of a series of species collected by Charles Darwin and collectively stated in Gould's paper, in general terms, to be from the Galapagos Islands. In the more elaborate treatment that followed (Gould, 1841, p. 100) this species is said to be from "Charles and Chatham Islands." Darwin's specimens eventually went to the British Museum, and in the "Catalogue of Birds" of that institution (Sharpe, 1888, p. 7) a pair of these birds, designated as types, are entered as from Chatham Island. The series of *magnirostris* in the British Museum comprises seven specimens, all from the "Beagle" expedition. The two "types" and three others from Burnett and Fitzroy had all been mounted for exhibition; two others (study skins), collected by Darwin, passed into the T. C. Eyton collection, then to Salvin and Godman, and then to the British Museum. That these birds came from either Charles or Chatham Island is unlikely.* No large-billed finch

*Mr. Kinnear has confidence in the accuracy of Fitzroy's ascription of specimens of *magnirostris* to Charles Island, of *strenua* to Chatham. But in this Darwin-Fitzroy collection there are no original labels that have survived to the present time; and there have been so many chances for dissociation of specimens and data that my every instinct impels me to rely upon the evidence supplied by the specific or subspecific characters of the specimens rather than on what has been written about them.

has been found upon those islands, and the assumption that *magnirostris* was native upon Charles, where it has been exterminated since Darwin's visit, seems to me to be unwarranted. Darwin's own statement regarding the confusion of localities has been cited in support of the Charles Island claims, but I can not so regard it. He says first: "Unfortunately most of the specimens of the finch tribe were mingled together; but I have strong reasons to suspect that some of the species of the subgroup Geospiza are confined to separate islands." Then: "Two species of the sub-group Cactornis, and two of Camarhynchus, were procured in the archipelago; and of the numerous specimens of these two sub-groups shot by four collectors at James Island all were found to belong to one species of each; whereas the numerous specimens shot either on Chatham or Charles Island (for the two sets were mingled together) all belonged to the two other species: hence we may feel almost sure that these islands possess their representative species of these two sub-groups" (Journal of Researches). It seems to me that the wording of this latter statement distinctly excludes *Geospiza*, and that it cannot be taken to have any bearing on the question as to whether Darwin collected a large billed *Geospiza* on Charles Island.

Darwin's itinerary on the "Beagle" began at Chatham Island, then southwest to Charles, northwest between Albemarle and Narborough, and around the north end of Albemarle to James. The present status of the large billed *Geospiza* upon these islands is as follows: non-existent upon Chatham and Charles; existent upon Albemarle and Narborough, but with bill size at the minimum; existent, and abundant, upon James, and with bill size close to the maximum.

A fact that our series brings out is that the largest billed birds are from the northern islands and that there is a decided reduction in bill size southward. The difference in this regard is striking, as between specimens from Culpepper, Wenman, Abingdon, Bindloe, Tower and James, on the one hand, and those from Jervis, Albemarle, Narborough, Indefatigable and Barrington, on the other. With this general trend of variation elsewhere in the archipelago it would be surprising if there were an extremely large-billed variant abruptly appearing on Charles, another southern island.

Gifford (1919, p. 225), in the published field notes covering the Academy collection that I am here reporting upon, states

under *Geospiza magnirostris*: "On Charles the largest-billed birds of all were taken." This sentence and the whole paragraph it introduces were inserted here by mistake, belonging properly under *Geospiza fortis*, as became apparent upon consulting his manuscript field note-book. The Academy expedition collected no large-billed *Geospiza* upon Charles Island.

I do not believe that *magnirostris* and *strenua* can be recognized as separate forms, and I do not believe that Darwin's specimens

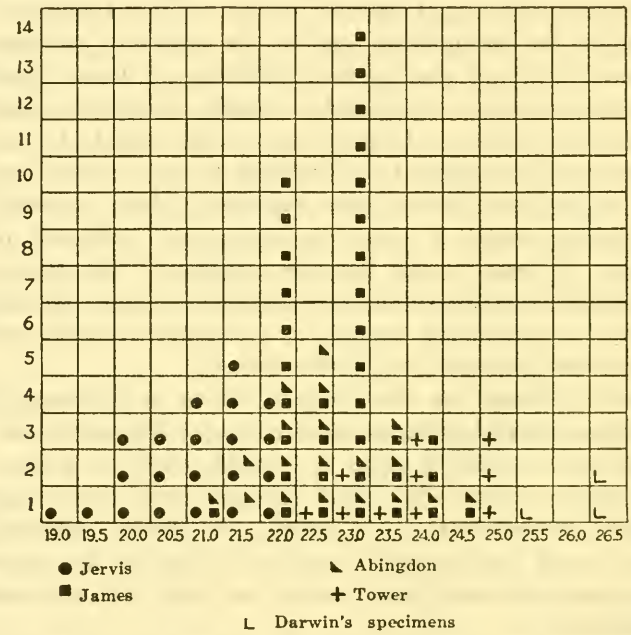

Fig. 23. Length of culmen in male specimens of *Geospiza magnirostris*: Jervis, 21; James, 36; Abingdon, 19; Tower, 10; also 3 specimens collected by Darwin, island unknown. Each symbol represents a specimen. Numerals at left of diagram indicate number of specimens; numerals at bottom, length of culmen in millimeters.

of *magnirostris* came from Charles Island. In all probability they were collected upon James Island, where Darwin did by far the greater part of his field work, and where at the present time size is near the maximum in this species. Admittedly the type series are a trifle larger than any birds since collected, but, even so, the difference is slight and it is not inconceivable that there has actually been some change in characters in the *magnirostris* population

since Darwin's time, that he collected his very large-billed birds upon James Island and that no such large-billed birds are to be found there today. I find this easier to believe than that this form was formerly existent upon Charles Island and has recently been exterminated there. The Geospizidæ throughout the Galapagos give the impression of being in a state of flux.

Geospiza strenua was described by Gould (1837, p. 5) from the "Galapagos Islands," restricted later (1841, p. 100) to "James and Chatham islands." Sharpe (1888, p. 8) lists the specimens collected by Darwin that formed the basis of Gould's description (entered as "types") as collected on Chatham Island, but inasmuch as no such heavy-billed *Geospiza* has since been found upon that island the conclusion was reached by Rothschild & Hartert (1899, p. 155) that a mistake was made and that the type must have come from James Island. These birds, however, particularly the male, have smaller bills than the male from James Island, more like those from Albemarle.

Ridgway (1896, p. 293) described *Geospiza pachyrhyncha* from Tower Island, differing from *strenua* in its deeper and broader bill. This type of bill is certainly developed to its utmost in Tower Island specimens, but merely to attach a name to the bird of this island does not tell the whole story. Bill structure in the Tower Island series is no more uniform than it is on other islands, and some smaller-billed adults from Tower have that feature no more largely developed than is the mode on Abingdon or on James. On the other hand, exceptional individuals on James and Abingdon closely approach the maximum of the Tower series. In other words, here is the overlapping of measurements that justified Rothschild & Hartert (1899, p. 156) and Snodgrass & Heller (1904, p. 330) in their refusal to recognize *pachyrhyncha*. The large size and large bill of the Tower Island form is part of a general trend to which I have previously alluded.

Geospiza darwini was described by Rothschild & Hartert (1899, p. 158) from Culpepper Island, and regarded by them subsequently (1902, p. 389) as a subspecies of *G. conirostris*. Examining their series I can appreciate the grounds upon which they acted (our own material is inadequate), but even so I can not bring myself to accept their conclusions. The female "*darwini*" is a streaked bird, as in *magnirostris*, and quite unlike the dusky female of *conirostris*, debarring treatment of this form as a subspecies of

conirostris in any event. The bill of "*darwini*" is on the average admittedly different from the mode of *magnirostris*, being compressed laterally and with more rounded culmen, intermediate in appearance between typical *magnirostris* and *conirostris*. Some specimens from Culpepper, though, are indistinguishable from *magnirostris*, and there are birds in our James Island series with the bill exactly as in "*darwini*." Thus, while there is a strong tendency toward the development of certain bill characters in the Culpepper bird, it hardly seems to justify a separate name.

Measurements in millimeters of the type series of *Geospiza magnirostris* in the British Museum

No.	Sex	Wing	Tail	Culmen	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
55.12.19.80	♂	89.0	51.5	25.5	23.5	16.8	26.5	22.5
37.2.21.402	♂	89.0	54.0	26.5	24.2	17.8	25.2	24.5
85.12.14.280	♂	90.0	54.2	26.8	24.0	17.8	25.0	24.5
55.12.19.113	♀?	84.5	51.0	24.5	23.2	17.2	25.5	21.0
37.2.21.403	♀?	87.0	51.0	24.8	.....	17.0	25.0	23.0
	♀?	84.5	50.5	24.5	22.8	16.8	24.2	23.0
85.12.14.281	♀?	85.5	53.0	26.0	23.0	16.2	25.0	23.2

Measurements in millimeters (average, minimum and maximum) of *Geospiza magnirostris*

MALES

Number of specimens	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
10[1]	Culpepper	80.7 (78.0-84.0)	49.7 (46.0-53.2)	21.3 (19.5-22.8)		16.8 (14.2-19.5)	12.7 (11.0-14.0)	25.1 (23.5-26.5)	22.7 (19.8-24.0)
3	Culpepper	83.6 (80.2-85.5)	52.7 (51.5-54.5)	22.2 (21.5-23.0)	12.1 (12.0-12.2)	18.2 (17.5-18.8)	13.9 (13.5-14.2)	25.8 (25.5-26.0)	22.5 (21.5-23.0)
2	Wenman	84.0-85.0	52.5-53.0	23.0-24.0	12.5-13.0	20.0-20.0	14.5-15.0	25.5-26.0	23.5-24.0
10	Abingdon	80.0 (77.0-83.0)	48.9 (42.0-52.2)	22.2 (21.0-23.5)	12.1 (11.0-12.5)	20.1 (19.0-22.0)	15.3 (14.5-16.5)	24.9 (23.5-26.0)	21.5 (20.0-22.5)
4	Bindloe	79.3 (78.0-81.0)	48.7 (47.5-51.0)	21.8 (21.0-22.2)	11.5 (11.0-12.0)	19.0 (18.2-20.8)	14.6 (14.0-15.5)	24.1 (23.0-26.0)	20.6 (19.5-21.5)
10	Tower	83.6 (77.5-87.5)	51.5 (48.0-53.0)	23.9 (22.5-25.0)	12.4 (12.0-13.2)	21.2 (19.0-23.0)	15.9 (15.0-17.0)	25.0 (24.0-26.0)	22.6 (21.5-23.0)
10	James	82.3 (78.5-85.5)	50.0 (47.0-53.5)	22.7 (21.0-24.0)	12.4 (11.2-13.5)	21.2 (20.0-22.0)	15.6 (14.5-16.2)	25.0 (24.0-26.0)	22.3 (20.0-23.5)
10	Jervis	80.7 (77.0-83.5)	50.5 (48.0-54.0)	20.9 (19.0-22.2)	11.6 (11.0-12.0)	18.2 (17.0-20.0)	13.6 (12.5-14.0)	23.5 (21.0-24.5)	22.3 (20.0-23.5)
4	Albemarle	76.1 (74.0-80.0)	46.7 (43.5-53.2)	20.7 (19.0-22.0)	11.1 (10.5-12.0)	17.0 (15.5-19.0)	13.0 (12.5-14.2)	23.7 (22.5-25.0)	21.3 (20.5-22.2)
1	Narborough	79.0	47.2	22.0	11.5	19.0	14.2	24.0	21.0
5	Indefatigable	79.5 (74.0-83.5)	49.6 (44.0-53.5)	21.7 (20.5-22.5)	11.7 (11.0-12.2)	19.9 (17.2-21.0)	15.3 (12.5-16.5)	24.3 (23.0-25.0)	21.5 (20.5-22.5)
1	Barrington	80.0	48.5	20.8	12.0	16.0	13.0	22.5	22.0

[1] "*Geospiza darwini*"; specimens in Rothschild Museum.

FEMALES

Number of specimens	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
4[1]	Culpepper	77.7 (77.2-78.0)	49.6 (48.2-51.2)	21.9 (21.0-24.0)		17.2 (16.0-18.0)	12.8 (12.0-13.2)	24.2 (23.5-24.8)	20.9 (18.5-22.2)
10	Abingdon	77.1 (74.0-79.0)	46.5 (43.0-49.0)	22.0 (20.8-23.2)	11.7 (11.2-12.2)	19.3 (18.8-20.5)	14.6 (13.5-16.0)	23.7 (23.0-24.5)	21.9 (20.5-23.2)
7	Tower	79.9 (77.2-83.0)	49.2 (45.5-52.8)	23.8 (23.2-25.0)	12.4 (12.0-13.5)	21.4 (20.2-23.5)	15.8 (15.0-16.8)	24.7 (23.5-25.8)	22.5 (21.5-23.2)
10	James	78.9 (76.5-82.0)	47.5 (42.2-49.5)	22.5 (21.2-24.0)	12.1 (11.5-12.8)	20.0 (19.0-21.0)	15.3 (14.2-16.0)	24.5 (23.0-27.0)	21.1 (20.0-22.0)
10	Jervis	78.9 (77.5-81.0)	47.7 (46.0-50.0)	20.8 (19.5-22.2)	11.5 (10.5-12.5)	18.1 (16.5-20.0)	13.4 (12.5-15.0)	23.7 (22.5-24.2)	21.5 (20.5-22.5)
3	Albemarle	75.6 (75.0-76.2)	45.1 (42.0-47.2)	18.8 (18.2-20.0)	10.0 (9.5-10.5)	15.5 (14.5-16.5)	12.1 (11.2-12.5)	22.5 (22.2-23.0)	20.4 (20.0-21.2)
6	Indefatigable (3) and Seymour (3)	76.0 (72.5-78.0)	47.3 (42.5-51.5)	21.2 (20.2-22.2)	11.6 (11.0-12.5)	18.5 (15.5-19.8)	14.1 (13.0-15.0)	23.5 (22.2-24.8)	20.7 (19.8-21.2)

[1] "*Geospiza darwini*"; specimens in Rothschild Museum.

Specimens of *Geospiza magnirostris* in the Academy Collection and (figures in parentheses) in the Stanford University Collection

Island	Male (black)	Male (streaked)	Female	Young	Sex undetermined
Culpepper	2	1			
Wenman	2		2		1
Abingdon	1 (4)	14 (2)	21 (1)		
Bindloe	1 (2)	(1)	(1)		
Tower	3 (4)	2 (1)	5 (2)		(2)
James	19 (4)	13 (1)	9 (2)	(5)	1
Jervis	20	1	10		2
Albemarle		4	3	1	
Narborough	(1)		(2)		
Seymour		1	3		
Indefatigable	3	2	3		
Barrington	1				

73. Geospiza fortis Gould

Geospiza fortis Gould, 1837a, p. 5 (Galapagos Ids.; orig. descr.); 1841, p. 101, pl. 38 ("Charles and Chatham islands").—Sharpe, 1888, p. 10.—Ridgway, 1901, p. 502.

Geospiza fortis fortis Rothschild & Hartert, 1899, p. 161.—Snodgrass & Heller, 1904, p. 319.

Geospiza dubia Gould, 1837a, p. 6 (Galapagos Ids.; orig. descr.); 1841, p. 103 ("Chatham Island").—Sharpe, 1888, p. 9 (type specimen believed to have been lost).—Ridgway, 1901, p. 501.

Geospiza dubia dubia Rothschild & Hartert, 1899, p. 160.

Geospiza fortis dubia Snodgrass & Heller, 1904, p. 328.

Geospiza fratercula Ridgway, 1894, p. 363 (Abingdon Id.; orig. descr.); 1901, p. 504.

Geospiza fortis fratercula Rothschild & Hartert, 1899, p. 161.—Snodgrass & Heller, 1904, p. 326.

Geospiza albemarlei Ridgway, 1894, p. 362 (Albemarle Id.; orig. descr.); 1901, p. 502.

Geospiza dubia albemarlei Rothschild & Hartert, 1899, p. 160.

Geospiza fortis platyrhyncha Heller & Snodgrass, 1901, p. 75 (Iguana Cove, Albemarle Id.; orig. descr.).—Snodgrass & Heller, 1904, p. 327.

Geospiza platyrhyncha Ridgway, 1901, p. 673.

Geospiza dubia simillima Rothschild & Hartert, 1899, p. 161 (Charles Id.; orig. descr.).

Geospiza simillima Ridgway, 1901, p. 502.

Geospiza fortis simillima Snodgrass & Heller, 1904, p. 329.

Geospiza dentirostris Gould, 1837a, p. 6 (Galapagos Ids.; orig. descr.).—Rothschild, 1907, p. 12.

Geospiza nebulosa Gould, 1837a, p. 5 (Galapagos Ids.; orig. descr.); 1841, p. 101 (Charles Id.).

Geospiza bauri Ridgway, 1894, p. 362 (James Id.; orig. descr.).

Cactornis brevirostris Ridgway, 1890, p. 108 (Charles Id.; orig. descr.).

GEOSPIZA FORTIS Gould

Cotype.—British Museum, no. 55.12.19.82; (♀?; Galapagos Islands); received from Zoological Society of London.

Geospiza fortis was described and figured as having the male jet black, but although apparently no black male reached the British Museum, there must have been such, forming at least one other cotype.

GEOSPIZA NEBULOSA Gould

Type.—British Museum, no. 37.2.21.400; (♀); Charles Island; presented by Burnett and Fitzroy.*

GEOSPIZA DENTIROSTRIS Gould

Type.—British Museum, no. 55.12.19.176; (Galapagos Islands); Charles Darwin; received from Zoological Society of London.

"Mr. Gould considers the specimen a female, from the appearance of its plumage; but from dissection, I thought it was a male" (Darwin, 1841, p. 102).

GEOSPIZA FRATERCULA Ridgway

Type.—United States National Museum, no. 116110; (♂ ad.) Abingdon Island; April 16 (1888); C. H. Townsend; U. S. Fish Commission, Voyage of the Albatross, 1887-88.

GEOSPIZA ALBEMARLEI Ridgway

Type.—United States National Museum, no. 115977: ♂, streaked; Tagus Cove, Albemarle Island; April 10 (1888); C. H. Townsend; U. S. Fish Commission, Voyage of the Albatross, 1887-88.

GEOSPIZA DUBIA SIMILLIMA Rothschild & Hartert

Type.—Rothschild Museum; ♂ ad.; Charles Island; November 4, 1897; C. D. Hull (Webster-Harris expedition); orig. no. 2267.

GEOSPIZA FORTIS PLATYRHYNCHA Heller & Snodgrass

Type.—Leland Stanford Junior University, no. 5150; ♂ ad.; Iguana Cove, Albemarle Island; June 7, 1899; R. E. Snodgrass and E. Heller (Hopkins-Stanford Galapagos expedition); orig. no. 147.

GEOSPIZA BAURI Ridgway

Type.—Rothschild Museum; ♂ ad.; James Island; August 17, 1891; Dr. G. Baur; orig. no. 562.

*Sharpe (1888, p. 11) wrongly lists the type of this species as collected by Darwin and as received from the Zoological Society; actually it was collected by Captain Fitzroy. N.B.K.

CACTORNIS BREVIROSTRIS Ridgway

Type.—United States National Museum, no. 115920; ♂ (adult but not entirely black); Charles Island; April 8, 1888; U. S. S. Albatross.

DESCRIPTION.—Differs from *Geospiza magnirostris* in smaller size and disproportionately smaller bill, from *G. fuliginosa* in larger size and disproportionately larger bill (see measurements, p. 165). In coloration and plumage stages I can see no differences between these species (see description of *G. magnirostris*, p. 144). Variation in shape of bill is such in each form as to preclude definition of specific differences of that nature.

HABITAT.—The greater part of the Galapagos Archipelago, including all of the central islands; perhaps only of casual occurrence on Wenman and Hood. The only parts of the group from which it has not been reported are the outlying islands of Culpepper, at the extreme north, and Tower, at the north-east.

There are at hand 812 skins in the Academy collection* and 125 in the Stanford University collection, representing every island upon which the species has been found (see table. p. 164). They were collected on the several islands upon seasons as follows: Wenman, September; Abingdon, June and September; Bindloe, June and September; James, January, April, August and December; Jervis, December; Indefatigable, January, July, October and November; Seymour, April, July and November; Daphne, July and November; Duncan, August and December; Albemarle, January, February, March, April, May, June, August, November and December; Narborough, January and April; Barrington, October; Charles, February, March, May, June and October; Gardner-near-Charles, October; Champion, October; Chatham, January, February, May, July, September and October; Hood, June and September; Gardner-near-Hood, February and September.

Variation in bill color is roughly as follows. Abingdon: in a series collected September 21, the bill is black in all but two, in which it is partly dusky. In a series collected in June there are three black males and one streaked male with black bill, and four streaked birds (perhaps immature) with light colored bill. Bindloe:

*The Academy series of *Geospiza fortis* is catalogued under the following numbers: 5096, 5158-5309, 5336, 5338-5423, 5433-5480, 5482-5487, 5489-5549, 5552-5606, 5762, 6004-6028, 6030-6040, 6042-6044, 6046-6163, 6165-6195, 6197-6315, 6317-6319, 6321-6367, 6475, 6767-6769, 6771-6775, 6777-6814, 6905.

in a series collected September 17, 18, the bill is light colored throughout. In June birds it is black or dusky. Indefatigable: October, light-colored or parti-colored; November, a few black billed, mostly parti-colored; January, all black; July, all light colored. Albemarle: March and April, black; November, parti-color. Narborough: April, black. Chatham: September and October, light colored or partly dusky; January and February, black; July, September and October, light colored or parti-colored. Charles: From February to the middle of May, black; June to middle of October almost uniformly light colored.

The correlation between black bill and period of breeding activity can be verified by reference to Gifford's (1919, pp. 228-230) published field observations upon this same collection.

It will be noted that I have synonymized under *fortis* a number of other described forms, to a greater extent than has been done by anyone previously. This was by no means in attempted corroboration of any preconceived idea of my own, for the extremes of variation in the series here assembled under one name are so great as to make it seem a matter of course at first glance that there must be several distinct forms involved. With that conviction firmly in mind I spent a great deal of time in attempts to apply previously published descriptions of the various species and subspecies here synonymized to restricted series from one island or another, and, that failing, in efforts to formulate definitions of my own that would serve the same purpose. It was with considerable reluctance that I finally accepted the apparently inevitable conclusion that just one form, a widely variable one, was included under the many proposed names. The differences involved are mostly in size and shape of bill, to a slight degree in other measurements.

Geospiza fortis was described by Gould (1837, p. 5) from the Galapagos Islands, later (1841, p. 101) restricted to "Charles and Chatham islands." The type locality has latterly been regarded as Charles Island (see Sharpe, 1888, p. 10). *Geospiza dubia*, described by Gould (1837, p. 6) from the Galapagos Islands, was later (1841, p. 103) restricted to Chatham Island. These two forms have, I believe, been accepted by all subsequent writers either as distinct species or as two subspecies. The differences between them are described as consisting in larger size with relatively larger bill in *dubia*, smaller size in *fortis*, and in variously

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described minor differences in shape of bill. *Dubia* has been restricted to Chatham, Barrington and Duncan; to *fortis* has been ascribed a range including those islands and many others.

Now, it is quite possible to pick out from among Chatham Island birds a series of large billed specimens and a series of small billed ones, and if intermediates should chance to be absent these extremes are so different as to justify their being regarded as distinct forms.

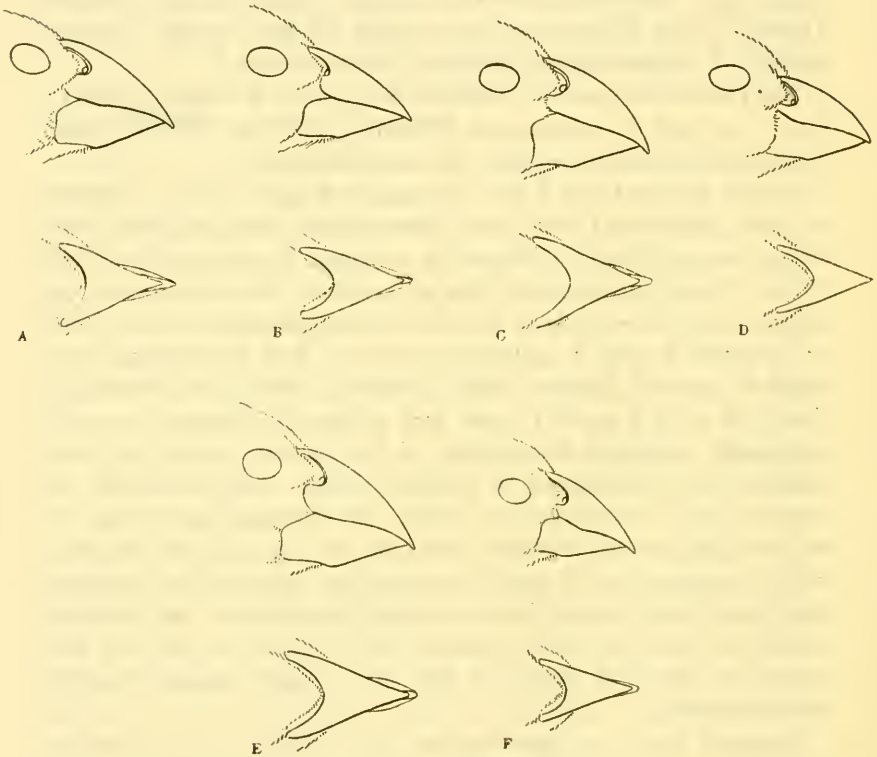

Fig. 24. Geospiza fortis, males, showing range of variation upon different islands: a (no. 5341), b (no. 5391), Chatham; c (no. 5150, coll. Stanford Univ., type of Geospiza f. platyrhyncha), d (no. 5237), Albemarle; e (no. 5161), f (no. 5412), Charles. Natural size.

I did just this thing in my preliminary examination of Chatham Island birds. Unfortunately there were still doubtful intermediates to be allocated, and these in our large series were so numerous and bridged the gap so absolutely as to make it impossible to draw any dividing line. Exactly the same condition prevails

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on some of the other large islands. (See tables, pp. 158-160). This, to my mind, precludes the possibility of recognizing the form *dubia*.

Three forms have been ascribed to Albemarle, *fortis*, *albemarlei* (Ridgway, 1894, p. 362), and *platyrhyncha* (Heller & Snodgrass, 1901, p. 75). The last mentioned writers regard *albemarlei* as a

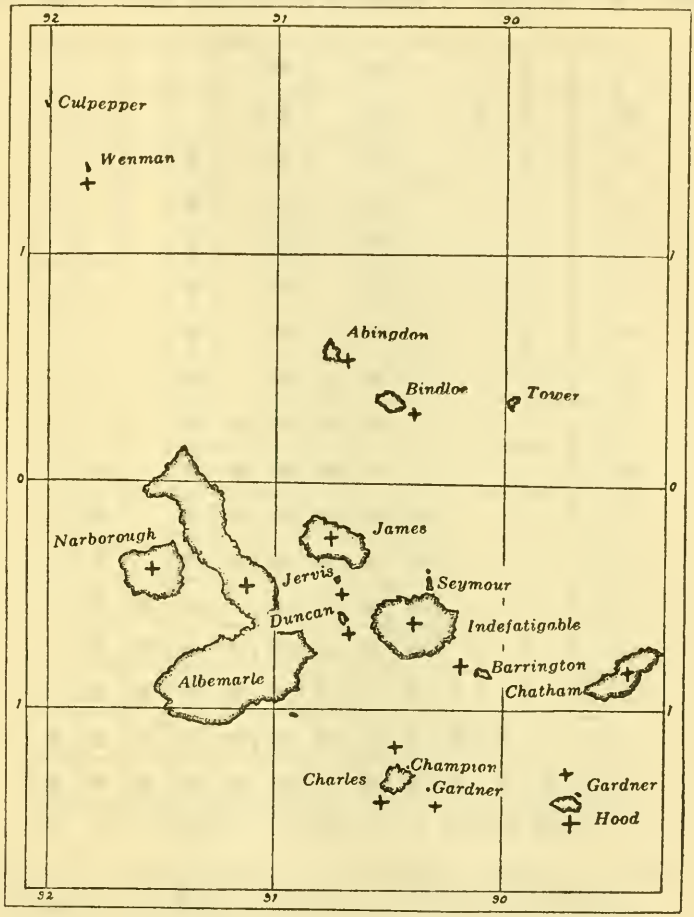

Fig. 25. Map showing distribution of *Geospiza fortis*. Symbols indicate islands where recorded.

synonym of *fortis*, so just two forms are ascribed to Albemarle by any one author. Rothschild & Hartert, (1899, p. 160), it may be pointed out, treat *albemarlei* as a subspecies of *G. dubia*, an action that shows, incidentally, the extreme similarity of *fortis*

and *dubia*. It is altogether a very pretty tangle of names! The actual situation upon Albemarle is not as clear as upon some of the other islands, for the differences described by Heller & Snodgrass as distinguishing *fortis* and *platyrhyncha* do exist, and they can to some extent be correlated with different localities upon the island. Briefly, *fortis* is regarded as a small billed form, found

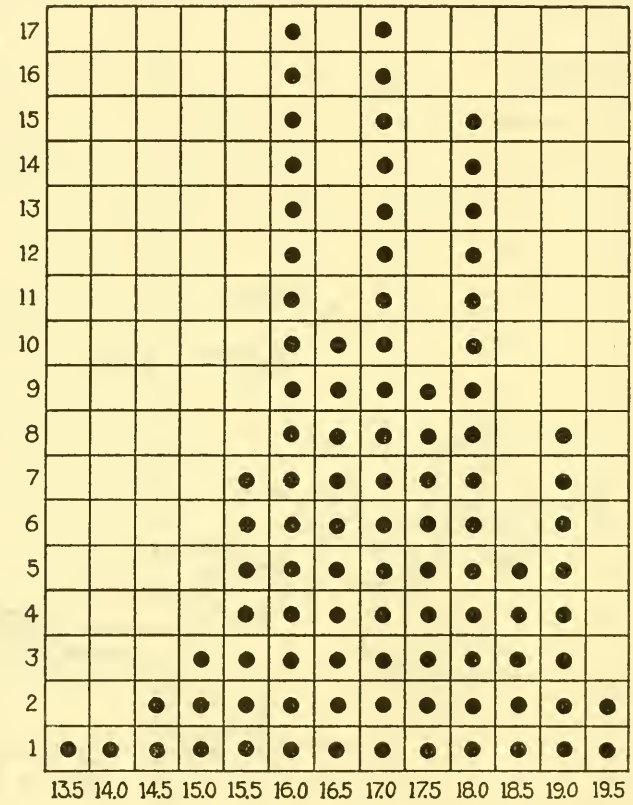

Fig. 26. Length of culmen in 97 male specimens of *Geospiza fortis* from Albemarle. Each symbol represents a specimen. Numerals at left of diagram indicate number of specimens; numerals at bottom, length of culmen in millimeters.

upon the northern end of the island (specifically, at Tagus Cove), *platyrhyncha* as a large billed form from the southern end (at and near Iguana Cove). It may be admitted that in our series most of the birds from north Albemarle are small billed, and

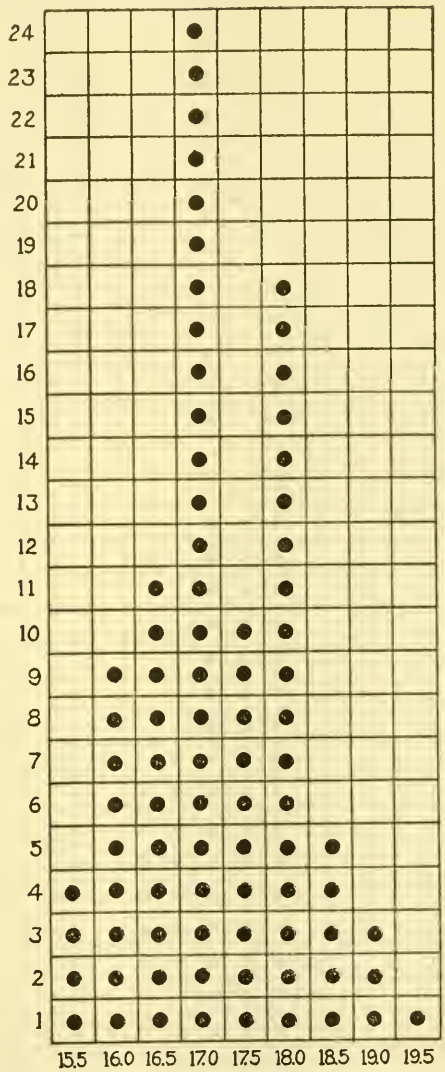

Fig. 27. Length of culmen in 85 male specimens of *Geospiza fortis* from Chatham. Each symbol represents a specimen. Numerals at left of diagram indicate number of specimens; numerals at bottom, length of culmen in millimeters.

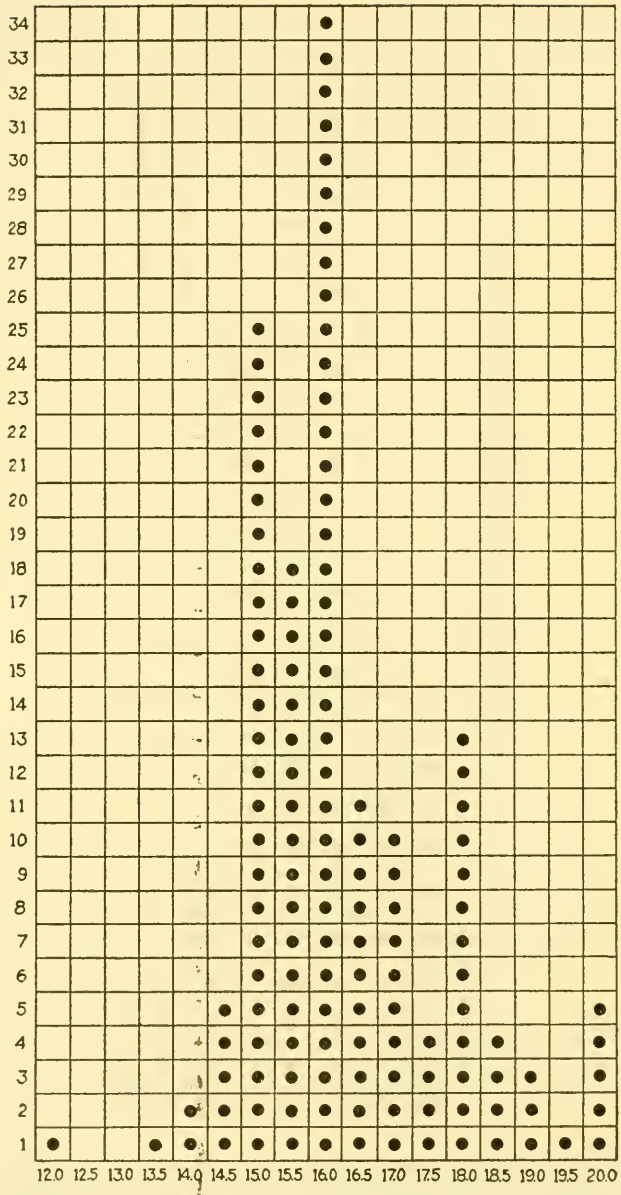

Fig. 28. Length of culmen in 137 male specimens of *Geospiza fortis* from Charles. Each symbol represents a specimen. Numerals at left of diagram indicate number of specimens; numerals at bottom, length of culmen in millimeters.

most of those from south Albemarle are large billed. Furthermore, the mode of the birds from the north end (distinctly small billed) is very similar to the modes on Narborough and James, neighboring islands near the northern portion of Albemarle; and the mode of the birds from south Albemarle (distinctly large billed) is close to that upon Charles, immediately to the southward (see table, p. 165). At the same time, there is upon Albemarle such a range of measurements in series from any one point, caused by a relatively few large billed birds in north Albemarle and a relatively few small billed birds in south Albemarle, as to cause an extensive overlapping in measurements in series from the two regions. Thus, no division can be made on geographical grounds. Individual variation throughout the island is about the same as on Chatham and Charles, making it out of the question to establish dividing lines based on measurements alone. It might be argued that the relatively few exceptional birds in the series from the two extremes of the island were migrants from the opposite ends, but there is no evidence at hand to support this view. On the whole, despite the diversity of bill structure, and admitting the apparent tendency toward geographical segregation of the two extremes, it is not feasible to define more than one form of *fortis* upon Albemarle Island.

Geospiza fratercula (Ridgway, 1894, p. 363) was described from Abingdon Island, based upon possession of a supposedly smaller bill than in *fortis*. The range was later extended to include Bindloe Island. It is recognized as a subspecies of *fortis* by Rothschild & Hartert (1899, p. 161), and by Snodgrass & Heller (1904, p. 326), but on a basis of generally smaller size and shorter wing, rather than on size of bill. In the series now available the lesser wing measurement is verified to this extent, that the birds from Abingdon include some individuals with the shortest wing measurements found in *fortis* from any locality. The extremes, however, are nearly reached in individuals from distant islands, and overlapping measurements preclude any satisfactory definition of the form *fratercula*. There are no bill differences.

Geospiza nebulosa, *G. dentirostris*, *G. bauri*, *G. dubia simillima*, and *Cactornis brevirostris* were all based upon single birds or perhaps on three or four specimens, they have not been recognized by others subsequent to the descriptions, and our own extensive series do not bear out the existence of any such forms. I have

seen them all and regard them all as variants of the extremely unstable *Geospiza fortis*. Some of these names represent normal variation such as I find in our own series. The one known specimen of "*Cactornis brevirostris*" is an extreme departure from the mode of *fortis*, but nevertheless to be regarded, I am convinced, as merely a single aberrant individual, such as may be found in our series of other species.

The bird from Charles Island that was recorded by Ridgway (1896, p. 515) as *Geospiza strenua* (U. S. Nat. Mus. no. 115905) is a male in streaked plumage, collected April 8, 1888. Although listed by Ridgway (*loc. cit.*) as "immature," it had with little doubt been breeding during the nesting season that had just closed. It is not in juvenal plumage, it is in extremely worn plumage with a few new feathers interspersed, and it is unquestionably more

Fig. 29. Geospiza dentirostris, (female?); coll. British Museum no. 55.12.19.176; type; natural size. Drawing by H. Grönvold.

than a year old, as large in general dimensions and in size of bill as it would ever become. The bill is mostly black, with a pale colored area on the lower mandible. Measurements are as follows: wing 76.0 mm.; tail 42.0; culmen 20.5; gonys 12.2; depth of bill at base 18.2; width of mandible at base 13.0; tarsus 24.2; middle toe with claw 21.5. It can be closely matched in size and general appearance by specimens of *magnirostris* from Jervis and Albemarle islands. At the same time there are specimens of *fortis* from Charles Island that nearly equal it in all measurements (see table, p. 165). Taken on Jervis or Albemarle this bird would pass as a small example of *magnirostris* (and there is the possibility that it is a stray from one of those islands), but taken on Charles it can not, by itself, be accepted as proof of the regular

occurrence of *magnirostris* on that island. It seems to me to form one of the many closely graded steps that unite *fortis* and *magnirostris*, an aberrant *fortis* of unusually large size.

It may be worth repeating for the sake of emphasis, that *Geospiza fortis* is a remarkably variable form. The difference between the extremes of bill measurement among specimens from any one island is so great, as shown in the accompanying drawings, that I will probably be criticized for lumping them all under one name. I can only re-affirm that the gradation between the extremes on any one island is such as to render it impossible to make any satisfactory division of specimens into two or more definable forms, as, indeed, is shown to some extent in the accompanying tables of measurements. Here again, field observations coupled with the judicious collecting of paired birds and whole families of parents and young might be expected to yield instructive results.

Daphne is an islet between Indefatigable and James, some four miles off the north coast of Indefatigable and about 12 miles southeast of James. Our 22 specimens of *fortis* from Daphne are distinctly small-billed, as small as the Abingdon bird, and thus closely similar to the James series and dissimilar to specimens from Indefatigable. Birds from South Seymour Island, about four miles east of Daphne and but slightly separated from Indefatigable, are indistinguishable from Indefatigable specimens, as might be expected.

In general it will be seen that in *fortis* there is increase in general size of bill from the north southward. A line roughly dividing the smaller and larger birds would pass through the center of Albemarle, south of Duncan, and south of Daphne. I do not see, though, that it is possible to define these differences in terms of subspecies, or with rigidly outlined habitats, individual variation is so wide and exceptional variants relatively so numerous. The large bill of the southernmost variants of *fortis* may have relation to the small bill of the southernmost *magnirostris*. Regarding the two species as one variable form, the trend of variation, large to small, could be shown as a double line, from north to south then north once more, the turning point at the southernmost Charles Island indicated by the large-billed *fortis* above described.

Our single specimen from Wenman Island, no. 5465, a streaked male collected September 24, may be regarded as a straggler to that point. It was apparently the only one seen upon the island

by this expedition, and it seems to be the first reported there by anyone. It is a large sized, large billed bird, quite different from the "*fratercula*" mode upon Abingdon and Bindloe, the nearest islands to the southeast. It can be most closely matched by specimens from Albemarle, which lies almost south of Wenman, a little farther than Abingdon. Gifford (1919, p. 230) has given other evidence of the occasional wandering of this species from island to island.

In the series available from Abingdon Island it will be noted that in this species, as in other "ground finches" occurring thereon, there is a very small proportion of high-plumaged males. The Academy series of *fortis* from Abingdon includes one black male and 14 streaked ones, while from the neighboring Bindloe Island, out of 8 males, 6 are black and one partly black.

The species has not been reported before from Hood Island and our series from that island does not show whether or not the birds were breeding there. All have pale colored bills, even the February birds, though *conirostris* then was with black bills.

Specimens of *Geospiza fortis* in the Academy Collection and (figures in parentheses) in the Stanford University Collection

Island	Male (black)	Male (streaked)	Female	Young	Sex undetermined
Wenman		1			
Abingdon	1 (2)	14 (5)	8		(1)
Bindloe	6 (3)	2 (1)	5 (2)		1 (1)
James	8 (8)	2 (3)	10 (3)	(6)	
Jervis	1		2		
Indefatigable	15 (4)	19	31		1 (1)
Seymour	14 (1)	3	24 (1)		
Daphne	15	1	6		
Duncan	17	4	14		1
Albemarle	28 (24)	19 (6)	45 (21)	4 (1)	3 (2)
Narborough	4 (9)		3		
Barrington	3				
Charles	88 (4)	54 (1)	156 (5)	55 (1)	13
Gardner-near-Charles		2			
Champion		1			
Chatham	35 (4)	17 (2)	38 (1)	1 (1)	3 (1)
Hood		3	8		
Gardner-near-Hood			3		

Measurements in millimeters (average, minimum and maximum) of *Geospiza fortis*

MALES

Number of specimens	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
10	Abingdon	65.0 (61.0-71.0)	40.3 (37.0-44.5)	15.8 (15.0-17.0)	8.5 (7.5- 9.0)	11.5 (10.2-12.5)	9.4 (8.5-10.5)	20.1 (19.0-21.5)	17.6 (16.5-19.0)
10	Bindloe	65.8 (64.0-68.0)	40.1 (38.0-42.5)	16.2 (15.2-17.2)	8.6 (8.0- 9.2)	12.0 (11.5-12.8)	9.2 (9.0- 9.8)	19.7 (19.0-20.5)	17.1 (16.5-18.0)
10	James	69.8 (68.0-72.0)	42.8 (41.0-45.0)	16.3 (14.0-17.5)	8.7 (8.0- 9.2)	12.5 (10.0-14.0)	9.6 (8.0-10.2)	21.7 (21.0-23.5)	18.9 (17.5-21.0)
10	Narborough	69.4 (67.0-72.0)	41.6 (38.0-45.0)	16.2 (14.8-17.2)	8.8 (8.2- 9.5)	12.0 (11.0-13.0)	9.4 (9.0-10.0)	21.1 (20.0-22.2)	18.3 (17.5-19.5)
10	n. Albemarle	69.6 (66.0-74.0)	42.5 (38.5-48.0)	16.1 (14.8-18.5)	8.6 (7.8-10.5)	12.2 (11.0-14.5)	9.5 (8.5-12.0)	21.3 (20.0-22.8)	18.6 (17.0-20.5)
10	s. Albemarle	74.2 (71.0-77.2)	45.4 (42.2-49.0)	18.2 (15.8-19.5)	9.8 (8.5-11.0)	14.2 (12.2-16.2)	10.9 (9.0-11.5)	22.4 (21.0-24.5)	20.2 (18.0-22.8)
10	Daphne	65.8 (63.2-68.0)	40.4 (38.0-42.5)	14.4 (13.0-15.8)	8.2 (7.5- 8.8)	10.4 (9.0-12.0)	8.1 (7.5- 8.8)	20.7 (20.0-21.2)	17.8 (16.5-19.0)
10	Seymour	69.6 (66.0-73.0)	43.4 (41.5-45.5)	15.8 (15.0-16.5)	8.7 (8.0- 9.2)	11.9 (10.2-13.0)	9.3 (8.2-10.0)	21.5 (20.5-22.0)	18.9 (17.8-20.0)
15	Indefatigable	71.2 (63.5-79.0)	43.2 (40.0-47.0)	17.4 (16.0-19.5)	9.2 (8.5-11.0)	13.1 (11.0-16.5)	10.3 (8.5-12.5)	21.3 (20.0-24.5)	19.4 (17.8-20.0)
10	Duncan	68.4 (64.2-71.5)	42.1 (40.0-44.8)	15.0 (14.0-17.5)	8.1 (7.5- 8.8)	11.2 (10.0-13.0)	8.5 (8.0-10.5)	21.1 (19.5-23.0)	19.0 (17.5-21.0)
23	Charles	72.5 (68.0-78.0)	44.5 (40.0-48.5)	16.7 (14.0-20.2)	9.2 (7.5-11.0)	12.7 (11.0-16.0)	10.0 (8.2-12.0)	22.1 (20.0-24.0)	19.2 (17.2-21.5)
26	Chatham	72.6 (68.0-76.0)	44.8 (40.0-47.0)	17.6 (16.5-19.5)	9.5 (9.0-10.5)	13.7 (11.8-16.2)	10.8 (9.5-12.5)	22.2 (21.0-23.2)	19.3 (18.0-21.0)

FEMALES

8	Abingdon	60.9 (57.2-63.5)	38.0 (32.5-40.8)	14.7 (13.5-15.8)	8.2 (7.8- 8.5)	10.7 (9.5-11.5)	8.6 (7.2- 9.2)	18.8 (18.2-19.5)	16.8 (16.0-17.8)
7	Bindloe	62.6 (61.8-63.0)	37.1 (34.2-39.0)	15.9 (15.2-16.8)	8.4 (8.0- 8.8)	11.7 (11.0-12.5)	9.0 (8.5-10.0)	19.0 (18.0-19.5)	16.9 (16.0-17.5)
10	James	68.0 (64.0-74.5)	40.9 (38.2-43.0)	15.9 (14.8-17.0)	8.6 (8.0- 9.5)	11.8 (10.2-14.0)	9.3 (8.2-11.0)	20.6 (19.0-22.2)	17.6 (16.5-19.2)
3	Narborough	68.0 (65.8-70.0)	43.3 (41.5-45.0)	16.1 (15.5-17.2)	8.8 (8.5- 9.0)	12.3 (11.5-13.5)	9.3 (9.0- 9.8)	20.6 (20.2-21.0)	17.7 (17.0-19.0)
10	n. Albemarle	67.3 (63.2-70.5)	40.5 (37.5-42.2)	16.1 (14.5-17.5)	8.7 (8.0- 9.8)	12.0 (11.0-13.5)	9.6 (8.5-11.0)	21.6 (20.0-22.5)	19.1 (18.0-20.0)
10	s. Albemarle	71.6 (68.0-75.5)	44.2 (42.0-47.2)	17.6 (16.5-18.2)	9.8 (8.8-10.5)	13.6 (12.5-14.8)	10.7 (10.0-11.8)	21.9 (21.0-23.2)	19.2 (17.8-20.8)
10	Indefatigable	66.9 (63.5-72.5)	40.2 (37.5-43.0)	16.0 (14.5-17.8)	8.8 (8.0-10.0)	11.8 (10.8-13.8)	9.5 (8.5-11.8)	21.0 (18.5-22.5)	18.7 (18.0-19.8)
10	Duncan	65.3 (62.0-68.8)	39.1 (35.2-42.0)	15.0 (14.2-16.0)	8.1 (7.2- 8.8)	10.6 (10.0-11.2)	8.3 (7.8- 8.5)	20.2 (19.5-21.0)	17.5 (16.5-18.5)
10	Charles	68.3 (67.0-74.0)	41.8 (38.0-46.5)	16.6 (14.2-18.8)	9.2 (8.0-10.2)	12.4 (10.2-15.0)	9.6 (8.5-11.5)	21.8 (20.8-23.0)	19.7 (17.8-21.5)
10	Chatham	68.5 (66.0-73.0)	41.7 (39.0-44.5)	16.9 (15.0-19.2)	9.1 (8.0-10.5)	12.9 (11.0-15.5)	10.3 (9.0-11.8)	22.1 (21.2-24.0)	19.1 (17.8-21.0)

MEASUREMENTS IN MILLIMETERS OF MALE SPECIMENS OF *Geospiza fortis* FROM INDEFATIGABLE ISLAND

Museum	No.	Age	Date	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
Stanford Univ.	4668	streaked	Apr. 30, 1899	63.5*	40.0*	16.0	9.0	11.0	9.0	20.0	18.5
Stanford Univ.	4702	black	Apr. 30, 1899	69.5	41.0	16.0	8.5	12.0	9.0	21.2	19.5
C. A. S.	5247	black	Nov. 18, 1905	70.0	44.0	16.0	8.5	12.0	9.2	21.0	18.5
C. A. S.	5392	black	Nov. 7, 1905	70.0	43.5	16.2	8.5	11.2	9.2	20.5	19.0
C. A. S.	5301	black	July 23, 1906	70.5	42.0	16.5	8.5	12.0	9.5	22.0	19.2
C. A. S.	5509	streaked	Nov. 18, 1905	66.0	41.0	17.0	9.2	12.2	10.0	22.0	18.0
Stanford Univ.	4667	black	Apr. 30, 1899	68.0	40.0	17.0	8.5	12.0	8.5	22.0	17.8
C. A. S.	5475	streaked	Nov. 18, 1905	68.5	43.5	17.0	9.2	13.0	10.2	22.0	19.2
Stanford Univ.	4707	black	Apr. 30, 1899	68.5	40.0	17.5	9.0	12.5	10.0	22.0	20.0
C. A. S.	5295	black	Nov. 13, 1905	72.0	44.5	17.5	9.2	13.0	10.8	21.2	19.0
C. A. S.	6780	black	Jan. 12, 1906	74.2	46.0	18.0	9.5	15.0	12.0	22.5	20.5
C. A. S.	5462	streaked	Nov. 20, 1905	76.0	44.5	18.5	9.5	14.2	11.0	23.0	20.5
C. A. S.	5336	black	Nov. 3, 1905	77.0	47.0	19.0	10.0	15.5	12.0	23.5	21.0
C. A. S.	5258	black	Nov. 25, 1905	76.0	44.5	19.5	10.0	15.0	11.2	22.5	20.5
C. A. S.	5223	black	Jan. 11, 1906	79.0	47.0	19.5	11.0	16.5	12.5	24.5	20.0

*Very worn plumage

MEASUREMENTS IN MILLIMETERS OF MALE SPECIMENS OF *Geospiza fortis* FROM CHATHAM ISLAND

Museum	No.	Age	Date	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
C. A. S.	5391	black	Oct. 16, 1905	70.0	47.0	16.5	9.0	12.5	9.5	21.0	19.5
C. A. S.	6772	black	Jan. 29, 1906	68.0	40.0	17.0	9.0	11.8	9.5	21.0	18.2
C. A. S.	5360	black	Jan. 29, 1906	69.2	41.2	17.0	9.0	13.0	11.0	22.0	19.2
C. A. S.	5355	black	Feb. 8, 1906	71.5	44.0	17.0	9.5	12.0	9.5	21.5	19.5
C. A. S.	5350	black	Jan. 25, 1906	71.5	45.5	17.0	9.2	13.0	10.0	23.0	21.0
C. A. S.	5405	black	Oct. 18, 1905	72.0	45.5	17.0	9.0	13.5	10.0	21.0	18.0
C. A. S.	5349	black	Feb. 9, 1906	72.5	43.0	17.0	10.0	13.2	10.2	22.5	20.0
C. A. S.	5259	black	Jan. 26, 1906	72.5	44.5	17.0	9.0	13.5	11.0	22.0	19.0
C. A. S.	5362	black	Feb. 8, 1906	73.0	44.0	17.0	9.2	13.0	10.5	22.0	19.0
C. A. S.	5170	black	Oct. 17, 1905	73.0	45.5	17.0	9.2	14.0	11.0	23.2	19.0
C. A. S.	5394	black	Oct. 16, 1905	74.0	44.0	17.0	9.2	12.2	10.0	21.2	19.5
C. A. S.	5347	black	Oct. 16, 1905	74.5	46.0	17.0	9.2	14.5	12.0	22.2	18.5
C. A. S.	5277	black	Feb. 9, 1906	70.5	41.0	17.2	9.0	14.0	11.0	22.5	18.0
C. A. S.	5352	black	Oct. 17, 1905	74.5	46.8	17.2	9.0	15.2	11.0	22.2	18.5
C. A. S.	5229	black	July 6, 1906	70.0	45.0	17.5	9.5	12.5	9.5	22.2	20.0
C. A. S.	5354	black	Jan. 29, 1906	72.0	46.0	17.5	9.5	13.5	11.0	21.5	19.0
C. A. S.	5370	black	Feb. 13, 1906	72.8	44.0	17.5	9.5	13.2	10.2	21.5	18.5
C. A. S.	5172	streaked	Oct. 16, 1905	74.2	47.0	17.8	10.0	15.0	12.0	23.0	21.0
C. A. S.	5173	streaked	Sept. 10, 1906	72.5	47.0	18.0	10.0	15.5	11.5	22.2	20.0
C. A. S.	5339	black	Jan. 29, 1906	75.2	44.8	18.0	9.5	14.0	11.5	23.0	19.5
C. A. S.	5169	black	Jan. 26, 1906	76.0	44.8	18.0	10.0	14.0	11.2	22.0	19.5
C. A. S.	5344	black	Sept. 8, 1906	72.2	46.0	18.5	9.8	14.8	12.0	23.0	19.0
C. A. S.	5377	black	Jan. 29, 1906	76.0	45.5	18.5	10.0	14.2	12.2	23.2	19.2
C. A. S.	5171	black	Jan. 27, 1906	74.0	46.5	19.0	10.0	16.2	12.5	23.2	19.0
C. A. S.	5341	black	Jan. 25, 1906	75.2	45.5	19.0	10.0	14.8	11.5	22.5	20.0
Stanford Univ.	4859	black	May 23, 1899	70.0	45.5	19.5	10.5	14.5	11.0	22.0	20.0

MEASUREMENTS IN MILLIMETERS OF MALE SPECIMENS OF *Geospiza fortis* FROM CHARLES ISLAND

Museum	No.	Age	Date	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
C. A. S.	5216	black	Feb. 28, 1906	73.0	43.0	14.0	7.5	11.0	9.0	20.0	18.5
C. A. S.	5397	black	Oct. 11, 1905	68.5	44.0	15.0	8.5	11.0	9.0	21.0	18.5
C. A. S.	5412	black	Mar. 1, 1906	70.0	44.5	15.0	8.2	11.0	8.2	21.0	17.2
C. A. S.	5419	black	Mar. 1, 1906	71.0	42.0	15.0	8.2	11.2	8.5	22.0	18.0
C. A. S.	5358	black	Oct. 10, 1905	71.0	44.0	15.0	8.5	11.5	9.0	20.2	19.0
C. A. S.	5265	black	Mar. 1, 1906	72.0	44.5	15.0	8.2	11.0	9.0	20.0	18.2
C. A. S.	5401	black	Mar. 2, 1906	73.0	43.5	15.0	9.0	11.5	9.5	22.0	19.0
C. A. S.	5231	black	Mar. 1, 1906	68.0	41.0	15.5	8.2	11.2	8.5	22.0	18.5
C. A. S.	5359	black	May 23, 1906	70.5	40.0	15.5	8.5	11.0	9.0	21.5	17.2
C. A. S.	5393	black	Oct. 9, 1905	72.5	45.5	15.5	9.0	12.0	9.5	22.0	19.0
C. A. S.	5199	black	June 4, 1906	70.0	45.0	16.0	8.5	12.0	9.8	21.0	19.0
C. A. S.	5255	black	Mar. 1, 1906	71.2	41.5	16.0	8.8	12.2	9.5	22.2	18.5
C. A. S.	5298	black	May 31, 1906	70.2	43.0	17.0	9.2	11.8	9.8	22.5	19.5
C. A. S.	5269	black	Oct. 12, 1905	74.0	44.2	17.5	10.0	13.0	10.0	24.0	20.0
C. A. S.	5345	black	June 4, 1906	75.5	44.5	17.5	10.0	14.5	11.0	23.0	20.0
C. A. S.	5346	black	June 2, 1906	75.0	46.5	17.8	10.0	13.0	11.5	23.0	20.2
C. A. S.	5351	black	May 28, 1906	73.5	44.0	18.0	10.5	14.2	10.5	23.0	19.5
C. A. S.	5214	black	Oct. 5, 1905	74.0	48.5	18.0	10.0	14.0	11.2	22.2	20.2
C. A. S.	5243	black	May 31, 1906	74.0	48.5	18.2	10.2	15.0	12.0	24.0	19.0
C. A. S.	5260	black	Oct. 5, 1905	73.2	48.5	19.0	10.5	15.0	11.0	23.0	20.0
C. A. S.	5227	black	May 28, 1906	74.5	42.0	19.8	10.0	15.0	11.8	23.0	20.5
C. A. S.	5371	black	Oct. 9, 1905	75.2	47.0	19.8	10.0	14.0	11.2	23.5	21.0
C. A. S.	5161	streaked	Oct. 5, 1905	78.0	48.0	20.2	11.0	16.0	12.0	23.0	21.5
			"Cactornis brevirostris"								
U. S. Nat. Mus.	115920*	black	April 8, 1888	68.0	42.5	18.5	9.8	11.5	9.5	21.5	19.8

*Type

74. Geospiza fuliginosa fuliginosa Gould

Geospiza fuliginosa Gould, 1837a, p. 5 (orig. descr.; Galapagos Islands); 1841, p. 101 ("Chatham and James islands").—Sclater & Salvin, 1870, p. 323 (Indefatigable).—Sundevall, 1871, p. 125.—Salvin, 1876, p. 482, figs.—Sharpe, 1888, p. 12.—Ridgway, 1890, p. 107; 1897, p. 526; 1901, p. 504.—Rothschild, 1902a, p. 46 (Chatham Id., nest and eggs).—Gifford, 1919, p. 231, part.

Geospiza fuliginosa fuliginosa Rothschild & Hartert, 1899, p. 161; 1902, p. 394.—Snodgrass & Heller, 1904, p. 315 (Chatham Id.).

Geospiza parvula (not of Gould) Sundevall, 1871, p. 125.—Salvin, 1876, p. 482, figs.—Sharpe, 1888, p. 13.

Geospiza fuliginosa parvula Snodgrass & Heller, 1904, p. 294.

Geospiza harterti Ridgway, 1901, p. 507 (orig. descr.; Chatham Id.).

GEOSPIZA FULIGINOSA Gould

Cotype.—British Museum, no. 55.12.19.44; (♂ ad.; Galapagos Islands); received from Zoological Society of London.

Cotype.—British Museum, no. 57.11.28.247; (♂ ad.; Galapagos Islands); received from J. Gould.

Cotype.—British Museum, no. 85.12.14.320; (♀?; Galapagos Islands); Charles Darwin.*

Cotype.—British Museum, no. 37.2.21.410; (♀?; Galapagos Islands); received from Burnett and Fitzroy.

Cotype.—British Museum, no. 37.2.21.411; (♀?; Galapagos Islands); received from Burnett and Fitzroy.

Number 55.12.19.44 is apparently the specimen that was indicated by Sharpe (1888, p. 13) as "type of species", and it now bears a red "type label".

GEOSPIZA HARTERTI Ridgway

Type.—Rothschild Museum; ♂ ad.; Chatham Island; September 8, 1891; "Dr. G. Baur coll., ex spirits."

In my opinion this specimen with others in the Rothschild Museum similarly labelled (Albemarle 2, Crossman 14, Hood 1, Daphne 3, Charles 1, Gardner-near-Charles 2) form a series of intermediates between *fortis* and *fuliginosa*, nearer the latter, perhaps, and not a distinguishable species or subspecies.

DESCRIPTION.—Differs from *Geospiza fortis* in smaller size and disproportionately smaller bill (see measurements, p. 175). Coloration and plumage stages as in *fortis* and *magnirostris* (see description of *G. magnirostris*, p. 144).

*Ex Salvin-Godman coll. (purchased from T. C. Eyton coll.); purchased by Eyton at Zoological Society's sale. All the Galapagos birds in the Zoological Society collection were collected by Darwin. N.B.K.

Habitat.—All of the central and southern islands of the Galapagos Archipelago. Explicitly, it has been found on James, Jervis,

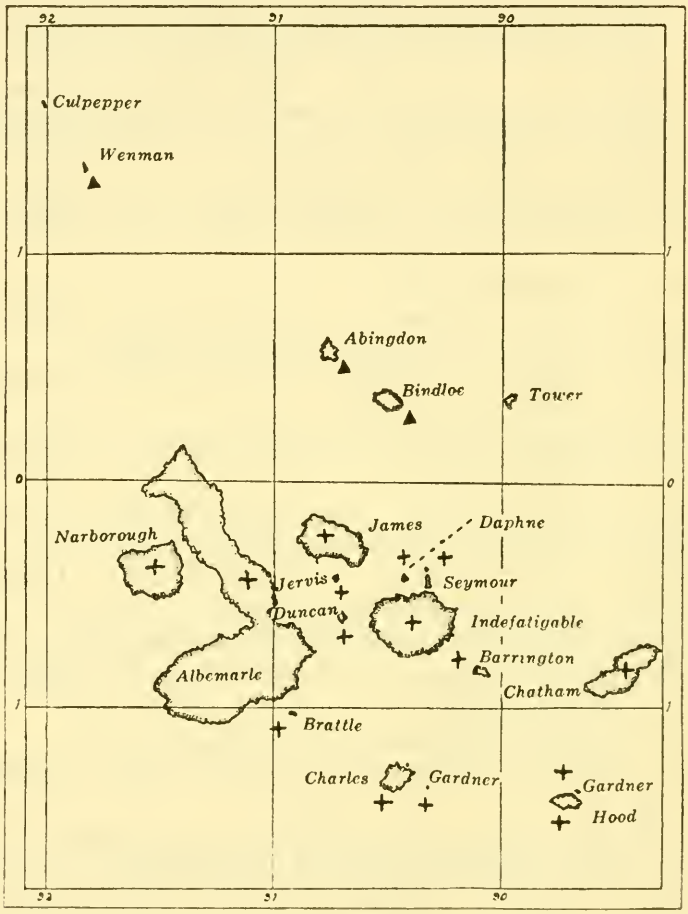

Fig. 30. Map showing distribution of subspecies of *Geospiza fuliginosa*. Symbols indicate islands where recorded.

Indefatigable, Seymour, Daphne, Duncan, Albemarle, Narborough, Brattle, Barrington, Charles, Gardner-near-Charles, Enderby, Hood, Gardner-near-Hood, and Chatham.

There are at hand 645 skins in the Academy collection* and 107 in the Stanford University collection, as shown in the accompanying table. They were collected on the several islands at seasons as follows: James, December, January, April; Jervis, December; Indefatigable, January, April, July, October, November; Seymour, April, May, July, November; Duncan, May, August, December; Albemarle, January, February, March, April, May, August, September, October, November, December; Narborough, January, March, April; Brattle, October; Barrington, May, July, October; Charles, February, March, May, June, October; Gardner-near-Charles, October; Enderby, May; Hood, January, February, May, June, July, September, October; Gardner-near-Hood, May, September; Chatham, January, February, May, July, September, October.

Variation in bill color is about as follows. In adults taken late in November and early in December the bill is mostly pale colored, often partly dusky, and occasionally black. From late December until early May it is entirely black with hardly an exception. In most of the birds taken late in May it is parti-colored, with pale bills beginning to predominate. From the latter part of June until late in September it is pale colored. Most October birds have the bill pale colored, but in a very few it is dusky or parti-colored. This variation occurs similarly in black males, in adult streaked males, and in adult females. It is less apparent in the series of streaked birds (male and female) as such series include many immature birds in the plumage following the juvenal, and in all these the bill is pale colored. Comparison of this variation with the data given by Gifford (1919, pp. 234-235) pertaining to breeding activities will show how closely the periods of acquisition and loss of black color in the bill correspond with the waxing and waning of the reproductive period.

There are birds in juvenal plumage at hand collected on Albemarle during April (April 11-26), and on Charles between May 16 and June 1. The annual molt of the adult appears to be accomplished between the middle of April and the end of June; the post-juvenal molt probably occurs at about the same time.

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*The Academy series of *Geospiza fuliginosa* are catalogued under the following numbers. *G. f. fuliginosa*: nos. 5424-5430, 5607-5761, 5763-5813, 5815-5861, 5863-5901, 5903-5926, 6368-6379, 6381-6522, 6524-6565, 6567-6575, 6577-6662, 6815, 6817-6832, 6834-6852, 6854-6858, 6919, 8042.

G. f. minor: nos. 5431-5432, 5862, 5927-5941, 5952, 6380, 6523, 6566, 6663-6675, 6859-6862.

Fuliginosa is one of the most widely spread of any of the Geospizidæ. It occurs over a greater number of islands than does any other species except *fortis* and with less variation as between different islands. It is also one of the most abundant species. Gifford (1919, p. 231) says that it is "the commonest of all the Galapagos birds, being found on every island and islet visited, except Culpepper". At the same time the amount of variation exhibited from any one island (or at any rate from several of the islands) is such as to afford justification for the action of earlier students of Galapagos birds in assuming that there were two species represented. In our large series from Chatham Island in particular, it seemed at first an easy and obvious thing to do, to effect a division on the score of size, and the differences between extremes was such as to make it seem impossible that they should

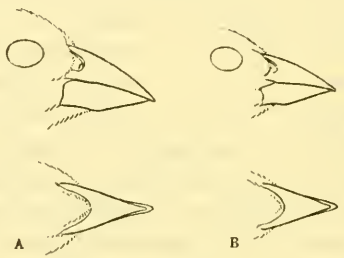


Fig. 31. Geospiza fuliginosa, males: a, G. f. fuliginosa (no. 5871), Chatham; b, G. f. minor (no. 5939), Abingdon. Natural size.

all be of one form. In the accompanying table of measurements (p. 175) two series of black males from Chatham Island are entered to illustrate the range of size between the extremes. Overlapping of every measurement occurs, however, so that it is not possible to draw any line between.

A supposedly smaller form to which the name "*parvula*" has been applied has received recognition from some quarters, notably of late from Snodgrass & Heller (1904, p. 294). It should be pointed out first that the name *Geospiza parvula* Gould is applicable, not to a form of *G. fuliginosa*, but to the bird later named *Camarhynchus prosthemelas* Sclater & Salvin (see p. 229). At any rate, I am not able to define or allocate two forms of *Geospiza fuliginosa* on the central and southern islands. Snodgrass & Heller restrict the habitat of *G. fuliginosa fuliginosa* to Chatham Island.

75. Geospiza fuliginosa minor Rothschild & Hartert

Geospiza fuliginosa minor Rothschild & Hartert, 1899, p. 162 (orig. descr.; Bindloe and Abingdon islands); 1902, p. 395 (nest and eggs).—Snodgrass & Heller, 1904, p. 316.—Hartert, 1919, p. 152 (particulars of type specimen, in Rothschild Museum).
Geospiza minor Ridgway, 1901, p. 506.
Geospiza parvula (not of Gould) Sclater & Salvin, 1870, p. 323.—Salvin, 1876, p. 483, part.—Sharpe, 1888, p. 14, part.—Ridgway, 1890, p. 107; 1897, p. 529, part.

GEOSPIZA FULIGINOSA MINOR Rothschild & Hartert

Type.—Rothschild Museum; ♂ ad.; Bindloe Island; September 5, 1891; "Dr. Baur coll. Ex spirits."

DESCRIPTION.—Differs from *Geospiza fuliginosa fuliginosa* in slightly smaller general size and in smaller bill (see text, beyond, and measurements, p. 175).

HABITAT.—Wenman, Abingdon, and Bindloe islands.

The material at hand consists of 39 skins in the Academy collection, collected on Wenman, Abingdon, and Bindloe, September 17 to 24; and 7 from the Stanford University collection taken on Abingdon and Bindloe, June 20 to 25. The Wenman birds have light colored bills; they appear to be all immature. Of those from Abingdon, the June birds have the bill mostly blackish or dusky, the September birds have the bill black in all that can be recognized as adult. Of the Bindloe series, the June specimens have the bill black or dusky, in the September skins (both black and streaked) the bill is uniformly pale colored. In the Abingdon Island September series some of the birds (with black bill) are marked as being in breeding condition, and there are in the series young birds just out of the nest. It would appear that nesting was in progress on Abingdon during September, but not on Bindloe.

This is perhaps as faintly characterized a form as any in the family that is distinguished by a separate name. Differences, as compared with *G. f. fuliginosa*, consist of slightly smaller general size and rather lighter bill. In every measurement there is extensive overlapping with *fuliginosa*; on Chatham Island in particular there are many birds that are as small as *minor* (see table of measurements). It is perhaps desirable to continue the form under a separate subspecific name so as to emphasize the existence of the tendency to small size, but the ascribed characters can hardly be regarded other than as tendencies in the described direction.

It is worthy of notice that in our Abingdon series of 27 skins there is only one black male, though many of the streaked males are adult and in breeding condition. From no other island is there such a small proportion of black males. (See Rothschild & Hartert, 1899, p. 162.) It is a curious fact that this bird should have been breeding on Abingdon in September, the nesting season elsewhere in the archipelago appearing to lie between November and April.

Apparently the Academy expedition was the first to report this species from Wenman Island.

Specimens of the *Geospiza fuliginosa* group in the Academy Collection and (figures in parentheses) in the Stanford University Collection

Name	Island	Male (black)	Male (streaked)	Female	Young	Sex undetermined
Geospiza f. minor	Wenman		1	3		
Geospiza f. minor	Abingdon	1(3)	12(1)	10	2	2
Geospiza f. minor	Bindloe	5(3)	1	2		
Geospiza f. fuliginosa	James	5(1)	1(1)	3(4)	(4)	2
Geospiza f. fuliginosa	Jervis	5	2			
Geospiza f. fuliginosa	Indefatigable	19(6)	11(1)	30		3(1)
Geospiza f. fuliginosa	Seymour	8(18)	5(2)	11(8)		
Geospiza f. fuliginosa	Daphne		1			
Geospiza f. fuliginosa	Duncan	31(3)	22	23(1)		(2)
Geospiza f. fuliginosa	Albemarle	33	17	36	5	1
Geospiza f. fuliginosa	Narborough	2(13)		(8)		(2)
Geospiza f. fuliginosa	Brattle	4	2	4		
Geospiza f. fuliginosa	Barrington	22(6)	1(1)	4(2)		
Geospiza f. fuliginosa	Charles	23(2)	23(5)	71	15	11
Geospiza f. fuliginosa	Gardner-near-Charles	2	1			
Geospiza f. fuliginosa	Enderby	1			2	
Geospiza f. fuliginosa	Hood	17(3)	2(1)	11(1)		1(1)
Geospiza f. fuliginosa	Gardner-near-Hood	4	2(1)	5		1
Geospiza f. fuliginosa	Chatham	40(4)	28(1)	85(4)		2

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF THE SUBSPECIES OF *Geospiza fuliginosa*

MALES

Number of specimens	Name	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
1	Geospiza f. minor	Wennian	59.0	40.5	11.5	6.0	8.2	6.2	19.0	16.0
10	Geospiza f. minor	Abingdon	57.9 (55.2-60.0)	36.1 (34.0-39.0)	11.1 (10.0-12.5)	6.3 (6.0-7.0)	7.4 (6.5-8.2)	6.1 (6.0-6.5)	18.0 (17.0-19.0)	15.2 (14.5-16.0)
9	Geospiza f. minor	Bindloe	57.8 (55.2-59.2)	36.4 (36.0-37.0)	11.0 (10.2-11.2)	6.2 (6.0-6.5)	7.0 (6.2-7.8)	6.0 (5.8-6.5)	18.2 (18.0-19.0)	15.2 (14.2-16.0)
7	Geospiza f. fuliginosa	James	61.8 (58.0-64.2)	37.6 (33.5-42.0)	11.3 (10.2-12.0)	6.5 (6.2-6.8)	7.8 (7.5-8.0)	6.5 (6.2-7.0)	19.3 (18.5-20.0)	16.3 (15.0-17.0)
5	Geospiza f. fuliginosa	Jervis	61.7 (61.0-62.2)	37.8 (36.0-39.8)	11.8 (11.0-12.0)	6.7 (6.2-7.0)	7.8 (7.2-9.0)	6.4 (6.2-7.0)	19.5 (19.0-20.0)	16.8 (16.0-17.5)
10	Geospiza f. fuliginosa	Albemarle	64.2 (63.2-66.5)	40.9 (38.5-43.0)	11.8 (11.0-13.0)	6.7 (6.2-7.2)	8.2 (7.2-9.0)	6.7 (6.2-7.0)	19.8 (19.0-20.5)	16.8 (16.0-17.5)
10	Geospiza f. fuliginosa	Narborough	62.5 (61.5-65.0)	37.8 (36.0-40.0)	11.0 (10.0-11.5)	6.2 (6.0-6.5)	7.6 (7.2-8.0)	6.3 (6.0-7.0)	19.4 (18.2-20.5)	16.2 (15.5-17.0)
10	Geospiza f. fuliginosa	Duncan	62.4 (60.0-64.5)	37.9 (37.0-40.0)	11.7 (11.0-13.0)	6.7 (6.2-7.5)	7.9 (7.5-8.5)	6.7 (6.2-7.0)	19.9 (19.0-20.5)	16.6 (15.5-17.2)
10	Geospiza f. fuliginosa	Indefatigable	62.4 (60.5-64.5)	38.9 (37.5-41.5)	11.5 (11.0-12.0)	6.5 (6.0-7.0)	7.6 (7.2-8.2)	6.3 (6.0-7.0)	19.8 (19.0-20.5)	16.2 (15.2-17.0)
10	Geospiza f. fuliginosa	Barrington	62.0 (60.2-64.5)	38.3 (37.0-39.8)	12.0 (10.5-13.0)	6.8 (6.0-7.0)	7.9 (7.0-8.2)	6.5 (6.0-7.0)	19.4 (18.5-21.0)	16.4 (15.8-17.0)
10	Geospiza f. fuliginosa	Charles	62.2 (60.5-65.0)	39.4 (37.5-42.2)	11.2 (10.0-12.2)	6.7 (6.2-7.0)	7.8 (7.2-8.5)	6.5 (6.0-7.0)	19.8 (19.0-20.0)	16.9 (16.0-17.5)
10	Geospiza f. fuliginosa	Hood	63.5 (62.2-65.0)	39.9 (38.8-41.0)	11.9 (11.5-12.5)	6.9 (6.5-7.2)	7.7 (7.2-8.5)	6.6 (6.5-7.0)	19.8 (18.5-21.0)	16.8 (16.0-17.8)
10	Geospiza f. fuliginosa	Chatham	63.4 (61.0-65.0)	39.6 (36.5-42.0)	12.1 (10.8-13.2)	7.1 (7.0-7.5)	8.0 (7.0-9.0)	6.7 (6.5-7.2)	19.9 (19.0-20.2)	17.1 (16.0-18.0)
10	Geospiza f. fuliginosa	Chatham	61.1 (57.0-63.5)	36.8 (34.0-38.0)	10.5 (10.0-11.2)	6.0 (5.8-6.2)	7.1 (7.0-7.5)	5.9 (5.5-6.2)	19.3 (18.0-20.5)	15.6 (15.0-16.0)

FEMALES

3	Geospiza f. minor	Wenman	62.0 (57.8-67.5)	37.7 (37.0-38.5)	11.6 (11.2-12.2)	6.2 (6.0-6.5)	7.6 (7.2-8.2)	6.6 (6.2-7.0)	19.9 (19.2-20.5)	16.3 (15.8-17.0)
9	Geospiza f. minor	Abingdon	57.2 (54.5-60.2)	36.5 (33.8-39.0)	11.1 (10.8-11.5)	6.2	7.4 (7.2-7.8)	6.1 (6.0-6.5)	18.1 (16.8-19.0)	15.5 (14.0-16.5)
2	Geospiza f. minor	Bindloe	54.8-56.5	31.0-32.5	9.0-11.5	5.8-6.2	6.5-7.5	5.5-6.0	16.5-17.5	13.0-14.5
6	Geospiza f. fuliginosa	James	60.8 (60.0-62.0)	37.3 (36.0-39.8)	12.3 (11.8-13.0)	6.8 (6.2-7.0)	7.9 (7.5-8.2)	6.4 (6.0-6.8)	18.9 (17.8-20.0)	16.3 (15.2-17.2)
2	Geospiza f. fuliginosa	Jervis	60.5-61.0	34.5-35.5	11.2-12.5	6.2-6.5	7.8-8.0	6.5-6.5	18.2-19.2	15.5-16.0
10	Geospiza f. fuliginosa	Albemarle	60.0 (56.2-63.2)	36.9 (35.0-40.0)	11.3 (10.2-12.8)	6.6 (6.0-7.2)	7.9 (7.2-8.5)	6.3 (6.0-6.8)	19.7 (19.2-20.2)	16.8 (16.2-18.0)
8	Geospiza f. fuliginosa	Narborough	61.4 (58.0-63.5)	37.9 (35.0-40.0)	11.1 (10.5-11.8)	6.5 (6.0-7.0)	7.9 (7.2-8.2)	6.2 (6.0-6.8)	19.4 (18.5-20.2)	16.4 (15.8-17.0)
10	Geospiza f. fuliginosa	Duncan	60.3 (58.0-63.0)	35.9 (34.2-38.5)	12.1 (11.2-12.8)	6.6 (6.2-7.0)	7.6 (7.0-8.0)	6.5 (6.0-6.8)	19.7 (18.5-20.5)	16.6 (15.2-17.5)
10	Geospiza f. fuliginosa	Indefatigable	59.3 (57.2-61.0)	36.5 (33.0-38.5)	12.1 (11.2-12.5)	6.7 (6.2-7.0)	7.8 (7.2-8.2)	6.3 (6.2-6.5)	19.4 (19.0-20.0)	17.1 (16.2-17.5)
6	Geospiza f. fuliginosa	Barrington	59.0 (57.2-61.5)	35.0 (32.5-37.0)	12.0 (11.2-12.5)	6.6 (6.2-7.0)	7.8 (7.2-8.0)	6.4 (6.2-6.5)	18.6 (18.0-19.8)	16.8 (16.2-17.5)
10	Geospiza f. fuliginosa	Charles	60.2 (59.5-61.5)	36.2 (34.2-38.5)	11.8 (11.0-12.8)	6.8 (6.2-7.2)	7.5 (7.0-8.0)	6.2 (6.0-6.5)	19.3 (18.2-20.0)	17.1 (16.2-18.2)
10	Geospiza f. fuliginosa	Hood	60.9 (58.2-62.5)	38.0 (34.2-41.0)	11.8 (11.0-12.5)	6.8 (6.2-7.0)	7.6 (7.0-8.5)	6.4 (6.0-6.8)	19.3 (17.2-20.2)	16.7 (15.2-17.8)
10	Geospiza f. fuliginosa	Chatham	60.8 (57.8-62.0)	37.5 (35.5-39.0)	12.6 (12.2-14.0)	6.9 (6.5-7.8)	8.0 (7.8-8.8)	6.4 (6.0-7.0)	19.5 (18.5-20.0)	17.0 (16.0-17.5)
10	Geospiza f. fuliginosa	Chatham	58.8 (54.0-62.0)	35.7 (32.2-38.0)	10.3 (9.5-11.0)	6.0	6.9 (6.5-7.2)	5.6 (5.2-6.0)	18.8 (18.2-19.8)	15.8 (15.0-17.5)

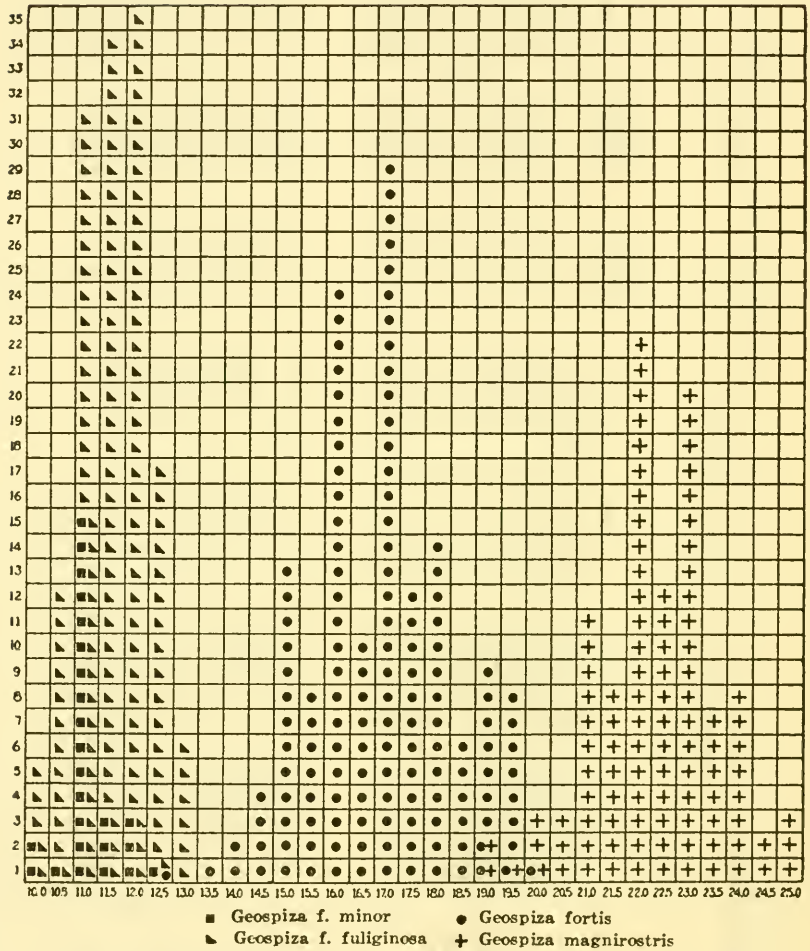


Fig. 32. Length of culmen in 25 male specimens of *Geospiza fuliginosa minor*, 140 of *G. f. fuliginosa*, 141 of *G. fortis*, and 110 of *G. magnirostris*. Each symbol represents a specimen. Numerals at left of diagram indicate number of specimens; numerals at bottom, length of culmen in millimeters.

76. Geospiza acutirostris Ridgway

Geospiza acutirostris Ridgway, 1894, p. 363 (Tower Id.; orig. descr.); 1901, p. 506.—Rothschild & Hartert, 1899, p. 162.
Geospiza fuliginosa acutirostris Snodgrass & Heller, 1904, p. 316.

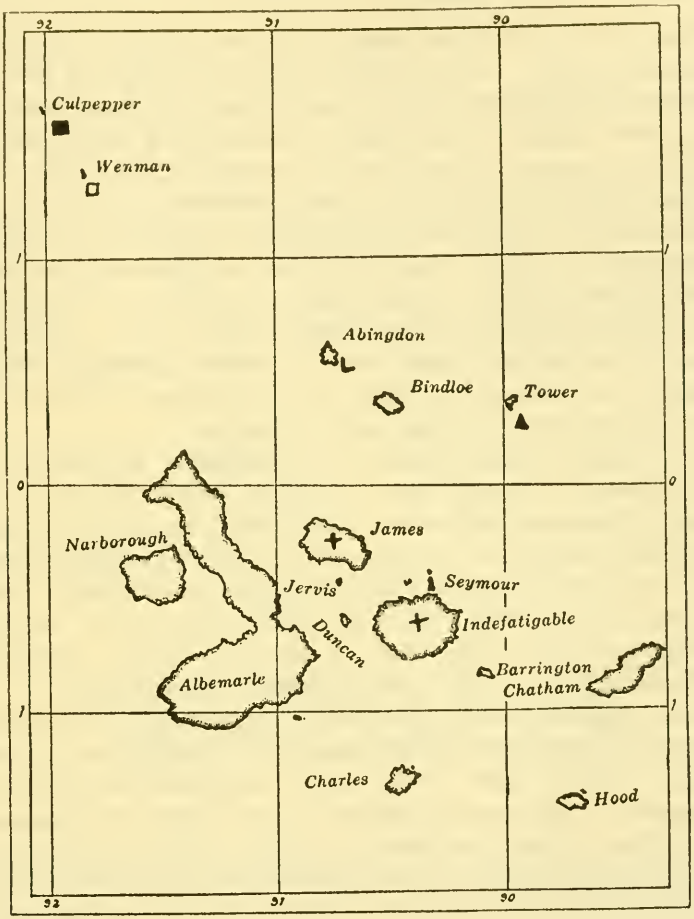


Fig. 33. Map showing distribution of *Geospiza acutirostris*, *G. difficilis*, *G. debilirostris*, *G. s. septentrionalis*, and *G. septentrionalis nigrescens*. Symbols indicate islands where recorded.

GEOSPIZA ACUTIROSTRIS Ridgway

Type.—Rothschild Museum; ♂ ad.; Tower Island; (no date); Dr. Baur coll.; "ex spirits."

HABITAT.—Tower Island.

DESCRIPTION.—At the minimum of size in the genus (see measurements, p. 187). About the same size as *G. fuliginosa* but with differently shaped bill, which is notably long and acute, with culmen almost straight. *Adult male.*—Uniform black except that the under tail coverts are more or less broadly margined with white or pale buff. *Adult female.*—A dusky, streaked bird, darker than females of the *magnirostris-fortis-fuliginosa* aggregation. General color dusky or blackish, usually with narrow, sometimes with fairly broad, feather edgings of pale buffy or whitish. In one female the head and upper breast are almost solidly black. *Variants.*—There is no assuredly adult male in streaked plumage at hand. There is one male molting from streaked plumage into black, but this may be a molt from the juvenal plumage.

The available series consists of 24 specimens, all adult, 14 in the Academy collection (nos. 5942-5951, 6676-6679), 10 in the Stanford University collection. The birds of the Academy series, collected on September 14 and 15, have light colored bills throughout. Of the Stanford University series, Snodgrass & Heller (1904, p. 316) remark: "Our birds, which were taken in June, all have pinkish-horn-colored bills, but are apparently adult". Rothschild & Hartert (1899, p. 162), after examining 65 specimens, say: "In no other species have we seen such a proportion of black-billed adult black males, while black males with yellowish beaks are very scarce. All the birds of the Harris' expedition were killed in December." The seasonal variation in bill color is thus apparent.

The Tower Island *acutirostris* is, to my notion, of the *Geospiza debilirostris* aggregation, but the differentiating characters are such as to make it seem desirable to treat the form as specifically distinct.

77. Geospiza difficilis Sharpe

Geospiza difficilis Sharpe, 1888, p. 12 ("Abingdon and Charles islands"; orig. descr.).—Rothschild & Hartert, 1899, p. 163; 1902, p. 397.—Ridgway, 1890, p. 107; 1897, p. 532; 1901, p. 507.
Geospiza fuliginosa difficilis Snodgrass & Heller, 1904, p. 317.
Geospiza dentirostris Sclater & Salvin, 1870, p. 323 (Abingdon).—Salvin, 1876, p. 483 (Abingdon).

GEOSPIZA DIFFICILIS Sharpe

Cotype.—British Museum, no. 85.12.14.321; ♂ ad.; Abingdon Island; December 14-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.322; ♂ im.; Abingdon Island; December 15-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.323; ♀; Abingdon Island; December 14-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 75.4.2.14; ♂ im.; Abingdon Island; December 14-30, 1868; Dr. A. Habel.

No. 85.12.14.321 bears a red "type label."

In the original description seven specimens are listed, four from Abingdon. No type was indicated, but the one jet black male has been given a red "type label". Of the three from other islands, specimen "a" ("Galapagos Islands") is *Geospiza debilirostris*, specimens "f", "g", from Charles Island, are adult males, the first of *Geospiza fuliginosa*, the second of *Camarhynchus parvulus*.

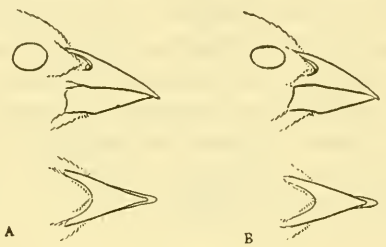


Fig. 34. a, Geospiza difficilis, male (no. 5216, coll. Stanford Univ.), Abingdon; b, Geospiza acutirostris, male (no. 5943), Tower. Natural size.

HABITAT.—The higher parts of Abingdon Island.

DESCRIPTION.—Most nearly like *G. acutirostris*, and of the same size, but with heavier, less acute bill. *Adult male.*—Uniform black except that the under tail coverts are margined with white or pale buff. *Adult female.*—Essentially like females of *acutirostris* in their dark coloration, except that neither of the two specimens at hand is black-headed, as are some of the *acutirostris* series. *Variants.*—A streaked male at hand closely resembles the females, but has brighter cinnamon bordering edges on the wing coverts.

A black male, nearly perfect otherwise, has the black feathers above and below narrowly edged with olivaceous, a common feature in other forms of *Geospiza*.

There are but two specimens in the Academy collection (nos. 6680, 6681), both collected September 21. These are adult females, both with black bills, and one labelled "ovaries large". The series at hand from the Stanford University collection consists of six males, four black and two streaked, all collected June 25. The bill is parti-colored in five; in one (a streaked bird) it is light colored. Five have nearly finished the annual molt. The bird with the light colored bill, presumably a bird of the year, is not obviously molting, but it is in freshly acquired plumage. According to Rothschild & Hartert (1899, p. 163), of a "large series" from Abingdon Island collected in August, there is none with a perfectly black bill.

This is a puzzling form from the systematic standpoint. It is so similar to *Geospiza fuliginosa* that Snodgrass & Heller treat it as a subspecies of that species, justifying their action, which places two subspecies of one species upon one small island, upon the grounds that *difficilis* and *minor* are found at different altitudes, *difficilis* at higher levels, *minor* at lower ones. Gifford (MS) also has written observations relating to the absence of *difficilis* at low elevations. For my own views as to the systematic position of *difficilis* see page 182.

78. Geospiza debilirostris Ridgway

Geospiza debilirostris Ridgway, 1894, p. 363 (James Island; orig. descr.); 1901, p. 508.—Rothschild & Hartert, 1899, p. 163.—Snodgrass & Heller, 1904, p. 333.

GEOSPIZA DEBILIROSTRIS Ridgway

Type.—United States National Museum, no. 116003; ♂ ad.; James Island; April 11 (1888); U. S. Fish Commission, Voyage of Albatross, 1887-88.

DESCRIPTION.—Of medium size (wing 66—72.5 mm.) and with somewhat elongated bill. *Adult male.*—Uniform black except that the under tail coverts are margined with white or buff. *Adult female.*—Almost or quite uniformly dusky above, streaked below. Generally dark colored, as in this whole group (*acutirostris*, *difficilis*, *debilirostris*, *septentrionalis*), as compared with the

lighter colored *magnirostris, fortis, fuliginosa* aggregation. Several females are nearly as dark as males, solidly blackish above and sparsely streaked below. *Juvenal.*—Essentially like the adult female in color and markings. Two males in streaked (not juvenal) plumage are indistinguishable from females.

HABITAT.—James and Indefatigable islands. Narborough Island?

Represented in the Academy collection by 77 specimens, 45 from James Island and 32 from Indefatigable (nos. 6868-6904, 6906-6918, 6920-6946). These were collected on James Island, January 2, 4; August 8; December 22, 28, 30. On Indefatigable, January 12, 18; July 12, 23, 24; November 8, 9, 10, 14.

The color of the bill in these birds is about as follows. James: In August specimens the bill is pale colored throughout. In December specimens it is mostly pale colored below, dusky above; a few are almost entirely light colored, a few almost entirely black. In January specimens it is mostly black; in a few it is dusky. In each series there is a greater proportion of pale colored bills among the females than among the males. Indefatigable: In July specimens the bill is pale colored throughout. In the November series there are some pale colored bills but in most cases it is more or less dusky. In most of the January birds the bill is black; in a few cases it is partly or entirely pale colored. The series includes only three females taken in November and three in January, and in all these the bill is pale colored.

Gifford (1919, p. 238) states that birds taken in December and January "showed no particular enlargement of the reproductive organs." Presumably the breeding season was a little later, as would be inferred from the parti-colored bills of December and January specimens, if I am correct in my belief that the bill becomes black in breeding birds.

Besides specimens actually collected on James and Indefatigable islands, there is a statement by Beck of some seen upon Narborough. On April 4 he saw birds there and took a set of eggs (Gifford, 1919, p. 238). It seems curious, if this observation is correct, that the species should not have been observed on Albemarle, where so much collecting has been done, and where, if on Narborough, the species should logically also occur.

Since the description of *Geospiza debilirostris* by Ridgway in 1894, it has been regarded as an isolated form. Rothschild & Hartert (1899, p. 163) make comparisons with *difficilis* and *fortis*,

Ridgway (1894, p. 363; 1896, p. 533; 1901, p. 508), with *fuliginosa* and *fortis*. Snodgrass & Heller (1904, p. 333) call attention to resemblances with *difficilis* and *septentrionalis*, but with no more than the resulting implication of close relationship.

It seems to me that there is a group of species and subspecies, closely related and closely similar, in the forms *nigrescens*, *septentrionalis*, *difficilis*, *acutirostris*, and *debilirostris*. These birds all have the same shaped bill (relatively long, slender and sharp-pointed), differing from one another in little more than in general size and in size of bill. They are much more closely like one another than like any other form of *Geospiza*. The similarity between *debilirostris*, *difficilis* and *septentrionalis* has been pointed

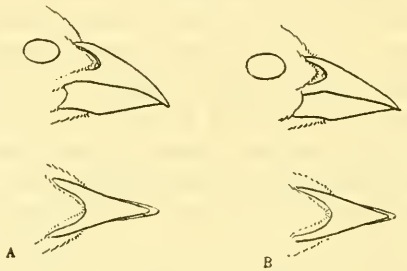


Fig. 35. Geospiza debilirostris, males: a (no. 6909), James; b (no. 6876), Indefatigable. Natural size.

out by Snodgrass & Heller (*loc. cit.*); that *acutirostris* belongs to the same aggregation seems evident.

There are six islands on which birds of this group occur, occupied, according to the treatment here adopted, by four species. These are *Geospiza septentrionalis*, divided into two subspecies, *nigrescens* and *septentrionalis*, on Culpepper and Wenman, respectively; *G. difficilis* on Abingdon; *G. acutirostris* on Tower; and *G. debilirostris* on James and Indefatigable. The differences between the extremes are considerable, but the medium sized *debilirostris* practically bridges the gap between the smaller *acutirostris* and *difficilis* and the larger *septentrionalis*. Selected specimens of *septentrionalis* and *debilirostris* are very closely alike.

All of the birds of this group might be regarded as subspecies of one species, but between the four species into which I here divide them there are sharper and wider differences than there are between the two forms of *septentrionalis* here recognized from Cul-

pepper and Wenman islands, respectively. On two other islands, James and Indefatigable, birds of the form found thereon (*debilirostris*) exhibit a perceptible average difference in size, larger on James, smaller on Indefatigable.

According to Gifford (1919, p. 237) *debilirostris* occurs in the green (humid) zone of Indefatigable and James, on the latter island at from 1500 feet altitude upward. It was not found in the low, arid sections of those islands. According to Snodgrass & Heller (1904, p. 317) *difficilis*, on Abingdon, is restricted to the higher (green, humid) zone, and absent below 500 feet altitude. Gifford (MS) has similar observations. This common habitat predilection of *debilirostris* and *difficilis* may be accepted as further evidence of the close relationship between the two that is suggested by structural features. In the case of *difficilis*, by accepting this relationship, we avoid the recognition of two subspecies upon one small island, the course followed by Snodgrass & Heller in treating *difficilis* as a subspecies of *fuliginosa*.

We may thus regard the *debilirostris* group as confined to the higher, humid zone upon Indefatigable, James, and Abingdon, where the lower, arid zone is occupied by members of the closely related *fuliginosa* group. Tower, Culpepper and Wenman islands are low lying and arid, with no parts occupied by the green, humid zone. They are, it is true, occupied by forms (*acutirostris* and *septentrionalis*) that I regard as of the *debilirostris* group, of the high zone on other islands, but it will be observed that Tower, Culpepper and Wenman have no representatives of the *fuliginosa* group. It is on islands where both these closely related groups occur that we find zonal differences in the distribution of the species. Bindloe, close to Abingdon (where *difficilis* occurs), is of too low altitude for the green, humid zone to be represented there; it has no representative of the *debilirostris* group, but it is occupied by a form of *fuliginosa*, namely, *G. f. minor*.

To put the facts a little differently: On the part of the Galapagos Archipelago where the *debilirostris* group occurs, those islands that are low and arid throughout are occupied entirely either by a representative of the *debilirostris* group or by a representative of the *fuliginosa* group, but not by both; those islands containing both low and arid, and high and humid zones, have representatives of each group, one in each zone.

79. Geospiza septentrionalis septentrionalis Rothschild & Hartert

Geospiza scandens septentrionalis Rothschild & Hartert, 1899, p. 165 (orig. descr.; Wenman Island); 1902, p. 399.—Hartert, 1919, p. 153 (particulars of type specimen, in Rothschild Museum).
Geospiza septentrionalis Ridgway, 1901, p. 510.—Snodgrass & Heller, 1904, p. 333.—Gifford, 1919, p. 241.

GEOSPIZA SCANDENS SEPTENTRIONALIS Rothschild & Hartert

Type.—Rothschild Museum; ♂ ad.; Wenman Island; August 4, 1897; Charles M. Harris (Webster-Harris expedition); orig. no. 311.

DESCRIPTION.—Of medium size (wing 68-74 mm.) and with elongated bill. *Adult male.*—Uniform black except that the under tail coverts are edged with buffy or cinnamon. No specimens at hand show whitish feather edgings. *Adult female.*—A dusky, streaked bird, with the dark markings inclined to fuse anteriorly so as to produce a black-headed effect. Ground color below buffy; edgings to wing coverts dark cinnamomeous. *Juvenal.*—Essentially similar to adult female. Young of both sexes are distinctly black-headed, an effect that is emphasized by the fact that the ventral streaks are narrow and obscurely defined.

HABITAT.—Wenman Island.

Represented in the Academy collection by 57 specimens (nos. 6947-6980, 6991, 6994-7015), all collected on September 24, 1906. I have also at hand 13 additional skins from the Stanford University collection taken during December, 1898.

Rothschild & Hartert (1899, p. 165; 1902, p. 399) regard *septentrionalis* as a subspecies of the *Geospiza scandens* aggregation, but I agree with Snodgrass & Heller (1904, p. 333) in considering it as specifically distinct. I believe that its closest relationships lie with the *debilirostris-difficilis-acutirostris* aggregation, here called the *debilirostris* group. As regards characters distinguishing the two forms of *septentrionalis*, it will be noted that besides differences in size and shape of bill, there is a difference in the proportionate number of black males upon the two islands. On Culpepper, out of 18 males, 12 are black and of the remaining six, five, though not entirely black, are mostly so; only one is streaked. Of 38 males from Wenman, there are only three that are black; the majority are indistinguishable from females. However, in the Rothschild Museum series, out of 18 males from Wenman, 15 are black,

3 streaked. These different proportions in series collected in different years are extremely puzzling. There are four birds in juvenal plumage at hand from Wenman Island, two males and two females. They are all black-headed to a marked degree, distinctly more so than any adult female in the series, and more so than most of the streaked males.

In most of the males of our September series the bill is light colored, in a few it is dusky or black. Most of the blackish-billed birds are marked "testes large"; presumably the breeding season was drawing near. No bird with light colored bill has the label so annotated. The females and young have all light colored bills.

30. Geospiza septentrionalis nigrescens new subspecies

Geospiza scandens septentrionalis Rothschild & Hartert, 1899, p. 165, part (Culpepper Island).

Geospiza septentrionalis Ridgway, 1901, p. 510, part (Culpepper Island).—Snodgrass & Heller, 1904, p. 333, part (Culpepper Island).

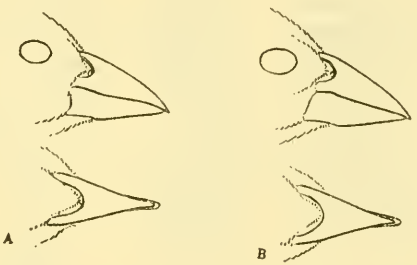


Fig. 36. Geospiza septentrionalis, males: a, G. s. septentrionalis (no. 6955), Wenman; b, G. s. nigrescens (no. 6984), Culpepper. Natural size.

Type.—Male adult, no. 6984, Mus. Calif. Acad. Sci.; Culpepper Island, Galapagos Archipelago; September 25, 1906; collected by R. H. Beck.

Characters.—Similar to *Geospiza septentrionalis septentrionalis*, but with larger (both longer and heavier) bill.

Habitat.—Culpepper Island.

Represented in the Academy collection by 14 specimens (nos. 6981-6990, 6992, 6993, 7016, 7017), all collected on September

25, 1906. There are also at hand 7 skins from the Stanford University collection, taken on December 10, 1898. None of our September taken series has the bill black. In two adult males the upper mandible is partly dusky; in all the others the bill is entirely light colored. In the December series the bill is in some cases light colored, in others parti-colored and mostly dusky.

This is a slightly differentiated form, but one that it seems to me is worthy of nomenclatural recognition. This and typical *septentrionalis* differ in about the same way and to the same degree as do the several recognized subspecies of *Geospiza scandens*.

Specimens of the *Geospiza debilirostris* group in the Academy Collection and (figures in parentheses) in the Stanford University Collection

Name	Island	Male (black)	Male (streaked)	Female	Young	Sex undetermined
Geospiza s. nigrescens	Culpepper	6(6)	5(1)	2(1)		1
Geospiza s. septentrionalis	Wenman	3(5)	29(1)	21(6)	4	
Geospiza difficilis	Abingdon	(4)	(2)	2		
Geospiza acutirostris	Tower	10(7)	(1)	4(2)		
Geospiza debilirostris	James	29		16(2)		
Geospiza debilirostris	Indefatigable	19	4	9		

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF SPECIES AND SUBSPECIES OF THE *Geospiza debilirostris* GROUP

MALES

Number of specimens	Name	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
10	Geospiza s. nigrescens	Culpepper	71.9 (70.0-73.0)	47.9 (46.0-50.0)	15.5 (14.5-17.0)	8.9 (8.0-9.5)	8.9 (8.2- 9.2)	7.4 (6.8-8.0)	22.9 (22.0-23.5)	19.8 (18.0-20.5)
10	Geospiza s. septentrionalis	Wenman	71.1 (68.0-74.0)	45.8 (43.5-48.0)	14.1 (13.2-15.0)	8.5 (8.0-9.5)	8.0 (7.5- 8.8)	6.9 (6.5-7.2)	22.1 (21.2-23.0)	19.0 (18.0-20.5)
6	Geospiza difficilis	Abingdon	61.1 (60.5-62.2)	37.5 (35.0-39.2)	14.3 (13.8-14.5)	7.7 (7.5-8.5)	8.2 (8.0- 8.5)	6.6 (6.0-7.0)	20.9 (20.5-21.2)	19.0 (18.5-19.5)
10	Geospiza acutirostris	Tower	62.3 (61.0-65.0)	38.8 (36.0-41.2)	12.4 (11.5-13.5)	7.2 (7.0-7.8)	7.8 (7.2- 8.0)	6.4 (6.0-6.8)	19.0 (18.2-20.0)	16.1 (15.0-17.0)
10	Geospiza debilirostris	James	70.3 (68.2-72.5)	41.2 (39.5-45.0)	14.8 (14.0-15.8)	7.9 (7.2-8.5)	9.4 (8.5-10.2)	7.7 (7.2-8.0)	23.9 (23.0-26.0)	20.7 (19.0-22.2)
10	Geospiza debilirostris	Indefatigable	67.6 (66.0-69.0)	41.3 (39.0-44.5)	14.3 (12.8-15.0)	7.4 (7.0-8.0)	8.5 (8.0- 9.2)	7.2 (7.0-7.5)	22.1 (20.5-23.5)	19.3 (18.0-20.0)

FEMALES

3	Geospiza s. nigrescens	Culpepper	68.5 (68.0-69.0)	46.5 (46.0-47.0)	14.8 (14.5-15.0)	8.9 (8.8-9.0)	8.3 (8.0- 8.5)	7.1 (7.0-7.2)	21.9 (21.5-22.2)	19.7 (19.5-19.8)
10	Geospiza s. septentrionalis	Wenman	67.2 (66.0-68.0)	45.3 (43.0-46.5)	14.3 (13.5-15.0)	8.4 (8.0-9.0)	7.7 (7.2- 8.2)	6.6 (6.2-7.0)	20.9 (20.5-21.5)	18.3 (17.2-19.0)
2	Geospiza difficilis	Abingdon	59.0-59.8	35.0-35.0	14.0-14.0	8.0-8.0	8.2- 8.5	6.5-6.8	20.5-21.0	18.0-18.5
6	Geospiza acutirostris	Tower	60.0 (58.5-60.8)	37.1 (35.0-39.5)	12.2 (11.8-12.5)	7.3 (6.8-7.8)	7.4 (7.0- 8.0)	6.0 (5.8-6.2)	18.5 (17.5-19.2)	15.2 (14.8-15.8)
10	Geospiza debilirostris	James	67.8 (66.5-70.0)	38.8 (36.0-41.0)	14.6 (13.8-15.0)	7.7 (7.2-8.5)	9.2 (8.5- 9.8)	7.5 (7.0-8.0)	23.1 (21.5-24.2)	20.2 (18.2-21.5)
9	Geospiza debilirostris	Indefatigable	66.1 (64.0-68.5)	40.5 (38.5-42.2)	13.6 (13.0-14.5)	7.2 (7.0-8.0)	8.5 (8.0- 9.0)	7.0 (6.5-7.5)	22.1 (21.2-23.0)	19.8 (19.0-21.0)

Geospiza scandens (Gould)

Birds of this aggregation occur upon all of the central islands. They have not been found on certain of the outlying islands, on Culpepper and Wenman at the extreme north, on Tower at the northeast, or on Hood at the southeast. They are not known to occur upon Narborough but it is likely that they do so.

Rothschild & Hartert (1899) place under the specific name *Geospiza scandens* five subspecies: *scandens* (James Id.), *intermedia* (Charles Id.), *fatigata* (Indefatigable, Duncan, Albemarle, Jervis, Chatham, and Barrington islands), *abingdoni* (Abingdon and Bindloe islands), *septentrionalis* (Culpepper and Wenman islands). Snodgrass & Heller (1904), in the subgenus *Cactornis*, under the "*Geospiza scandens* series" place four subspecies, differing in some details from the arrangement by Rothschild & Hartert: *scandens* (James and Charles islands), *fatigata* (Indefatigable, Seymour, Barrington, Chatham, Duncan, Jervis, and Albemarle islands), *abingdoni* (Abingdon Id.), *rothschildi* (Bindloe Id.). *Septentrionalis* (Wenman and Culpepper islands) they regard as a distinct species and in another subgenus, *Geospiza*. Ridgway (1901), consistently denying subspecific treatment to all Galapagos forms, recognizes the following six species in the order here given: *scandens* (James Id.), *septentrionalis* (Wenman and Culpepper islands), *intermedia* (Charles and Gardner-near-Charles islands), *fatigata* (Indefatigable, Duncan, Albemarle, Jervis, Chatham, and Barrington islands), *abingdoni* (Abingdon Island), *rothschildi* (Bindloe Id.). *Barringtoni* (Barrington Id.) is doubtfully synonymized under *fatigata*. The differences obtaining among these several systems and my own are not radical; they mostly involve matters of detail and of expression of ideas.

In what has been called the *Geospiza scandens* series (from which, in agreement with Snodgrass & Heller, I would exclude *septentrionalis*) it must be emphasized that there is such slight variation upon the several islands involved that it is indeed a question as to whether *scandens*, *intermedia*, *abingdoni*, and *rothschildi* might not well be placed all under one name. In any event, considering the triviality of the differences and the wide overlapping of characters between the several forms, it certainly seems best to treat these four as subspecifically related, whereby proper emphasis is also laid upon the relatively wide gap between the *scandens* series and any other form of *Geospiza*.

Variation consists almost entirely in size and shape of bill. *Geospiza s. scandens*, upon James Island, has notably the smallest bill of the several forms; the bill is both short and slender. Jervis Island birds show a slight increase in size, but are still best in-

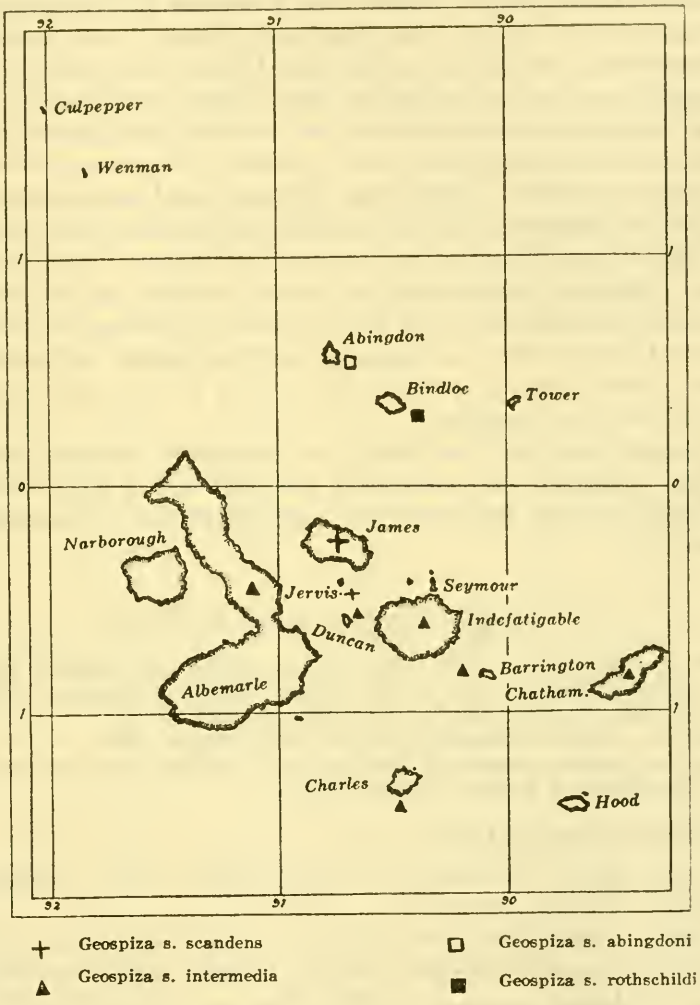


Fig. 37. Map showing distribution of the subspecies of *Geospiza scandens*. Symbols indicate islands where recorded.

cluded under the same name. Slightly longer and heavier of bill is the form *intermedia*, under which name may be included the birds upon Albemarle, Duncan, Indefatigable, Charles, Barrington, and

Chatham. It is possible that additional specimens from Chatham will demonstrate the existence of a distinguishably stubby-billed form upon that island, as is suggested by the few skins at hand.

It will be seen that from a minimum of bill size upon the centrally located James Island, there is increase in this measurement upon all islands to the southward. There is also such increase to the northward, in Abingdon Island birds (*abingdoni*), and still more so in the Bindloe Island form (*rothschildi*). So that variation in this species can not be traced in a linear direction, island by island, but from a central point (James Island) in various directions. There is no difference that I can see between the bill of *abingdoni*, north of James Island, and that of *intermedia* of Indefatigable Island to the southward. Differences here are of color, *abingdoni* being almost or entirely destitute of the black phase in the adult male, and showing minor differences in streaking and ground color, as compared with *intermedia*. *Rothschildi* takes a new course in increased heaviness of bill through thickening of the lower mandible.

Geospiza scandens (including four subspecies, *scandens*, *intermedia*, *abingdoni*, and *rothschildi*) is represented in the Academy collection by 391 specimens*, as indicated in the accompanying table.

81. Geospiza scandens scandens (Gould)

Cactornis scandens Gould, 1837a, p. 7 (Galapagos Islands; orig. descr.); 1841, p. 104, pl. 42 (James Island).—Sundevall, 1871, p. 124.—Salvin, 1876, p. 485.—Sharpe, 1888, p. 19.
Geospiza scandens Ridgway, 1896, p. 534; 1901, p. 509.
Geospiza scandens scandens Rothschild & Hartert, 1899, p. 164.—Snodgrass & Heller, 1904, p. 336.

CACTORNIS SCANDENS Gould

Type.—British Museum, no. 55.12.19.25; (♂ ad.; Galapagos Islands); "ex coll. Darwin".†

Sharpe (1888, p. 20) lists two skins as "types of species." The above is apparently Sharpe's specimen *a*, and it bears a red "type label." Sharpe's specimen *b* (Brit. Mus. no. 55.12.19.20; ♀?) is an example of *Geospiza debilirostris*.

*Entered in the Academy catalogue (not segregated by subspecies) under the numbers 6029, 7018-7407.

†James Island; collected by C. Darwin; ex Zoological Society's collection. N.B.K.

DESCRIPTION.—Of medium size (wing about 70 mm.); bill elongate and sharp-pointed. *Adult male.*—Uniform black except that the under tail coverts are more or less broadly margined with white or pale buff. *Adult female.*—A dusky appearing bird, almost uniformly blackish above. Breast and flanks heavily streaked with blackish, the streaks on chin and throat in many specimens running together to form a "solid" dark area of varying size. Middle of belly immaculate, whitish; under tail coverts streaked with dusky. In the females at hand (none in very fresh plumage) the wing coverts are faintly edged with pale brownish or grayish. There is no trace of cinnamomeous in these edgings, but the absence of this color may be due to fading. *Juvenal.*—Essentially like the adult female, but with dusky feathers of upper parts edged with olivaceous, and with wing coverts edged with cinnamomeous, both of which features, however, may be present to some extent in adult females in fresh, unfaded plumage.

HABITAT.—James and Jervis islands.

Represented by the following specimens. James Island: 3 males (black), 1 adult female; Jervis Island: 5 males (black), 3 adult females. Of the James Island birds, one black male (July 30) has the bill dusky; two males (December 19) black, with some streaks on the belly, and in extremely worn plumage (evidently on the verge of molt), have the bill light colored; the one female (December 19) has the bill dusky above, light colored below. It should be observed that the two males with light colored bills, though collected in the breeding season, were not breeding birds, as is noted in Gifford's (1919, p. 241) field observations.

Of the five black males from Jervis Island (two collected on December 18, three on December 21), four have the bill black or mostly black, in one it is dusky above, light colored below. Two adult females (December 20) have the bill dusky above, light colored below. According to Gifford's (*loc. cit.*) field notes, the two black-billed males collected on December 18 were in breeding condition. On the other specimens there are no pertinent observations.

In the combined series of the collections of the Academy and of Stanford University, there are 10 adult males from James Island and 5 from Jervis Island, all of which are in black plumage. Two from James Island (as noted above) have some streaks on the belly, but they are essentially black and not streaked as regards

their general plumage. In Gifford's field notes above cited (p. 241) he remarks: "During our sojourn on Jervis on December 18 most of the birds seen were black males." Evidently black plumage in the adult male is the common condition on James and Jervis islands.

Five young birds in the Stanford University collection (April 21, 22) are in juvenal plumage throughout. In color and markings these are essentially like the adult female, being streaked below to about the same degree. The bill is mostly dusky above, light colored below.

There is one specimen at hand from Jervis Island (Calif. Acad. Sci. no. 7376, adult female, December 21, 1905) that I keep under *Geospiza s. scandens* from sheer inability to place it elsewhere, but in bill measurements it lies outside the normal range of varia-

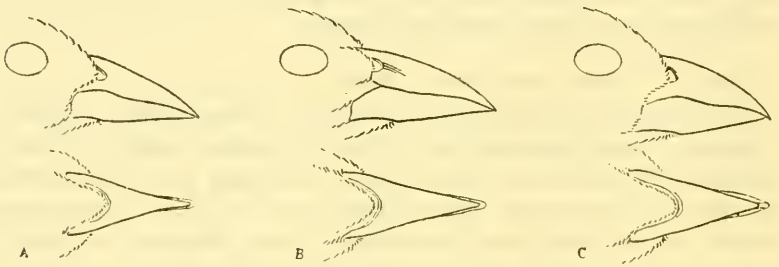


Fig. 38. Geospiza scandens, males: a, G. s. scandens (no. 7018), James; b, G. s. intermedia (no. 7165), Indefatigable; c. aberrant individual, tentatively referred to G. s. scandens (no. 7376), Jervis. Natural size.

tion of this subspecies (see fig. 38, c). It measures as follows: wing 67.2; tail 39.8; culmen 18.0; gonys 10.5; depth of bill at base 11.2: width of mandible at base 9.0; tarsus 22.5; middle toe with claw 19.2. The bill of this bird is heavier than in any of the subspecies of *Geospiza scandens*, though the difference in shape is such as not to be accurately reflected in the measurements here given. It is, in fact, intermediate in size and shape between *Geospiza scandens* and *G. propinqua* of Tower Island. This specimen was collected by E. W. Gifford (field no. 1756), and Gifford's field note book, under date of December 21, 1905, contains the following entry pertaining to it: "I obtained one *Geospiza* which seemed to be a sort of a cross between a *Geospiza scandens* and a *Geospiza strenua*".

82. Geospiza scandens intermedia Ridgway

Geospiza intermedia Ridgway, 1894, p. 361, in text (Charles Island; orig. descr.); 1897, p. 535; 1901, p. 511.
Geospiza scandens intermedia Rothschild & Hartert, 1899, p. 164.
Geospiza barringtoni Ridgway, 1894, p. 361 (Barrington Island; orig. descr.).
Geospiza fatigata Ridgway, 1896, p. 293 (Indefatigable Island; orig. descr.); 1897, p. 539; 1901, p. 511.
Geospiza scandens fatigata Rothschild & Hartert, 1899, p. 164.—Snodgrass & Heller, 1904, p. 338.
Cactornis scandens Sclater & Salvin, 1870, p. 323.—Salvin, 1876, p. 485.

GEOSPIZA INTERMEDIA Ridgway

Type.—United States National Museum, no. 115916; ♂ ad.; Charles Island; April 8 (1888); U. S. Fish Commission, Voyage of the Albatross.

GEOSPIZA BARRINGTONI Ridgway

Type.—Rothschild Museum; ♂ ad.; Barrington Island; July, 1891; Dr. G. Baur; orig. no. 596. "Ex spirits."

GEOSPIZA FATIGATA Ridgway

Type.—United States National Museum, no. 116048; ♂ ad.; Indefatigable Island; April 12 (1888); U. S. Fish Commission, Voyage of the Albatross.

DESCRIPTION.—Essentially similar to *G. scandens scandens*, from which it differs in slightly heavier bill. *Juvenal.*—There is rather remarkable color variation among some of the young birds. Among juveniles from Charles Island there are some that are almost uniformly black, others very pale colored, sparsely streaked on the breast and otherwise almost immaculately dirty whitish below. These variants are of the same sex and at exactly the same stage of existence, each in the plumage immediately following the natal down.

HABITAT.—Albemarle, Duncan, Indefatigable, Charles, Barrington, and Chatham islands and adjacent islets.

Represented by 351 specimens. These were collected on the several islands during the following months: Duncan, August, December; Indefatigable, January, July, October, November; Seymour, July, November; Daphne, July, November; Albemarle, March, April, August, November; Charles, February, March, May, June,

October; Gardner-near-Charles, October; Champion, October; Barrington, July, October; Chatham, February, July.

It will be noted that different islands vary in the proportion of black-plumaged males. It must be pointed out in this connection that the divisions I have made between black and streaked males are arbitrary to this extent, that as every intermediate degree may be found in some series, I have in some cases made divisions between those mostly black, on the one hand, and those mostly streaked, on the other. In the Barrington Island series, for example, there are 18 pure black males; in the 14 remaining male birds the black on the lower surface is more or less interrupted by light-colored margins to the feathers. Every one of these birds, though, is distinguishable from the streaked female, so I have here listed them as all in the same phase. Variation in bill color, black, dusky, parti-colored, or pale colored, can for the most part be correlated with the seasons, December and January birds being mostly black-billed, July and August birds mostly yellowish-billed.

There are birds in juvenal plumage from Indefatigable, collected January 12 and 18, one from Albemarle, March 15, and a number from Charles during May. Young males average darker than young females, and there is nearly as great variation among them as among adult males. Some males in juvenal plumage are distinctly blackish, far darker and more uniformly blackish than streaked males in later plumage stages.

There is a young bird in the collection (as recorded by Gifford, 1919, p. 241) that was collected at sea 20 miles south of Indefatigable, May 18, 1906. That distance from Indefatigable would be a much lesser distance from Charles, and the vessel at the time was travelling from Charles to Chatham. As far as specific characters go, or place of capture either, it might have come from either Charles, Indefatigable, or Barrington, but in any event it is of decided interest that a bird of this species, especially as being in juvenal plumage, should have been found so far from land.

There is such close similarity between birds of this species upon all of the southern islands that I feel no hesitation in lumping them under the one subspecific name, *intermedia*. The only exception to this statement may lie in the bird of Chatham Island. This island is inadequately represented, the entire series consisting of eight specimens, but these birds and four more in the Rothschild collection have clearly a relatively short heavy bill, as compared with others. There are no black males in the

series, but in the four February taken adults (the two males marked "testes large") the bill is black, indicative, as I believe, of the bird being in breeding condition. If there really proves to be a stubby-billed variant upon Chatham it will afford an interesting parallel to conditions in the *Cactospiza pallida* aggregation where Chatham Island is occupied by a heavy-billed form of this generally long-billed species.

There are at hand in the combined series of the Stanford University and the Academy collections 65 skins from Barrington Island, quite sufficient for a basis of judgment upon *Geospiza barringtoni* Ridgway (1894, p. 361). I can see no tangible features for distinguishing this form. In extensive series from any one island there are a few surprising variants in size and shape of the bill, and the name *barringtoni* was based upon an unusual bird of this sort.

83. Geospiza scandens abingdoni (Sclater & Salvin)

Cactornis abingdoni Sclater & Salvin, 1870, pp. 323, 326, fig. 5 (Abingdon Island; orig. descr.).—Salvin, 1876, p. 486, fig.—Sharpe, 1888, p. 20.—Ridgway, 1890, p. 108.
Geospiza abingdoni Ridgway, 1897, p. 540; 1901, p. 513.—Gifford, 1919, p. 239, part.
Geospiza scandens abingdoni Rothschild & Hartert, 1899, p. 165; 1902, p. 398.—Snodgrass & Heller, 1904, p. 340.

CACTORNIS ABINGDONI Sclater & Salvin

Cotype.—British Museum, no. 85.12.14.561; ♂ ad.; Abingdon Island; December 14-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 75.4.2.62; ♂ ad.; Abingdon Island; December 14, 1868; Dr. A. Habel.

No. 85.12.14.561 now bears a red "type label".

DESCRIPTION.—Essentially similar to *G. scandens scandens*, from which it differs in slightly heavier bill. Differs from *scandens*, *intermedia*, and *rothschildi* in that the adult male rarely assumes the entirely black plumage. *Adult male.*—Usually dull black, "solidly" so on head, neck, upper breast and back. Black feathers of lower breast and sides narrowly edged with whitish, producing a streaked effect. A restricted mid-ventral area unmarked. Under tail coverts narrowly streaked with dusky centrally. Wing coverts narrowly edged with rusty. *Adult female.*—Indistinguishable from the male just described. *Juvenal.*—Birds in juvenal plumage are

in general appearance just like the adults, being dark colored and notably black-headed. Coloration is almost uniform, there being scarcely a trace of ventral streaking. *Variant.*—One adult female in the series is appreciably paler colored than the others, with a much more extensive unmarked area below.

Habitat.—Abingdon Island.

Represented by the following specimens: adult male, 5, adult female, 8, juvenal female, 1. They were collected on the three days, September 20-22. In one male and four females the bill is mostly dusky, in the others it is dusky above and light colored below, in varying degrees.

The black phase of plumage seems to be very rare in this form. *Cactornis abingdoni* (Sclater & Salvin, 1870, p. 326) was described

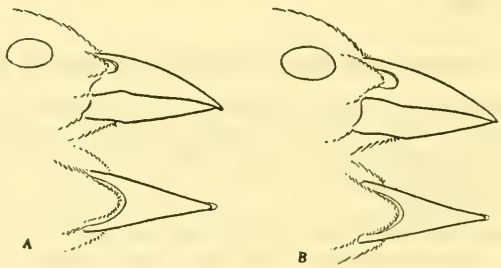


Fig. 39. Geospiza scandens: a, G. s. abingdoni (no. 7225, male), Abingdon; b, G. s. rothschildi (no. 5122, female, coll. Stanford Univ., type), Bindloe. Natural size.

from two specimens, neither of which was black; the five adult males in the Academy series are all streaked; Snodgrass & Heller (1904, p. 340) secured only "immature" specimens upon Abingdon; and Rothschild & Hartert (1899, p. 165) had "no perfectly adult males". In a later publication Rothschild & Hartert (1902, p. 398) speak of "one fully adult male" (which I have seen), the only evidence known to me of the occurrence of this phase upon Abingdon. In apparently mature male birds the head and upper breast are dull black, the rest of the lower parts more or less streaked. The streaked feathers are dusky at the center, and margined more or less broadly with buffy or dark grayish, the marginal area increasing toward the posterior end of the body.

The sexes are essentially alike, some females having as much black on head and breast as any of the males, though on the average females are more extensively streaked.

The inclusion in the Academy series of a bird in juvenal plumage collected on September 22 seems rather extraordinary. From published data at hand (see Gifford, 1919, p. 239) and from other evidence it would appear that the breeding season ordinarily begins in December.

Associated with the scarcity of the entirely black phase is the apparently contradictory character of generally darker coloration in the streaked phase in *abingdoni*, as compared with *scandens* and *intermedia*. The dully black-headed coloration that is the usual thing in *abingdoni* is of rare occurrence in *scandens* and *intermedia*, where the ventral streaking usually extends forward over breast and throat. In *abingdoni* the ground color forming the background to the streaking upon the body is buffy, whereas in *scandens* and *intermedia* it is more grayish.

84. Geospiza scandens rothschildi Heller & Snodgrass

Geospiza scandens rothschildi Heller & Snodgrass, 1901, p. 75 (Bindloe Island; orig. descr.).—Snodgrass & Heller, 1904, p. 341.
Geospiza rothschildi Ridgway, 1901, p. 673.
Geospiza scandens abingdoni Rothschild & Hartert, 1899, p. 165, part; 1902, p. 398, part.

GEOSPIZA SCANDENS ROTHSCHILDI Heller & Snodgrass

Type.—Leland Stanford Junior University, no. 5122; ♀ im.; Bindloe Island; June 21, 1899; R. E. Snodgrass and E. Heller (Hopkins-Stanford Galapagos expedition); orig. no. 152.

DESCRIPTION.—Differs from *scandens*, *intermedia*, and *abingdoni*, in its slightly heavier bill, with especially heavier lower mandible. *Adult male.*—Uniform black except that the under tail coverts are more or less broadly margined with whitish or pale buffy. *Adult female* and male in streaked plumage exactly like corresponding stages in *G. s. abingdoni*.

HABITAT.—Bindloe Island.

Represented by nine specimens, four adult (entirely black) males, and five adult females, collected on September 17. There are also at hand the series of seven specimens (including the type) upon which Heller & Snodgrass based the form *rothschildi*. Of the Academy series, three of the black-plumaged males have the bill mostly black with a small light colored spot on the lower

mandible, the fourth black male has the lower mandible mostly light colored, and the five females have the upper mandible mostly dusky, the lower mostly light colored. Of the Stanford University series (collected June 20, 21, 1899) the bills are all mostly light colored, with some dusky on the upper mandible. The Stanford University series were described as immature birds, and so presumably they are. They are not in the juvenal plumage but are severally either undergoing or have just undergone the post-juvenal molt.

The differences between *rothschildi* and *abingdoni* are slight, but *rothschildi* certainly has a slightly heavier bill than *abingdoni*, as claimed by Snodgrass & Heller, a difference that is more apparent upon comparison of specimens than by comparison of measurements. It is an interesting feature of this difference that the increased thickness in *rothschildi* lies entirely in the lower mandible, and this gives a distinctive character to the shape of the entire bill that is out of proportion to the small increase in size. The apparently common occurrence of black males upon Bindloe Island is a feature that should be given some weight in any comparison with *abingdoni*, in which that plumage phase is exceedingly rare.

CACTORNIS ASSIMILIS Gould

Cotype.—British Museum, no. 55.12.19.15;(♀?); Galapagos Islands; received from Zoological Society of London.

Cotype.—British Museum, no. 37.2.21.415;(♀?); Galapagos Islands; received from Burnett and Fitzroy.*

The proper application of the name *Cactornis assimilis* Gould (1837, p. 7) is apparently indeterminable. The type is in the British Museum and there is a second specimen, received from Burnett and Fitzroy, that is practically a duplicate, neither with exact data. These birds are of the *scandens* group; they have heavy bills and look very like females of *rothschildi* of Bindloe Island. As, however, the "Beagle" collections are not known to have included any specimens from Bindloe, though it was apparently visited by a party detached from the ship, I do not care to substitute the name *assimilis* for *rothschildi*. Neither can the specimens be matched in series from any other island. Hence, although *assimilis* is not a synonym of *scandens* and has priority over all other names in the *scandens* group, it is not possible to use it for any of the forms since described.

*Both birds in female plumage but sex not indicated on labels. From some other source Mr. Kinnear gives data of no. 37.2.21.415 as: "male; James Island."

SPECIMENS OF THE *Geospiza scandens* GROUP IN THE ACADEMY COLLECTION AND (FIGURES IN PARENTHESES) IN THE STANFORD UNIVERSITY COLLECTION

Name	Island	Male (black)	Male (streaked)	Female	Young	Sex undetermined
Geospiza scandens abingdoni	Abingdon		5(4)	8(3)	1(1)	
Geospiza scandens rothschildi	Bindloe	4	(3)	5(4)		
Geospiza scandens scandens	James	3(7)		1	(5)	
Geospiza scandens scandens	Jervis	5		6		
Geospiza scandens intermedia	Duncan	1	4	8		
Geospiza scandens intermedia	Indefatigable	25	7(2)	18(1)	3	2(1)
Geospiza scandens intermedia	Seymour	4(8)	12(4)	13(1)		
Geospiza scandens intermedia	Daphne	1		1		
Geospiza scandens intermedia	Albemarle	7(1)	9	5	1	1(2)
Geospiza scandens intermedia	Barrington	32(13)		14(4)		1
Geospiza scandens intermedia	Chatham		2(1)	3(1)		1
Geospiza scandens intermedia	Charles	43(3)	29	48(1)	36	15(1)
Geospiza scandens intermedia	Gardner-near-Charles		2			
Geospiza scandens intermedia	Champion	1		1		

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF THE SUBSPECIES OF *Geospiza scandens*

Number of specimens	Name	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
			MALES							
5	Geospiza s. abingdoni	Abingdon	70.9 (69.0-73.0)	45.8 (43.0-48.0)	18.7 (18.0-19.8)	10.9 (10.5-11.2)	9.5 (9.0-10.0)	8.1 (7.2-8.5)	21.9 (21.0-22.5)	19.7 (19.5-20.0)
8	Geospiza s. rothschildi	Bindloe	70.7 (67.5-75.0)	43.1 (41.0-44.0)	19.3 (18.0-21.0)	11.5 (11.0-12.0)	10.3 (9.5-11.5)	8.3 (7.5-9.5)	21.8 (21.0-23.5)	19.3 (18.0-21.0)
10	Geospiza s. scandens	James	69.1 (67.5-71.0)	41.9 (40.0-43.5)	17.0 (16.0-17.8)	10.3 (10.0-10.5)	8.6 (8.0- 9.0)	7.3 (7.0-8.0)	21.2 (20.2-22.5)	18.9 (18.0-20.0)
5	Geospiza s. scandens	Jervis	71.4 (70.5-72.5)	43.7 (42.0-45.0)	18.0 (16.5-19.5)	10.9 (10.0-11.5)	8.8 (8.5- 9.0)	7.3 (6.2-8.0)	21.2 (21.0-22.0)	19.1 (18.5-20.0)
10	Geospiza s. intermedia	Albemarle	71.5 (68.5-74.0)	42.6 (40.0-44.0)	18.5 (17.5-19.8)	11.2 (10.5-12.0)	9.3 (9.0-10.0)	7.9 (7.5-8.5)	22.3 (21.2-23.2)	19.9 (18.5-20.2)
5	Geospiza s. intermedia	Duncan	69.8 (69.0-70.2)	41.9 (40.5-43.0)	18.8 (18.2-19.5)	10.9 (10.5-12.0)	9.5 (9.0-10.0)	7.7 (7.2-8.0)	22.1 (21.2-23.0)	20.0 (19.2-21.0)
10	Geospiza s. intermedia	Indefatigable	71.2 (70.0-73.0)	42.8 (41.5-44.0)	20.1 (19.5-21.0)	11.8 (10.5-12.5)	9.6 (9.0-10.0)	8.0 (7.5-8.2)	22.3 (21.5-23.0)	19.8 (19.0-21.0)
3	Geospiza s. intermedia	Chatham	68.9 (67.0-71.5)	41.8 (40.2-43.2)	17.2 (17.0-17.5)	10.0	9.3 (9.0- 9.5)	7.6 (6.5-8.2)	21.4 (21.2-21.5)	20.4 (20.0-20.8)
10	Geospiza s. intermedia	Barrington	69.8 (67.0-73.0)	43.5 (39.0-46.5)	18.2 (17.0-20.0)	10.9 (10.5-11.2)	9.7 (9.0-10.2)	8.1 (7.5-8.5)	22.5 (22.0-23.2)	20.3 (19.2-22.0)
10	Geospiza s. intermedia	Charles	70.1 (66.8-72.0)	43.5 (41.5-45.0)	17.8 (17.0-18.5)	10.9 (10.0-11.5)	9.1 (8.5- 9.5)	7.6 (7.5-8.0)	22.1 (21.0-23.0)	20.2 (18.5-21.0)
			FEMALES							
10	Geospiza s. abingdoni	Abingdon	68.1 (65.2-72.0)	41.9 (38.5-44.0)	18.9 (17.2-20.2)	11.1 (10.5-12.0)	9.3 (8.5-10.5)	7.4 (6.8-8.2)	21.5 (21.0-22.5)	19.3 (18.0-20.5)
8	Geospiza s. rothschildi	Bindloe	68.8 (66.0-72.5)	41.1 (37.5-43.5)	19.5 (18.8-20.2)	11.4 (10.5-12.2)	10.0 (9.5-11.0)	8.4 (7.8-9.2)	21.8 (20.8-23.0)	19.5 (18.5-20.5)
1	Geospiza s. scandens	James	68.2	42.0	18.0	10.5	8.2	7.2	20.5	19.0
5	Geospiza s. scandens	Jervis	66.3 (64.0-68.0)	38.1 (36.0-40.0)	18.2 (16.5-20.0)	10.6 (9.5-11.5)	8.9 (8.0- 9.5)	7.2 (6.8-7.5)	20.8 (20.5-21.5)	18.7 (18.0-19.0)
5	Geospiza s. intermedia	Albemarle	68.5 (65.0-72.5)	41.5 (39.0-43.5)	18.9 (17.5-20.0)	11.0 (10.2-11.5)	8.9 (8.5- 9.5)	7.1 (6.5-7.8)	21.7 (21.0-22.0)	19.5 (18.5-20.0)
8	Geospiza s. intermedia	Duncan	68.1 (65.0-70.0)	40.1 (37.5-41.5)	18.9 (16.5-20.0)	10.8 (9.2-11.0)	8.9 (8.2- 9.8)	7.6 (7.0-8.0)	21.6 (20.5-22.2)	19.1 (17.0-20.2)
10	Geospiza s. intermedia	Indefatigable	68.1 (66.0-70.5)	40.6 (39.5-42.5)	19.7 (18.8-21.2)	11.4 (10.5-12.0)	9.2 (8.5-10.0)	7.6 (7.2-8.0)	21.4 (20.0-23.5)	19.5 (18.0-21.0)
3	Geospize s. intermedia	Chatham	64.4 (61.5-67.2)	39.8 (38.5-42.0)	17.3 (16.8-18.0)	9.7 (8.8-10.8)	10.1 (9.2-11.5)	8.1 (7.2-9.0)	20.6 (20.0-21.2)	18.4 (18.0-19.0)
10	Geospiza s. intermedia	Barrington	67.2 (64.5-70.5)	40.4 (39.0-44.0)	19.1 (17.5-20.0)	11.2 (10.2-12.0)	9.7 (8.8-10.5)	7.8 (7.0-8.2)	21.7 (20.8-22.5)	19.3 (18.0-20.0)
10	Geospiza s. intermedia	Charles	66.8 (63.0-70.0)	41.5 (35.2-44.5)	17.4 (16.2-18.5)	10.1 (9.2-11.0)	8.9 (8.5- 9.5)	7.4 (7.0-8.0)	21.2 (20.8-22.0)	19.2 (18.5-20.0)

85. Geospiza conirostris conirostris Ridgway

Geospiza conirostris Ridgway, 1890, p. 106, fig. 2 (Hood Island; orig. descr.); 1897, p. 516; 1901, p. 498.—Gifford, 1919, p. 225, part.
Geospiza conirostris conirostris Rothschild & Hartert, 1899, p. 158; 1902, p. 389.—Snodgrass & Heller, 1904, p. 344.
Geospiza media Ridgway, 1890, p. 107 (Hood Island; orig. descr.); 1897, p. 517.

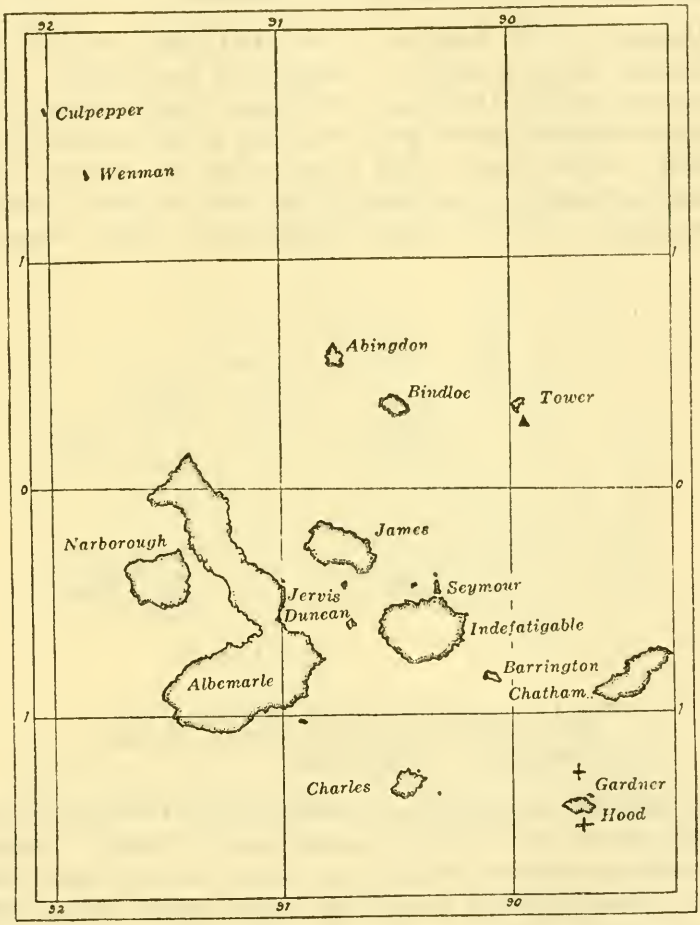


Fig. 40. Map showing distribution of subspecies of *Geospiza conirostris*. Symbols indicate islands where recorded.

Geospiza conirostris Ridgway

Type.—United States National Museum, no. 116070; ♂ ad.; Hood Island; April 7, 1888; U. S. S. Albatross.

Geospiza media Ridgway

Type.—United States National Museum, no. 116072; (♂ ad.); Hood Island; April 7, 1888; U. S. S. Albatross.

Description.—Of large size (wing 74-84 mm.) and with very heavy bill (about as deep as in *magnirostris* but relatively longer and much compressed laterally). *Adult male.*—Uniform black except that the under tail coverts are more or less broadly margined with whitish. *Adult female.*—Dull black, solidly so on head, neck, breast and back, and occasionally over most of belly. Usually with feathers of belly and sides broadly black centrally, narrowly

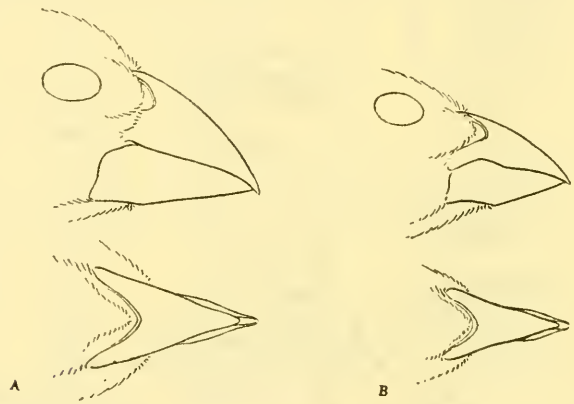


Fig. 41. Geospiza conirostris conirostris, males: a (no. 5007), Hood; b (no. 4990), Gardner-near-Hood. Natural size.

edged with whitish, producing a streaked effect. Under tail coverts mostly whitish, with a narrow central streak of dusky. Remiges and rectrices uniform black; wing coverts narrowly edged with rusty. *Streaked male.*—Exactly like adult female. Rump sometimes grayish or olivaceous, and belly rarely rather extensively whitish, to a variable degree. *Juvenal.*—Closely similar to adult female and streaked male, being dull black, obscurely streaked below, feathers of dorsum sometimes faintly edged with olivaceous, and wing coverts with rusty.

HABITAT.—Hood and Gardner-near-Hood islands.

There are at hand 184 skins in the Academy collection (nos. 4989-5095, 5097, 5098, 6689-6759, 6864-6867) and 29 from the Stanford University collection, taken upon Hood Island and upon Gardner-near-Hood (see table, p. 206). They were collected on the following dates. Hood: January 31, February 1-5, May 13-19, June 23-28, July 2, September 25-27, October 2. Gardner-near-Hood: February 3, May 17, June 27, September 28-30.

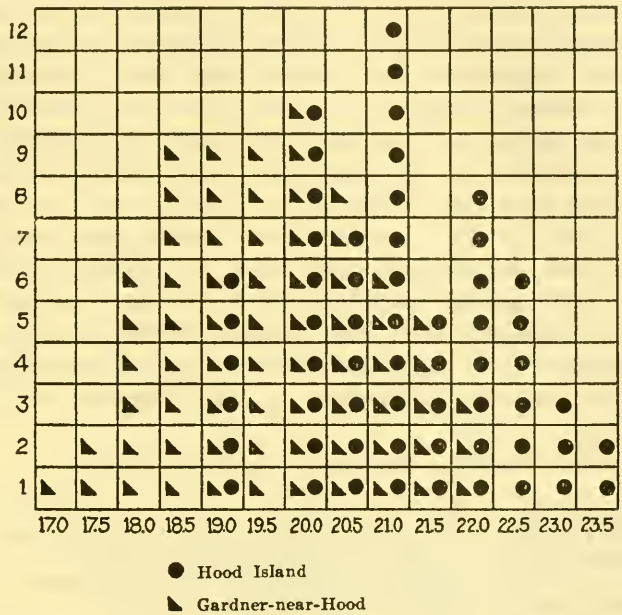


Fig. 42. Length of culmen in male specimens of *Geospiza conirostris*: 59 from Hood Island, 68 from Gardner-near-Hood. Each symbol represents a specimen. Numerals at left of diagram indicate number of specimens; numerals at bottom, length of culmen in millimeters.

Color of bill varies as follows. Black males: January, black; February, mostly black, some with lower mandible partly pale colored; May, black; June, pale colored below, with blotches of dusky above; September, mostly as in June, several entirely black; October, of five specimens three have the bill black, two mostly black. Streaked males: February, of nine birds, the bill is black in one, and dusky above, mostly pale colored below, in eight;

June to October, mostly pale colored below, blotched above. Females: February, mostly black or dusky, a few parti-colored below; May, black; June to September, mostly pale colored below, blotched above. In no case is the bill entirely pale colored; even birds in juvenal plumage have the upper mandible blotched with dusky.

The great variability in bill structure that is shown in this form has been commented upon by others (see Ridgway, 1897, p. 518; Snodgrass & Heller, 1904, p. 342), and it is well borne out in the Academy series. It is a striking fact, though, that in our two almost equally large series from Hood Island and from Gardner-near-Hood, respectively, large billed birds should predominate, and to a noticeable degree, in the series from Hood, small billed ones in the series from Gardner. The latter, a tiny islet, is so slightly removed from the larger Hood Island that it is hard to believe that these size differences have real genetic significance. Gifford (1919, p. 226) remarks that "finches were seen flying between Hood and Gardner quite often and doubtless some belonged to this species," corroborative of the idea that the birds can not be segregated upon either island. The fact remains, however, that there is an appreciable difference in bill size in the two lots. The accompanying diagram (p. 203) illustrates the point.

86. Geospiza conirostris propinqua Ridgway

Geospiza propinqua Ridgway, 1894, p. 361 (Tower Island; orig. descr.); 1897, p. 543; 1901, p. 499.—Hartert, 1919, p. 152 (particulars of type specimen, in Rothschild Museum).
Geospiza conirostris propinqua Rothschild & Hartert, 1899, p. 159; 1902, p. 390.—Snodgrass & Heller, 1904, p. 343.
Geospiza conirostris Gifford, 1919, p. 225, part.

GEOSPIZA PROPINQUA Ridgway

Type.—Rothschild Museum; (♂ ad.); Tower Island; September 2, 1891; Dr. G. Baur; orig. no. 597; "from spirits."

DESCRIPTION.—Generally similar to *G. conirostris* but slightly smaller and with slightly smaller and narrower bill. *Adult male.*—Uniform black except that the under tail coverts are more or less broadly margined with whitish. *Adult female.*—Light phase, essentially similar to female *magnirostris*; dark phase, essentially similar to lighter colored females of *conirostris*. Of eight females at hand, five are light colored and three are dark.

HABITAT.—Tower Island (and Culpepper Island?).

The Academy series includes eight specimens from Tower (nos. 4987, 4988, 6682-6687), Stanford University collection, nine. The Academy series was collected September 14, the Stanford University series on June 22 and 23. In the September birds, two (a black male and an adult female) have the bill dusky, in the others it is mostly pale colored, above and below. In the June specimens the bill in every case is mottled, more or less dusky above, pale colored below.

This form, judging from the relatively small series available, is again distinguished by variability in bill structure. It was described as a slender-billed form and most of our series bear out this character, but in some of our birds and in nearly all of the Stanford University series the bill is short and heavy. Snod-

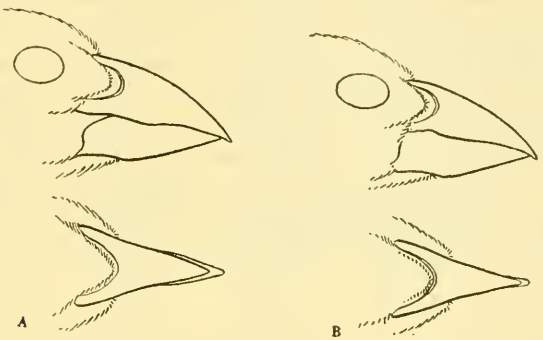


Fig. 43. Geospiza conirostris propinqua, males: a (no. 5281, coll. Stanford Univ.), b (no. 4987), both from Tower. Natural size.

grass & Heller (1904, p. 344) comment upon intergradation shown toward the heavy-billed *G. scandens rothschildi*, and the resemblance is strikingly apparent in the one black male of *propinqua* in the Academy series, but it is not suggested by most of the birds in the Stanford University series, which are decidedly heavy-billed.

Our series includes five females and two streaked males from Tower Island and these do not show the melanism that is so conspicuous in the corresponding plumages of *conirostris*. With one exception they are no darker than is the case in the streaked plumage of *G. magnirostris*.

Just as variability in bill structure seems indicative of intergradation toward the *scandens* group, so the variability in color

in the female plumages (some dark some streaked) seems to show intergradation toward the *magnirostris* group. *Propinqua* is not a satisfactory subspecies from the cataloger's standpoint, as it appears to represent a focus from which lines of resemblance can be drawn toward the extremes of *conirostris*, *magnirostris* and *scandens*. It is an unstable form.

There are two specimens at hand from Culpepper Island that I feel obliged to refer to *propinqua*. A black male in the Stanford University collection has been commented upon by Snodgrass & Heller (*loc. cit.*). A female (no. 6688) was collected on Culpepper by the Academy expedition, on September 25. This bird is somewhat beyond the maximum of *conirostris* and *propinqua* in length of wing and tail; the bill is larger than in *propinqua* but can be closely matched in specimens of *conirostris* from Hood Island. As in Tower Island *propinqua*, it is not particularly dark colored, but with relatively narrow streaks below upon a predominantly pale colored ground. For examples of *propinqua* from Tower Island to stray as far as Culpepper, or to be permanently resident there, does not seem reasonable, and records of such occurrence should rest upon unequivocally typical specimens. This can not be said of either of the Culpepper examples of *propinqua* at hand, but at the same time they can not be even as satisfactorily referred to any other form.

Specimens of the *Geospiza conirostris* group in the Academy Collection and (figures in parentheses) in the Stanford University Collection

Name	Island	Male (black)	Male (streaked)	Female	Young	Sex undetermined
Geospiza c. conirostris	Hood	31(10)	16(2)	29(2)	(7)	3
Geospiza c. conirostris	Gardner-near-Hood	29(5)	34	42(1)	(2)	
Geospiza c. propinqua	Tower	1(6)	2(1)	5(2)		
Geospiza c. propinqua	Culpepper	(1)		1		

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF
Geospiza c. conirostris AND *G. c. propinqua*

MALES

Number of specimens	Name	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with with claw
10	Geospiza c. conirostris	Hood	78.2 (74.0-83.5)	47.7 (44.5-50.0)	21.3 (19.0-23.5)	12.0 (11.2-12.8)	16.4 (14.5-18.5)	12.2 (11.0-13.0)	23.6 (22.5-24.2)	22.8 (22.0-24.0)
10	Geospiza c. conirostris	Gardner-near-Hood	77.1 (74.0-79.5)	47.5 (45.5-51.0)	19.6 (18.0-22.0)	11.1 (9.5-12.2)	14.4 (12.5-16.2)	10.9 (9.2-12.2)	23.0 (22.0-24.0)	21.7 (20.0-23.5)
9	Geospiza c. propinqua	Tower	74.3 (72.5-77.0)	46.3 (43.0-48.5)	19.5 (18.0-20.5)	10.9 (10.0-11.2)	12.9 (12.0-14.0)	9.9 (9.5-10.5)	23.8 (23.0-25.0)	21.2 (20.2-23.0)

FEMALES

10	Geospiza c. conirostris	Hood	75.7 (72.2-78.0)	44.2 (42.0-46.0)	20.5 (18.5-22.2)	11.7 (11.0-13.2)	15.3 (13.5-17.2)	11.5 (10.0-12.5)	23.2 (22.2-24.0)	22.2 (21.0-23.2)
10	Geospiza c. conirostris	Gardner-near-Hood	73.9 (71.0-76.0)	44.8 (41.2-48.5)	19.0 (17.0-22.0)	11.0 (9.5-12.5)	14.2 (12.5-16.0)	10.7 (9.2-12.5)	22.4 (21.5-23.2)	20.7 (20.0-22.0)
6	Geospiza c. propinqua	Tower	71.6 (71.0-72.2)	43.5 (42.0-44.2)	19.9 (18.5-21.0)	10.8 (10.5-11.0)	12.5 (12.0-14.0)	9.8 (9.0-11.2)	23.4 (22.5-24.5)	21.1 (19.2-22.0)

Genus Platyspiza Ridgway

Platyspiza Ridgway, Proc. U. S. Nat. Mus., XIX, no. 1116, March 15, 1897, p. 545. (Type *Camarhynchus variegatus* Sclater & Salvin, = *C. crassirostris* Gould.)

Large finch-like Geospizidæ (wing 80-88 mm.); coloration, high-plumaged male usually with head and breast black, sometimes almost entirely black; female and young streaked; bill short, deep and broad, culmen strongly convex, gonys straight; tarsus relatively long, ratio of "middle toe with claw" to tarsus about 8 : 10. (For structural details see Ridgway, 1901, p. 473.)

Platyspiza was proposed by Ridgway (*loc. cit.*) as a subgenus under *Camarhynchus* and used by him later (1901, p. 473) as a genus. Rothschild & Hartert (1899, p. 152) object to the use of the name either as a genus or subgenus, and Snodgrass & Heller, willing to use the name in a subgeneric sense, place *crassirostris* in the genus *Geospiza*. I agree with Ridgway in the conviction that this species is sufficiently distinct both from *Geospiza* and *Camarhynchus* to be placed in another genus. The bill is peculiar, presenting in its shortness, breadth and depth, its strongly convex culmen, and its straight gonys, a combination of characters that is peculiar to this one species. There are other peculiarities of structure and distribution pointing toward the taxonomic isolation of this form.

87. Platyspiza crassirostris (Gould)

Camarhynchus crassirostris Gould, 1837a, p. 6 (Galapagos Islands; orig. descr.); 1841, p. 103, pl. 41 (Charles Island).—Salvin, 1876, p. 489.—Sharpe, 1888, p. 16.—Ridgway, 1890, p. 110; 1897, p. 551.

Geospiza crassirostris Rothschild & Hartert, 1899, p. 166.—Snodgrass & Heller, 1904, p. 291.

Camarhynchus variegatus Sclater & Salvin, 1870, pp. 323, 324 (Abingdon and Bindloe islands; orig. descr.).—Salvin, 1876, p. 489, pl. 85, text fig.—Sharpe, 1888, p. 15.—Ridgway, 1897, p. 548.

Platyspiza crassirostris Ridgway, 1901, p. 474.—Gifford, 1919, p. 243.

Camarhynchus variegatus Sclater & Salvin

Cotype.—British Museum, no. 85.12.14.542; ♂ ad.; Abingdon Island; December 26-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.543; ♂ im.; Abingdon Island; December 18, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.541; ♀; Abingdon Island; (no date); Dr. A. Habel.

Cotype.—British Museum, no. 75.4.2.34; ♂ ad.; Abingdon Island; December 26-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 75.4.2.33; ♀; Abingdon Island; (no date); Dr. A. Habel.

Cotype.—British Museum, no. 75.4.2.35; ♀; Bindloe Island; November 4, 1868, Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.544; ♀; Bindloe Island; November 4, 1868, Dr. A. Habel.

Described from 16 specimens from Bindloe and Abingdon islands (no type indicated), of which 7 are extant in the British Museum. No. 85.12.14.542 now bears a British Museum red "type label."*

The bird listed by Sharpe (1888, p. 16) as the type of *Camarhynchus crassirostris* is, perhaps, an aberrant *C. psittacula.*† Gould's description and plate were from a female or immature male of *crassirostris*, a specimen that apparently has since disappeared. The skin of *psittacula* above-mentioned is a male with some black about the head. There is no reason apparent for attaching it to Gould's descriptive matter, and, in fact, despite Sharpe's statement, it does not now bear a red "type label".

Description.—Among the largest of the Geospizidæ (wing about 85 mm.). "Bill short, deep, and broad, with culmen strongly convex, but gonys straight, the latter decidedly shorter than basal width of mandible; maxillary tomium strongly angulated or deflexed basally; mandibular tomium with its decided subbasal angle obviously toothed" (Ridgway, 1901, p. 473).

Adult male.—Head, neck, breast, back, sides, wings, and tail, black, as in *Geospiza.* An irregularly defined triangular area on the lower belly white, from a median point on the breast broadening posteriorly; under tail coverts white. Feathers of flanks black centrally and whitish edged, producing a streaked effect. The extremely dark plumage just described is apparently not frequently attained, though I find it represented in series from different islands. More common is the state described as the adult male by Ridgway (1901, p. 474), in which the head and breast are more or less extensively black or dusky, rather sharply defined against the olivaceous back, streaked sides, and whitish belly. *Adult female.*

*Because it was figured. N.B.K.

†Collected by Fitzroy on James Island. N.B.K.

—A brownish appearing bird. Above olive brown, feathers on top of head and back with dark centers, producing a mottled effect; rump somewhat brighter olive and unstreaked. Remiges and rectrices brownish or dusky, narrowly edged with pale brown or olivaceous. Wing coverts edged with pale brown, producing ill-

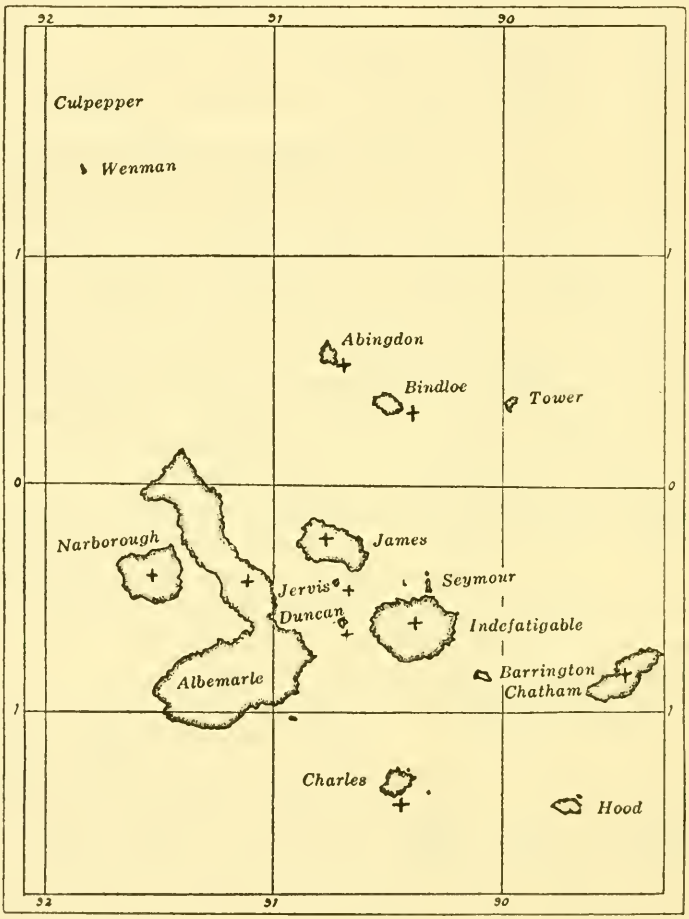


Fig. 44. Map showing distribution of *Platyspiza crassirostris*. Symbols indicate islands where recorded.

defined bars across the wing. Under parts whitish or pale creamy yellow, heavily streaked with brownish over breast and sides. Center of belly and under tail coverts immaculate. *Streaked male.*—Essentially similar to the adult female. In this plumage

every degree of variation is shown, from specimens indistinguishable from the female, through others showing a progressively increasing amount of black upon the head and throat, and thus grading into the black breast and the almost totally black (presumably "perfect plumaged") males. *Juvenal* (sexes alike).—Essentially like the adult female, though with feathers on back and wings perhaps more broadly margined with brownish, and in some cases with streakings on breast and throat tending to coalesce, giving a dusky-headed appearance. In some cases the ventral streakings are almost absent.

Recorded from the following islands: Abingdon, Bindloe, Albemarle, Narborough, James, Jervis, Duncan, Indefatigable, Chatham,

Fig. 45. Platyspiza crassirostris, male (no. 8401), Charles. Natural size.

and Charles. Found in fair abundance upon all of those islands by the Academy expedition (Gifford, 1919, p. 243). A total of 246 specimens was collected (nos. 8399-8644).

The adult male of this species is described by Ridgway (1901, p. 474) as having the black confined more or less to the head, neck, and upper chest, the back being brownish olive, the belly mostly whitish or yellowish. Our series shows that the extent of the black is extremely variable, the darkest colored males having the upper parts, wings and tail, almost uniformly sooty black, while below the black invades all but the center of the lower abdomen, and the lower tail coverts. Two of the three adult males from Charles are colored thus, as are others from James, and some, slightly less intensely black, from Indefatigable and Albemarle. Four adult males collected on James Island in August have light colored bills, while all but one of the adult males that were taken

there in December and January (the breeding season) have the bill black or dusky. In general, birds a year or more old taken from December to June have the bill dark colored or black, while those taken from July to November have it mostly lighter colored.

Male and female in juvenal plumage are alike, in a streaked plumage similar to that of the adult female. Following the post-juvenal molt the male bird on some of the islands, but apparently not on all, is streaked, and is generally similar to the adult female, and it breeds in this plumage. The fully mature male may or may not be black-headed, often almost entirely black, but this black-headed plumage is not a sharply defined stage, definitely following a certain molt. Long series of males from any one island show a number of intermediate steps, leading by degrees from the streaked to the mostly black plumage. Whether these steps are passed, year by year, by all alike, or whether individuals vary in the amount of black that is ever attained, are unsolved problems.

The question enters here of there being subspecific difference in this regard between forms on some of the islands. Thus, in the series of nineteen males from James Island there is considerable variation between the least black and the most extensively black specimens, but even the least black is sharply differentiated from the streaked female. Although it can not be doubted that some of the duller colored birds from James Island are of the same age as streaked males from other islands, they have all assumed a noticeably black plumage. On the other hand, of the twenty males from Chatham, only two are black-headed in any degree, and those only as much so as the duller of the James Island birds. The scarcity of black-headed birds upon Chatham is commented upon by Gifford (1919, p. 246). From Charles Island, too, we have only three black-headed males, but two of these are among the most extensively black-marked of any of the entire series.

There are other features that may prove to be of taxonomic significance, such as the relative grayness or green-ness of the olivaceous-backed males on different islands, and the breadth of streaking below on females and immatures, but individual variation in series from any one island is too great to justify one in claiming even a tendency in such particulars to exist at any specified locality. There is one molt a year, extending, in different indi-

viduals, through March, April, and May, occasionally into June. Birds in juvenal plumage were collected during March, April, and May. The plumage is affected noticeably by wear and fading, so that for close comparison it is essential to have birds taken at the same season upon different islands. Our series, large as it is, does not contain birds from all of the islands that are exactly comparable, seasonally, and allowance must accordingly be made in any conclusions that are drawn. Measurements do not disclose any size differences of taxonomic value.

SPECIMENS OF *Platyspiza crassirostris* IN THE ACADEMY COLLECTION AND (FIGURES IN PARENTHESES) IN THE STANFORD UNIVERSITY COLLECTION

Island	Male (black-headed)	Male (non-black-headed)	Female	Young	Sex undetermined
Abingdon	(3)	5(1)	3(2)		
Bindloe	3	1(1)	3(2)		
Bindloe	3	1(1)	3		
James	14(1)	5(1)	8		3
Albemarle	18(5)	14	29(1)	26	
Narborough	(5)		(4)	(1)	(1)
Duncan			(1)		
Indefatigable	10	4	24		1
Charles	2	14	25	2	4
Chatham	2	18(3)	5(1)		1(2)

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF
Platyspiza crassirostris

MALES

Number of specimens	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
5	Abingdon	81.5 (80.5-83.0)	53.8 (51.2-55.5)	14.3 (14.0-14.5)	7.2 (7.0-7.5)	12.1 (12.0-12.5)	9.4 (9.0-10.0)	27.3 (27.0-28.0)	22.1 (21.2-23.0)
3	Bindloe	84.2 (83.0-86.0)	54.8 (53.5-56.0)	14.3 (13.5-15.5)	7.3 (7.0-7.5)	12.8 (12.5-13.0)	10.0	28.5 (28.0-29.5)	23.3 (23.0-23.5)
10	James	86.4 (84.0-88.5)	56.1 (53.0-59.5)	14.8 (14.0-15.0)	7.6 (7.0-8.0)	12.8 (12.0-13.5)	10.1 (10.0-10.5)	28.0 (27.0-29.0)	22.2 (20.5-24.0)
10	Indefatigable	84.9 (83.0-86.0)	55.8 (54.0-57.5)	14.4 (14.0-15.5)	7.7 (7.5-8.0)	12.2 (11.5-12.5)	9.8 (8.5-10.5)	27.8 (26.5-28.5)	22.0 (20.5-23.0)
10	Albemarle	82.9 (80.0-85.0)	54.8 (53.0-58.0)	14.6 (13.5-16.0)	7.2 (6.5-8.0)	12.2 (11.5-12.5)	9.6 (9.0-10.0)	27.9 (26.0-29.5)	22.3 (21.0-23.0)
10	Chatham	83.6 (81.0-85.5)	54.6 (52.2-56.5)	15.3 (14.0-16.5)	7.7 (7.0-8.0)	12.8 (12.0-14.0)	10.0 (9.8-10.2)	27.7 (26.0-28.5)	22.8 (21.5-23.5)
10	Charles	84.3 (81.2-87.5)	54.1 (51.5-57.0)	15.1 (14.0-16.5)	7.6 (7.2-8.0)	12.6 (12.0-14.0)	9.9 (9.5-10.5)	27.4 (26.5-28.0)	22.0 (21.5-23.0)

FEMALES

5	Abingdon	78.9 (77.0-82.0)	52.8 (51.0-54.5)	15.0 (14.5-15.5)	7.2 (7.0-7.8)	11.8 (11.2-12.5)	9.3 (9.2- 9.8)	27.1 (26.5-27.5)	21.7 (20.5-22.5)
5	Bindloe	80.2 (79.5-81.2)	53.9 (52.0-56.2)	15.1 (14.5-16.0)	7.2 (7.0-7.5)	12.4 (12.0-13.0)	9.9 (9.5-10.0)	27.2 (26.8-28.0)	20.8 (20.2-21.8)
8	James	81.8 (79.0-85.8)	53.3 (51.0-56.0)	14.8 (14.2-15.0)	7.2 (7.0-7.5)	11.7 (11.2-13.2)	9.5 (9.0-10.2)	27.6 (27.0-28.5)	21.9 (20.0-23.2)
10	Indefatigable	80.9 (76.8-83.5)	52.3 (51.0-55.5)	14.9 (13.0-16.2)	7.0 (6.5-7.2)	11.9 (11.0-12.5)	9.6 (9.0-10.2)	27.3 (26.0-28.5)	21.3 (20.0-23.0)
10	Albemarle	80.8 (75.8-84.0)	52.8 (50.5-55.5)	14.8 (14.2-15.2)	7.1 (7.0-7.2)	11.8 (11.2-12.2)	9.4 (9.0-10.0)	27.7 (27.0-28.2)	21.4 (20.5-23.2)
6	Chatham	80.6 (78.0-84.0)	53.7 (52.0-55.5)	15.4 (14.0-16.0)	7.4 (6.5-8.0)	12.2 (11.5-12.8)	10.0 (9.5-10.5)	27.2 (26.0-28.5)	22.1 (21.2-23.0)
10	Charles	81.9 (80.0-84.2)	53.9 (50.8-56.2)	15.2 (14.2-17.0)	7.5 (7.2-8.0)	12.0 (11.5-12.5)	9.7 (9.2-10.5)	26.6 (26.0-27.5)	21.4 (20.0-22.5)

Genus CAMARHYNCHUS Gould

Camarhynchus Gould, Proc. Zool. Soc. London, part V, 1837a, p. 6. (Type, *Camarhynchus psittacula* Gould.)

Small and medium sized finch-like Geospizidæ (wing 58-75 mm.); coloration, high plumaged males usually with head and breast black (two species with no black markings), female and young streaked below or nearly immaculate below; one species with chestnut on throat; bill usually short and stout, laterally compressed, culmen convex (usually strongly so), gonys slightly to strongly convex; tarsus relatively long, ratio of "middle toe with claw" to tarsus about 8 : 10.

88. Camarhynchus psittacula Gould

Camarhynchus psittacula Gould, 1837a, p. 6 (Galapagos Islands; orig. descr.).

Camarhynchus psittaculus Gould, 1841, p. 103, pl. 40 (James Island). —Sclater & Salvin, 1870, p. 323 (Indefatigable).—Salvin, 1876, p. 488.—Sharpe, 1888, p. 16.—Ridgway, 1890, p. 109; 1897, p. 552; 1901, p. 477.—Gifford, 1919, p. 246.

Geospiza psittacula psittacula Rothschild & Hartert, 1899, p. 167; 1902, p. 400.—Snodgrass & Heller, 1904, p. 290.

Camarhynchus townsendi Ridgway, 1890, p. 110, fig. 5 (Charles Island; orig. descr.).

Geospiza psittacula townsendi Rothschild & Hartert, 1899, p. 167.—Snodgrass & Heller, 1904, p. 291.

Camarhynchus rostratus Ridgway, 1894, p. 363 (James Island; orig. descr.).

Camarhynchus compressirostris Ridgway, 1896, p. 294 (Jervis Island; orig. descr.); 1897, p. 558; 1901, p. 481.—Hartert, 1919, p. 153 (particulars of type specimen, in Rothschild Museum).

CAMARHYNCHUS PSITTACULA Gould

Cotype.—British Museum, no. 55.12.19.22; (♀?; Galapagos Islands); "ex coll. Darwin."

Cotype.—British Museum, no. 55.12.19.12; (♀?; Galapagos Islands); "ex coll. Darwin."

No. 55.12.19.22 bears a red "type label."

CAMARHYNCHUS TOWNSENDI Ridgway

Type.—United States National Museum, no. 115915; ♂ (in female plumage); Charles Island; April 8 (1888); U. S. Fish Commission, Voyage of the Albatross, 1887-88.

CAMARHYNCHUS ROSTRATUS Ridgway

Type.—United States National Museum, no. 116006; ♂ ad.; James

Island; April 11 (1888); U. S. Fish Commission, Voyage of the Albatross, 1887-88.

CAMARHYNCHUS COMPRESSIROSTRIS Ridgway

Type.—Rothschild Museum; ♀ ad.; Jervis Island; August 8, 1891; Dr. G. Baur; orig. no. 471.

DESCRIPTION.—Largest of the genus *Camarhynchus* (wing about 70 mm.). Culmen sharply decurved (parrot-like) and gonys markedly convex, up-curved. "Bill short and stout, its depth at base much exceeding distance from nostril to tip of maxilla, and width at base usually decidedly greater than length of gonys, never decidedly less" (Ridgway, 1901, p. 477). *Adult male.*—Head, neck and chest black; feathers of dorsum black, narrowly edged with greenish olivaceous; black area below extending farther back on sides than on breast, and passing into longitudinal black streaks; center of belly and under tail coverts white; flanks grayish olive; remiges, wing coverts, and rectrices black, narrowly edged with olivaceous. The specimen described is one of several representing the darkest extreme in the series. In another stage the black head is more sharply defined against a grayish dorsum, and there are others showing progressive diminution of the black area on head and breast, grading into a plumage that is closely similar to the adult female, though always with some black on face and throat. There is great variation, out of proportion to the number of adult males in the series. *Adult female.*—In general appearance gray-brown above, whitish below. On upper parts, grayish on pileum, more brownish on dorsum, passing into olivaceous brown on rump. Feathers of pileum dusky-streaked centrally, feathers of dorsum dark centered. A poorly defined whitish superciliary line and whitish area about eye. Dark color of upper parts extending to ear coverts and sides of neck, where blending into the whitish ventral surface. Flanks and belly faintly tinged with buffy or yellow. Rectrices and remiges dusky, narrowly edged with olivaceous; greater and median wing coverts broadly edged with grayish or whitish. Variants among females are practically immaculate below, are tinged more or less strongly with yellow over the whole lower area, have faintly indicated nebulous streaks on breast and sides, or have ventral streaks distinct and sharply defined. *Juvenal.*—Not represented in our series.

HABITAT.—James, Jervis, Seymour, Indefatigable, Duncan, Barrington, and Charles.

The Academy series consists of 34 specimens (nos. 8342, 8360, 8362, 8363, 8366, 8370-8398). Of the James Island birds, six were collected in December, five in January, and two in August. Nine males taken during December and January vary from an extremely black condition, involving head, breast, flanks and even

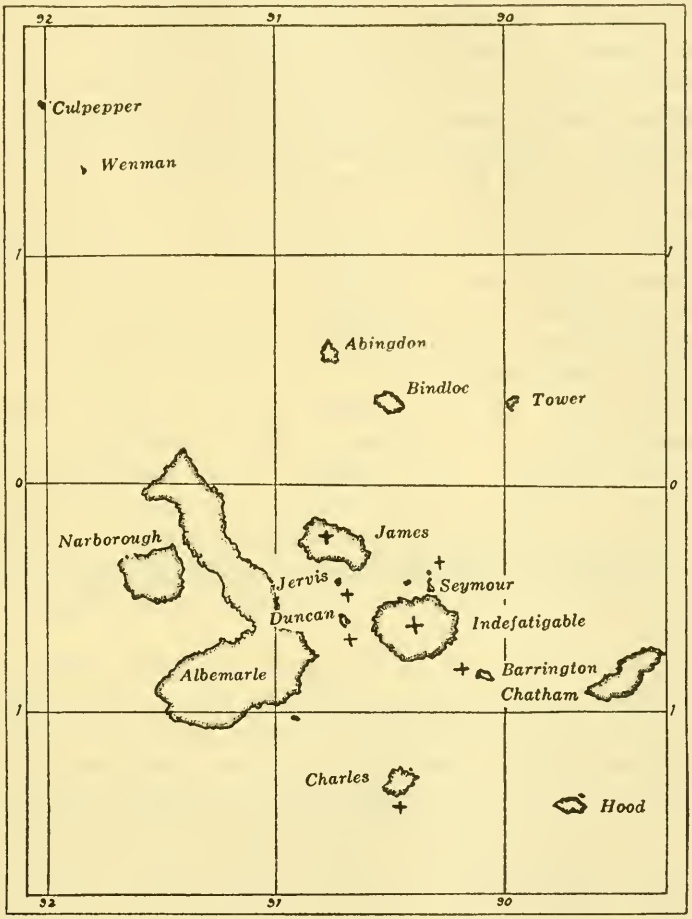


Fig. 46. Map showing distribution of *Camarhynchus psittacula*. Symbols indicate islands where recorded.

the back, through various intermediate stages to a condition where there are only small patches of black on head and throat. A male collected in August lies about midway between the extremes. December and January birds, both sexes, have the bill black, with the

exception of one (no. 8382), sex unknown, that is in the midst of the molt, and has a light colored bill. The two August specimens, male and female, respectively, have the bill light colored.

Of the nine specimens from Charles Island, five were collected in October, four in May. In seven of the nine the bill is light colored, in two, a male taken on October 5, and a female on May 29, it is dusky (not black). One of the two males has a good deal of black on forehead, throat, and upper breast; the other has traces of black on face and throat. Four specimens from Indefatigable were collected on July 11, 12, 17, and November 14, respectively. The three July birds (including a black-headed male) have the bill light colored; in the November specimen, an adult female, it is black. Five from Duncan were collected August 14 and 15. The two males are in the non-black female plumage. All have light colored bills. From Jervis there are two, both collected December 21, a very black male with black bill, an adult female with light colored bill. The one Barrington skin is an adult female, collected October 20. It has a light colored bill.

Psittacula and *affinis* are closely similar, so much so that it seemed to me at first that they should be treated as only subspecifically different. The objection to this course lies in the occurrence of *affinis* on James Island and on Seymour (hence by inference, on Indefatigable also), within the habitat of *psittacula*; although *affinis* is apparently rare on those islands, its occurrence there at all debars treatment of the two forms as only subspecifically different.

An added complication in this matter is found in the supposed *Camarhynchus compressirostris* (Ridgway, 1896, p. 294), described from Jervis Island. This form was based upon a single bird, a female, and has been recognized by no one except the describer. We have two birds of the *psittacula* type from Jervis Island, male and female, respectively, collected December 21 (nos. 8373, 8387). The male (black headed) is indistinguishable from James Island *psittacula*. The female is a smaller bird with a much smaller bill, but falls within the range of variation that is found on other islands. There is no ground here for the recognition of the form *compressirostris* and I am unable to supply any evidence upholding the existence of that species. Birds from Duncan Island are intermediate between *psittacula* and *affinis*.

Birds from Charles Island are distinctly gray colored and small

billed, enough so, so far as our small series (nine birds) goes, to justify the use of a separate name. Ridgway (1890, p. 110) based his *Camarhynchus townsendi* upon two specimens from Charles Island that exhibited the same sort of variation. My reason for not treating the Charles Island form under a distinct name, as a subspecies, *Camarhynchus psittacula townsendi*, is to be found in the parallel variation that occurs in *C. parvulus*. There, again, there are extremes of color, grayish and greenish, distinguishing series from different islands, but in the one really extensive series (which happens to be from Charles Island) both types of color are represented. It seems a fair assumption that a larger series of *psittacula* from Charles might show a similar range of variation.

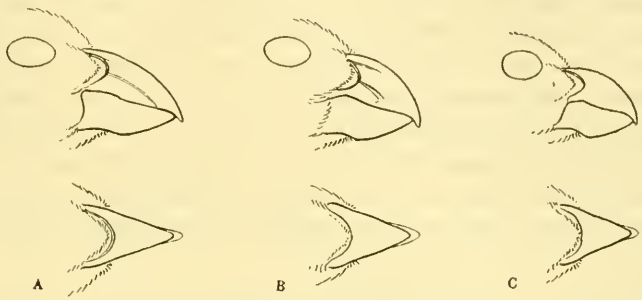


Fig. 47. a, Camarhynchus habeli (no. 8279), Bindloe; b, Camarhynchus psittacula (no. 8370), James; c, Camarhynchus affinis (no. 8333), Albemarle; male birds. Natural size.

89. Camarhynchus habeli Sclater & Salvin

Camarhynchus habeli Sclater & Salvin, 1870, pp. 323, 325 (orig. descr.; Abingdon and Bindloe islands).—Salvin, 1876, p. 490, fig.—Sharpe, 1888, p. 17.—Ridgway, 1890, p. 110; 1897, p. 555; 1901, p. 480.—Gifford, 1919, p. 247.

Geospiza habeli Rothschild & Hartert, 1899, p. 168; 1902, p. 401.—Snodgrass & Heller, 1904, p. 288.

Camarhynchus bindloei Ridgway, 1896, p. 294 (orig. descr.; Bindloe Id.); 1897, p. 556.—Hartert, 1919, p. 153 (particulars of type specimen, in Rothschild Museum).

CAMARHYNCHUS HABELI Sclater & Salvin

Cotype.—British Museum, no. 75.4.2.36; ♂ ad.; Abingdon Island; December 14-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 75.4.2.37; ♀; Abingdon Island; December 16-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.546; (♂); Abingdon Island; December 14-30, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.547; sex?; Abingdon Island; December 16, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.548; (♂); Bindloe Island; November 12, 1868; Dr. A. Habel.

No. 85.12.14.548 now bears a red "type label."

CAMARHYNCHUS BINDLOEI Ridgway

Type.—Rothschild Museum; ♂ ad.; Bindloe Island; September, 1891; Dr. G. Baur; orig. no. 696.

Camarhynchus habeli Sclater & Salvin was described from seven specimens, three from Bindloe and four from Abingdon, no type indicated. Sharpe (1888, p. 17) lists five skins as in the British Museum, one from Bindloe and four from Abingdon, which are still there. He indicated specimens "a" and "b", from Abingdon, as the types, and although there is no way of telling which skins those were, his statement fixes the type locality as Abingdon. This is confirmed by Ridgway, in naming the Bindloe bird. At present the one Bindloe skin has been mistakenly segregated, with a red label, as the "type" of *habeli.*

DESCRIPTION.—Differs from *C. psittacula* only in differently shaped, less sharply decurved, bill. "The culmen longer and gonys at same time shorter, the gonydeal angle more pronounced" (Ridgway, 1901, p. 480). In color and markings there are no differences between *habeli* and *psittacula.* In our *habeli* series, however, there are numerous adult males in plumage indistinguishable from the female, a condition that is not found in our *psittacula* series. *Juvenal.*—Not represented in our series.

HABITAT.—Abingdon and Bindloe islands.

There are at hand twenty-four specimens from Abingdon, twenty-five from Bindloe (nos. 8278-8326). Those from Abingdon were collected September 18 to 22, those from Bindloe on September 17 and 18. Of the Abingdon birds, three females have the bill black; in the other twenty-one specimens it is light colored. Of the Bindloe birds, seven males (all the black-headed ones) and two females have the bill black, in one male and three females it is dusky, in seven males and five females it is light colored.

Ridgway (1896, p. 294) described *Camarhynchus bindloei* from

Bindloe Island, differing from *habeli*, of Abingdon, in being "rather larger, with decidedly larger bill, the latter with culmen much less compressed." *Bindloei* has not been recognized by others, and

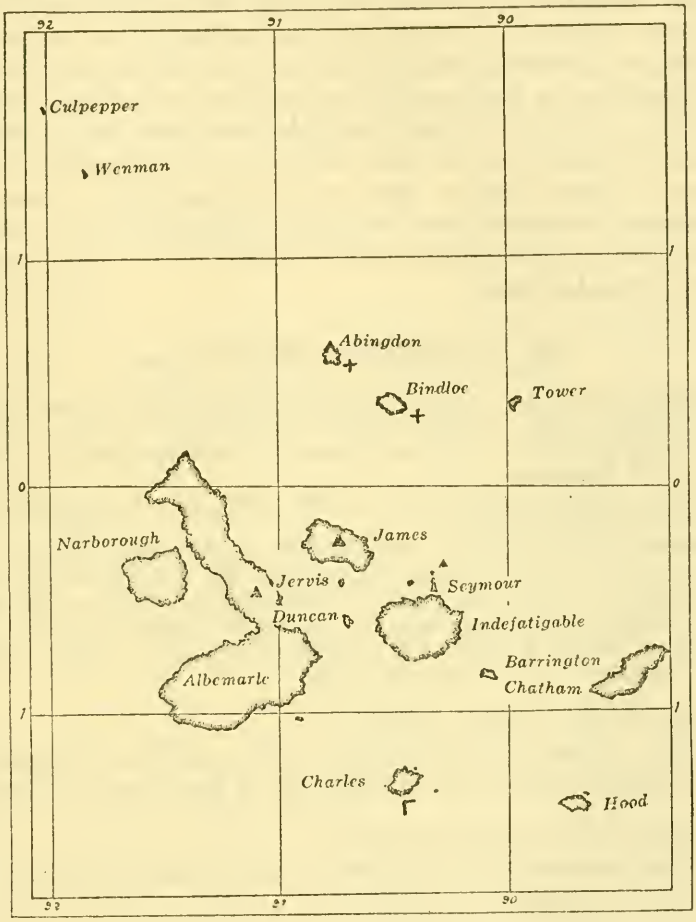


Fig. 48. Map showing distribution of *Camarhynchus habeli*, *C. affinis*, and *C. pauper*. Symbols indicate islands where recorded.

Ridgway, himself (1901, p. 480) reduced it to a synonym of *habeli*. I can not, myself, see the structural differences described, nor are

there any differences of color and pattern, in comparable plumages, between birds from the two islands. There is, however, a notable difference in the manner of occurrence of black-headed males. From Abingdon, not one of our series has a black head, from Bindloe, seven out of fifteen are thus marked. This can not be taken as a fortuitous circumstance, but is, I believe, an indication of conditions as they actually are upon the two islands. Gifford (1919, p. 247), in his published field notes upon this collection, states "I noticed but one black-headed one on Abingdon". Snodgrass & Heller (1904, p. 289) say: "Immature birds common on Abingdon, but adults rare, only two having been seen." Conditions in this regard are thus parallel to what occurs in other species upon Abingdon Island.

90. Camarhynchus affinis Ridgway

Camarhynchus affinis Ridgway, 1894, p. 365 (Albemarle Island; orig. descr.); 1897, p. 554; 1901, p. 481.—Gifford, 1919, p. 247.—Hartert, 1919, p. 153 (particulars of type specimen, in Rothschild Museum).

Geospiza affinis Rothschild & Hartert, 1899, p. 168.—Snodgrass & Heller, 1904, p. 289.

Geospiza psittacula affinis Rothschild & Hartert, 1902, p. 401.

Camarhynchus incertus Ridgway, 1896, p. 294 (James Island; orig. descr.); 1897, p. 560; 1901, p. 482.—Hartert, 1919, p. 153 (particulars of type specimen, in Rothschild Museum).

Geospiza incerta Rothschild & Hartert, 1899, p. 168; 1902, p. 401.—Snodgrass & Heller, 1904, p. 289.

CAMARHYNCHUS AFFINIS Ridgway

Type.—Rothschild Museum; (♀ ad.); "Cowley Bay, E. Albemarle, on mountain;" August 10, 11, 1891; Dr. G. Baur; orig. no. 598.

CAMARHYNCHUS INCERTUS Ridgway

Type.—Rothschild Museum; ♀ ad.; James Island; August 13, 1891; Dr. G. Baur; orig. no. 521.

DESCRIPTION.—Differs from *C. psittacula* in smaller size and in smaller and less sharply decurved bill. Differs from *C. habeli* in smaller size and in smaller and slightly less elongated bill. In color and markings there are no differences in adult and near adult plumages, between the three species. I have not seen the juvenal plumage of *psittacula* and *habeli*. *Juvenal.*—Above, general appearance brownish; top of head almost uniformly dusky; dorsum olivaceous, the feathers dusky centered, producing a mottled effect;

rump and upper tail coverts more nearly uniform olivaceous; a poorly defined yellowish area above the eye; cheeks and ear coverts olivaceous, flecked with dusky; below, ground color whitish, tinged with yellowish or buffy, nearly immaculate on throat and entirely unmarked on mid-belly and under tail coverts, otherwise heavily marked with broad, dusky, longitudinal streaks; rectrices and remiges dusky, narrowly edged with olivaceous; wing coverts dusky, broadly edged with olivaceous; bill (in dried skin) light brown; legs and feet blackish.

HABITAT.—Common upon Albemarle and perhaps upon Narborough; probably of only casual occurrence elsewhere, as on James and Seymour.

Represented in our collection by thirty-six skins from Albemarle, two from James, and one from Seymour (nos. 7848, 8327-8341, 8343-8348, 8350-8359, 8361, 8364, 8365, 8467-8469). The series from Albemarle includes seven adult males (only one with black head), nineteen adult females, five birds in juvenal plumage throughout, and five in process of the post-juvenal molt.

In the juvenal plumage the bird is heavily streaked below except on the middle of the lower abdomen and on the lower tail coverts, there are obscurely indicated streaks on the dorsal surface, and the general coloration on head and back is darker than in the succeeding stage. The bill is light colored. This plumage is represented in birds collected from March 19 to April 12. In the following plumage most of the ventral streaking is lost and the whole bird is paler colored. Some individuals retain faintly indicated streaks on the upper breast, which later in the year become more distinct when the feathers get worn. In this plumage male and female are alike, grayish olive above, grayish white below, under parts sometimes immaculate but usually with obscure streaks on breast and flanks. Birds of both sexes in this plumage taken in March have the bill black; some collected late in March and in April have the bill paler colored.

This plumage, heretofore regarded as an immature stage in the male, is worn at least two years by some individuals of that sex, possibly for an indefinite period by some. Males in this plumage a year old or more, taken during March and beginning the annual molt, show new white feathers coming in on throat and upper breast.

The one high plumaged specimen in the series (sex not indi-

cated, but presumably a male) has the top of the head blackish and there are black feathers edged with whitish covering most of the sides of the head, throat, and upper breast. This bird, collected August 11, has the upper mandible dusky, the lower horn color, the whole much paler colored than in breeding birds.

There are two specimens from James Island, male and female, respectively (nos. 8328, 8357), collected December 28, that presumably represent "*Camarhynchus incertus*" Ridgway (1896, p. 294). The male has some blackish on face and throat, and they both exhibit the olivaceous upper parts and yellowish buff under parts described by Ridgway as characteristic of "*incertus*", a type of coloration that differs from the mode of *affinis*, most examples of which are rather grayish in general tone. There are examples of *affinis* from Albemarle Island, however, which are distinctly yellowish below, and on this basis alone, therefore, I hesitate to recognize "*incertus*" as an established form. The same sort of variation is seen in *parvulus*, James Island examples of which are grayish, those from Indefatigable and Albemarle darker and more greenish. There is one bird from Seymour Island (no. 7848), collected November 22, that I feel obliged to refer to *affinis*. It is a male with no black on the head, and differs from the mode of *affinis* only in that the bill is a trifle smaller than the average in that form. It can be duplicated even in that respect, however, in selected specimens of *affinis*.

91. Camarhynchus pauper Ridgway

Camarhynchus pauper Ridgway, 1890, p. 111 (Charles Island; orig. descr.); 1897, p. 559; 1901, p. 483.—Gifford, 1919, p. 249.
Geospiza paupera Rothschild & Hartert, 1899, p. 169; 1902, p. 401.—Snodgrass & Heller, 1904, p. 288.

CAMARHYNCHUS PAUPER Ridgway

Type.—United States National Museum, no. 115913; ♀; Charles Island; April 8 (1888); U. S. Fish Commission, Voyage of Albatross, 1887-88.

DESCRIPTION.—Differs from *psittacula*, *habeli*, and *affinis*, in much smaller, less markedly decurved bill. The adult male is black-headed to a greater or less extent, as in those species, and the adult female and near-adult stages of both sexes are also the same so far as markings are concerned. In color, however, there

is this difference, that in *pauper* the general ground color is, on the average, distinctly of a greenish-olivaceous tinge, while in the related species it is more grayish or dusky.

Juvenal.—Male: Head, chest, and back solidly slaty black, broken by only a few faint flecks of olivaceous; sides and flanks heavily streaked with black; middle of belly narrowly unmarked, whitish, tinged with buffy; under tail coverts buffy, with central dusky stripes; remiges and rectrices blackish, narrowly edged with olivaceous; wing coverts broadly edged with rusty; bill (in dried skin) pale brown; feet dusky. There are several young males at hand in this black-headed plumage, but no young females. Other young males are streaked (as in young *affinis*) and all the young females are in this streaked plumage. Mature males not in the black-headed plumage, and mature females, are similar in markings to

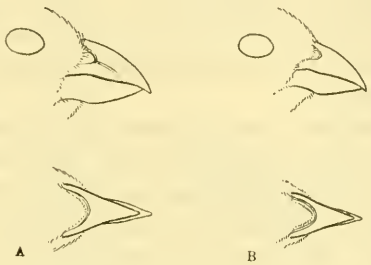


Fig. 49. a, Camarhynchus pauper (no. 8123), Charles; b, Camarhynchus parvulus parvulus (no. 7756), Indefatigable; male birds. Natural size.

those plumages as described under *C. psittacula*, and vary in the same way, from a heavily streaked plumage to one that is absolutely unmarked below, and with every degree of streakiness between. As yet we lack the clue as to whether these differences represent a sequence of plumages that is passed through by all individuals or whether they are different phases that persist unchanged throughout the life time of any one bird. There is one specimen at hand that sheds this much light upon the question, that it is molting from the streaked juvenal plumage into a stage with absolutely immaculate under parts, and there are two other specimens that appear to be undergoing the same change.

Habitat.—Charles Island.

Represented by 155 skins (nos. 8122-8220, 8222-8277), collected

on the following dates: October 7-12; February 28; March 1, 2; May 16, 24-31; June 1-4. Fifteen of the male birds are black-headed to a greater or less extent, ranging from an extreme (shown in five specimens) in which the entire head, neck and upper breast are solidly black, through various lesser degrees to a non black-headed condition, in which black markings remain only as a series of heavy streaks across the upper breast. Black-headed birds were collected during October, February, and March. In specimens taken during February and March the bill is solidly black; in those taken in October it is in some cases light colored, in some dusky, in none as black as in the February and March specimens. In the light colored males and in the females there is the same sort of seasonal variation in bill color. In breeding birds, male and female alike, the bill is black. This color fades to yellowish during the molting season, April to June, and begins to reappear in October. Just how soon the black bill is acquired by birds of the year is not apparent, but presumably by the time they begin to breed.

The juvenal plumage is much darker than some of the succeeding stages. In several young males the head and breast are as "solidly" black as in any adult, and in all cases there is the effect of a blackish head, while the lower surface is heavily marked with broad dusky streaks that leave only the lower abdomen and lower tail coverts unmarked. Young birds all have the bill light colored. One or two young birds are molting into a plumage that is grayish white below, tinged with buffy yellow, and unmarked, or at most with faint streaks on breast and sides.

The molt, annual or post-juvenal, as the case may be, takes place in April and May, but these molts are inadequately represented in our series. It is not possible to follow plumage changes beyond the juvenal with any certainty, due to this dearth of molting birds, and due also to lack of information as to whether any given specimen is a young of the year or older. There are fresh plumaged birds at hand in which the lower parts are immaculate or nearly so, and others that are heavily streaked below. Whether this is individual variation, or representative of distinct plumage stages I can not tell. Breeding males are black-headed in various degree, or else are more or less heavily streaked below. Non-breeding males in fresh plumage are similarly marked, but with the ventral streaks obscured, sometimes entirely hidden, by grayish white

feather edgings that disappear with wear later on. Breeding females are mostly with some streaks on breast and sides, though there are one or two at hand that are practically immaculate. There is another sort of plumage variation also, some of the birds being grayish, others buffy yellow, comparable to the characters ascribed, severally, to *Camarhynchus psittacula* and *"C. incertus."*

SPECIMENS OF *Camarhynchus habeli, C. psittacula, C. pauper,* AND *C. affinis,* IN THE ACADEMY COLLECTION AND (FIGURES IN PARENTHESIS) IN THE STANFORD UNIVERSITY COLLECTION

Name	Island	Male (black-headed)	Male (non-black-headed)	Female	Young	Sex undetermined
Camarhynchus habeli	Abingdon	(1)	7	17(1)		
Camarhynchus habeli	Bindloe	7(1)	8(1)	9		1
Camarhynchus psittacula	James	10(2)		2		1
Camarhynchus psittacula	Jervis	1		1		
Camarhynchus psittacula	Indefatigable	1		2(1)		1
Camarhynchus psittacula	Duncan		2	1		2
Camarhynchus psittacula	Barrington		(1)	1		
Camarhynchus psittacula	Charles	2		6		1
Camarhynchus pauper	Charles	15(1)	57(1)	52	18(1)	13
Camarhynchus affinis	Albemarle	1(3)	6(1)	18(1)	8	(1)
Camarhynchus affinis	James		1	1		
Camarhynchus affinis	Seymour		1			

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF
Camarhynchus habeli, C. psittacula, C. pauper, AND *C. affinis*

MALES

Number of specimens	Name	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
7	Camarhynchus habeli	Abingdon	67.1 (65.5-69.0)	40.6 (37.5-42.5)	14.8 (14.2-15.2)	7.7 (7.5-8.2)	10.3 (10.0-11.0)	7.5 (7.2-8.2)	22.9 (22.0-23.5)	19.0 (18.0-20.0)
10	Camarhynchus habeli	Bindloe	69.8 (68.5-72.0)	42.2 (37.2-44.0)	15.1 (14.8-15.5)	7.7 (7.2-8.2)	10.3 (10.0-10.8)	7.9 (7.5-8.2)	22.2 (22.0-23.0)	19.3 (18.0-20.2)
10	Camarhynchus psittacula	James	73.0 (70.5-75.0)	44.9 (43.5-48.0)	14.1 (14.0-14.5)	7.8 (7.5-8.5)	11.3 (11.0-12.0)	8.6 (8.0-9.0)	22.7 (22.5-23.5)	19.6 (18.8-20.5)
1	Camarhynchus psittacula	Indefatigable	74.0	46.0	14.0	7.5	11.2	8.8	22.8	17.5
2	Camarhynchus psittacula	Duncan	67.2-67.2	43.0-44.2	12.5-13.2	7.0-7.2	10.0-10.2	8.0-8.0	22.2-22.2	18.0-18.0
2	Camarhynchus psittacula	Charles	70.5-73.2	42.0-45.0	13.5-14.2	7.5-7.5	10.0-11.0	7.5-8.2	22.0-25.0	17.0-20.2
10	Camarhynchus pauper	Charles	69.6 (68.0-71.0)	43.6 (40.2-45.5)	12.5 (12.0-13.5)	7.0 (6.2-7.5)	8.7 (8.2- 9.2)	6.8 (6.5-7.5)	22.6 (22.0-23.0)	18.0 (17.0-18.5)
7	Camarhynchus affinis	Albemarle	65.0 (62.5-70.0)	40.3 (38.0-43.5)	11.9 (11.5-12.2)	6.3 (6.0-6.8)	9.1 (9.0- 9.2)	7.4 (7.0-7.5)	21.8 (21.0-22.2)	16.7 (16.0-17.0)

FEMALES

10	Camarhynchus habeli	Abingdon	66.3 (63.5-68.2)	40.1 (38.2-42.0)	14.6 (14.0-16.0)	7.9 (7.2-8.2)	10.1 (9.2-11.0)	7.5 (7.2-8.2)	22.1 (21.0-23.8)	18.5 (17.5-19.5)
10	Camarhynchus habeli	Bindloe	66.2 (64.0-68.0)	40.6 (38.0-42.5)	14.8 (14.0-15.5)	7.9 (7.2-8.2)	9.9 (9.5-10.0)	7.7 (7.2-8.0)	21.8 (20.0-23.2)	18.8 (17.5-19.2)
2	Camarhynchus psittacula	James	72.0-73.0	45.0-45.2	14.0-14.8	7.5-8.0	10.2-11.0	8.5-8.5	22.2-23.2	18.0-18.8
1	Camarhynchus psittacula	Jervis	63.5	40.2	13.0	7.2	9.5	7.0	21.0	17.5
1	Camarhynchus psittacula	Duncan	63.5	39.2	12.2	7.0	9.0	7.2	21.0	18.5
3	Camarhynchus psittacula	Indefatigable	66.9 (66.2-67.5)	41.2 (39.5-43.2)	13.1 (12.5-13.8)	7.1 (7.0-7.2)	9.1 (9.0- 9.2)	7.9 (7.8-8.0)	22.2 (21.8-22.5)	19.6 (19.5-19.8)
1	Camarhynchus psittacula	Barrington	71.2	43.0	14.5	8.2	11.5	8.5	23.2	19.0
6	Camarhynchus psittacula	Charles	67.2 (66.0-69.0)	42.2 (40.2-45.2)	13.7 (13.2-14.2)	7.3 (7.2-7.5)	10.4 (10.0-11.0)	8.1 (7.8-8.5)	22.3 (22.0-23.0)	19.5 (18.5-21.5)
10	Camarhynchus pauper	Charles	66.8 (65.0-70.5)	41.1 (39.0-43.2)	12.3 (11.5-13.5)	6.8 (6.2-7.2)	8.6 (7.8- 9.5)	6.9 (6.5-7.2)	21.7 (20.0-22.5)	17.7 (16.2-18.5)
10	Camarhynchus affinis	Albemarle	64.9 (63.0-67.5)	38.8 (36.0-42.0)	12.3 (11.5-13.2)	6.5 (6.2-7.0)	8.9 (8.5- 9.2)	7.3 (7.0-8.0)	21.7 (20.8-22.8)	17.4 (16.8-18.2)

92. Camarhynchus parvulus parvulus (Gould)

Geospiza parvula Gould, 1837a, p. 6 (orig. descr.; Galapagos Islands); 1841, p. 102, pl. 39 (James Id.).—Sharpe, 1888, p. 13, part.—Ridgway, 1897, p. 529, part.

Camarhynchus prosthemelas Sclater & Salvin, 1870, pp. 323, 325, fig. 4 (orig. descr.; Indefatigable Island).—Sharpe, 1888, p. 17.—Salvin, 1876, p. 490, fig.—Ridgway, 1890, p. 110, part; 1901, p. 484.—Gifford, 1919, p. 250, part.

Geospiza prosthemelas Rothschild & Hartert, 1899, p. 169.

Geospiza prosthemelas prosthemelas Snodgrass & Heller, 1904, p. 284.

GEOSPIZA PARVULA Gould

Cotype.—British Museum, no. 55.12.19.194; (♂ ad.; Galapagos Islands); C. Darwin.

Cotype.—British Museum, no. 55.12.19.167; (♀?; Galapagos Islands); C. Darwin.

These two specimens designated by Sharpe (1888, p. 14) as "types of species". The male now bears a red "type label". They are also labelled (presumably by Sharpe) as from Chatham Island, but they are not the Chatham Island form (*salvini*) of this species.

CAMARHYNCHUS PROSTHEMELAS Sclater & Salvin

Cotype.—British Museum, no. 75.4.2.38; ♂ im.; Indefatigable Island, August 26, 1868; Dr. A. Habel.

Cotype.—British Museum, no. 85.12.14.549; ♀; Indefatigable Island; (no date); Dr. A. Habel.

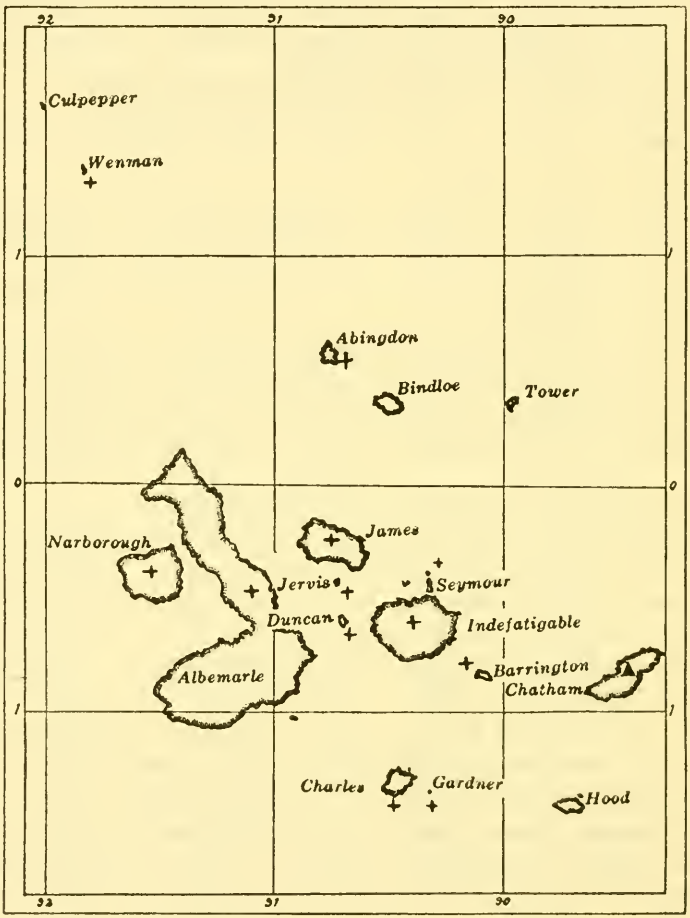
Cotype.—British Museum, no. 85.12.14.550; ♀; Indefatigable Island; September 12 (1868); Dr. A. Habel.

No. 75.4.2.38 now bears a red "type label",* though the other two skins were designated as types by Sharpe (1888, p. 17).

Geospiza parvula was described by Gould (1837, p. 6) as from the Galapagos Islands, the types later indicated by him as from James Island. The name has commonly been assumed to apply to small examples of *Geospiza fuliginosa*, and such a small variety has been recognized by some writers, disallowed by others. In the Catalogue of Birds, Sharpe (1888, p. 14) lists two specimens as the types, entered for no obvious reason as from Chatham Island. These two birds (apparently the originals of Gould's description and colored plate; they match the latter very closely) are adult male and female of the form that was later named *Camarhynchus*

*Because Sclater & Salvin described the male first. N.B.K.

prosthemelas by Sclater & Salvin. The male is exceptionally black on the back and the skin is folded so that the white belly is hidden to casual observation. It seems obvious that *Camarhynchus prosthemelas* Sclater & Salvin must become *Camarhynchus parvulus*



+ Camarhynchus p. parvulus

▲ Camarhynchus p. salvini

Fig. 50. Map showing distribution of the subspecies of *Camarhynchus parvulus*. Symbols indicate islands where recorded.

(Gould), with the type locality James Island. As regards the specific identity of Gould's male bird it is of interest to read Sharpe's (*loc. cit.*) brief description and comments.

DESCRIPTION.—Similar to *psittacula, habeli, affinis* and *pauper* in markings and color but much smaller. Shape of bill as in *pauper* but smaller. *Juvenal.*—Young birds at hand are streaked below (no black-headed individuals, as there are in the *pauper* series) and, as in *pauper,* some of these are molting into a plumage that is plain buffy yellow, unmarked, below.

HABITAT.—Wenman, Abingdon, James, Jervis, Seymour, Indefatigable, Duncan, Albemarle, Cowley, Narborough, Barrington, Charles, Gardner-near-Charles.

A total of 277 specimens was collected (nos. 7715-7737, 7739-7820, 7822-7847, 7849-7992, 8349). Specimens were collected on Wenman Island September 24; Abingdon: September 19, 20; James: August and January; Duncan: December 7; Indefatigable: January, July, October, November; Albemarle: March, April, August, November; Charles: February, March, May, June, October.

There are black-headed males in the series representing every month except July, September, and December. The one November example has the bill mostly black; all those collected during January, February, March and April have the bill entirely black; during May, June, and August the bill is mostly light colored, though some are intermediate and one August bird has a jet black bill; bills of October birds are mostly light colored, though some are intermediate. Males that are not black-headed (that is, in exactly the same plumage as females), and the adult females, exhibit the same seasonal change in color of bill.

According to Gifford (1919, p. 250) the breeding season (that is, from the beginning of mating until the period when most of the young are fledged) lasts from early November until early May, so it may be seen that bill color in adult birds practically coincides, the black with the breeding season, light color with the non-breeding season. There are long series of specimens at hand taken from May to November, some of which are obviously young of the year, and many more of which may belong in that category, all with light colored bills. Data given by Rothschild & Hartert (1899, p. 169) regarding bill color in this species, so far as it goes, corroborate my own statements.

The proportion of black-headed males seems to be about the same on each of the four islands that are adequately represented in our collection. On Charles, of the total of 77 apparently mature

males, 33 are black-headed; on Albemarle, 11 out of 26; on Indefatigable, 3 out of 12; on James, 5 out of 10.

I can not trace in our series the nicely graded and defined series of plumages that are described by Ridgway (1901, p. 484) as pertaining to "adult male", "immature male", "young male", "adult female", and "young female". All of the birds at hand that are in juvenal plumage are heavily streaked with dusky below. The few specimens showing the post-juvenal molt are losing the streaks and assuming a plumage that is uniformly buffy yellow on the under parts. Such a plumage, however, does not always follow the post-juvenal molt, for there are breeding birds, both male and female, with black bill, that are streaked on breast and flanks, and are exactly alike. There are more males that are streaked below and more females that are immaculate.

Under *salvini* I am stating my reasons for considering *parvulus* and *salvini* as only subspecifically different. In this connection allusion should be made to six specimens, including one in juvenal plumage, from Albemarle Island (nos. 7867, 7875, 7883, 7909, 7969, 7988), which I have hesitatingly referred to *parvulus*. These birds are appreciably larger than the mode of that form, being about midway in size between *parvulus* and *affinis*. The young bird, even, has a larger bill than black-headed males of *parvulus*.

There are slight average color differences apparent between series from different islands. James Island birds are grayish above, and uniformly so throughout the series. Albemarle and Indefatigable birds are appreciably darker, more greenish, on the back. The Charles Island series (by far the most extensive) exhibits both types of coloration. These differences are most apparent in the adult males.

93. Camarhynchus parvulus salvini Ridgway

Camarhynchus salvini Ridgway, 1894, p. 364 (orig. descr.; Chatham Island); 1897, p. 561; 1901, p. 486.
Geospiza salvini Rothschild & Hartert, 1899, p. 169; 1902, p. 402.
Geospiza prosthemelas salvini Snodgrass & Heller, 1904, p. 287.
Camarhynchus prosthemelas Sundevall, 1871, p. 125, part (Chatham Id.).—Ridgway, 1890, p. 110, part (Chatham Id.).—Gifford, 1919, p. 250, part.

CAMARHYNCHUS SALVINI Ridgway

Type.—United States National Museum, no. 125977; ♂ (in female plumage); Chatham Island; March 30, 1891; C. H. Townsend.

DESCRIPTION.—Similar to *C. p. parvulus*, from which it differs in slightly larger size, in having the plumage throughout strongly tinged with yellowish, and in that the mature male rarely has any black upon head or throat and then only to a limited extent.

HABITAT.—Chatham Island.

One hundred and twenty-six specimens collected, taken during September, October, January, February, and July (nos. 7993-8041, 8043-8061, 8063-8120). Of 69 males just five show more or less black on head and throat, in no case as much as in the maximum reached by *parvulus* on other islands. Ridgway (1901, p. 486) describes the adult male of *salvini* as "apparently without any black on head, neck, or chest." Rothschild & Hartert (1899, p. 169) comment upon the fact that up to that time, out of 74 skins that had been examined by ornithologists, not one black-headed male had been seen. Snodgrass & Heller (1904, p. 287) found one black-headed bird among the five adult males that they collected. Obviously in this form the black-headed condition can not be regarded as normal to all fully adult males. It is a phase of plumage that occurs in a very small percentage of the population, smaller perhaps than is shown by the figures of specimens collected, for black-headed birds would be conspicuous objects to any collector and would certainly be pursued as another bird might not be.

Variation in bill color, dark or light, is as follows. September: out of 9 specimens, one has a dusky bill. October: 43 specimens, 10 with dusky or black bill. January: 37 specimens, 26 with black bill. February: 26 specimens, 22 with black bill. July: 11 specimens, none with black bill. Of the five males with more or less black on head and throat, one, September 10, has a dusky bill; one, October 17, has a dusky bill; one, January 26, has a black bill; one each on July 6 and 7, have the bill light colored.

Salvini, as exemplified in our series, is a recognizable form, closely similar to *C. parvulus parvulus* but differing, except for the detail of the occasional black head, just as described by Ridgway (*loc. cit.*): "larger, more strongly tinged with buffy yellow and more extensively streaked beneath, the adult male apparently without any black on head, neck, or chest." The difference in size between *parvulus* and *salvini* is more evident in the series of prepared specimens than would be expected from the relatively slight differences shown in the table of comparative measure-

ments. *Salvini* is obviously a larger, bulkier bird. Size differences between the two are bridged by individual variants, and considering this variation and the kind and degree of difference between the two, it seems best to consider them as only subspecifically separated.

Specimens of the *Camarhynchus parvulus* group in the Academy Collection and (figures in parenthesis) in the Stanford University Collection

Name	Island	Male (black-headed)	Male (non-black-headed)	Female	Young	Sex undetermined
Camarhynchus p. parvulus	Wenman			2		
Camarhynchus p. parvulus	Abingdon		1	1		
Camarhynchus p. parvulus	James	5(4)	5(1)	4(3)	(5)	2(1)
Camarhynchus p. parvulus	Seymour			1		
Camarhynchus p. parvulus	Indefatigable	3	10	14		
Camarhynchus p. parvulus	Duncan			1	(1)	
Camarhynchus p. parvulus	Albemarle	12(7)	16(1)	27(1)	2(1)	2(1)
Camarhynchus p. parvulus	Narborough			(7)		
Camarhynchus p. parvulus	Charles	36(2)	41(1)	58(3)	8	23
Camarhynchus p. parvulus	Gardner-near-Charles					1
Camarhynchus p. parvulus	Champion					2
Camarhynchus p. salvini	Chatham	5(1)	63(4)	39(2)		9

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF THE SUBSPECIES OF *Camarhynchus parvulus*

MALES

Number of specimens	Name	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
5	Camarhynchus p. parvulus	James	63.4 (62.0-65.0)	37.5 (36.5-38.5)	9.1 (8.5- 9.5)	5.3 (5.0-5.5)	6.7 (6.5-7.2)	5.7 (5.0-6.0)	20.3 (20.0-21.0)	15.7 (15.5-16.0)
10	Camarhynchus p. parvulus	Albemarle	62.0 (61.0-64.2)	37.8 (36.5-40.0)	10.0 (9.0-10.5)	5.6 (5.5-6.0)	7.2 (7.0-7.5)	5.8 (5.5-6.0)	21.2 (20.0-22.0)	16.0 (15.0-16.5)
10	Camarhynchus p. parvulus	Indefatigable	62.3 (61.0-64.0)	38.4 (36.0-40.0)	9.7 (9.0-10.5)	5.8 (5.5-6.0)	7.1 (7.0-7.2)	6.0 (5.5-6.2)	21.0 (20.5-22.0)	16.0 (15.5-16.5)
10	Camarhynchus p. parvulus	Charles	63.9 (61.0-66.0)	40.3 (38.0-42.0)	9.8 (9.5-10.0)	5.5 (5.2-6.0)	7.6 (7.0-8.0)	6.5 (5.0-6.5)	20.5 (19.0-21.0)	16.3 (16.0-16.8)
10	Camarhynchus p. salvini	Chatham	65.1 (63.0-67.0)	40.6 (38.5-43.0)	10.9 (10.2-11.5)	6.1 (6.0-7.0)	7.8 (7.2-8.5)	6.3 (6.2-6.5)	21.8 (21.0-23.0)	16.5 (16.0-17.0)

FEMALES

6	Camarhynchus p. parvulus	James	58.9 (55.0-61.5)	35.6 (34.2-37.0)	10.3 (10.2-10.5)	5.5 (5.0-6.0)	6.9 (6.5-7.2)	5.8 (5.2-6.2)	19.5 (19.0-20.0)	15.3 (15.0-15.5)
10	Camarhynchus p. parvulus	Albemarle	60.2 (57.2-65.0)	37.1 (34.5-42.5)	10.2 (9.2-11.0)	5.8 (5.5-6.2)	7.3 (6.5-7.8)	6.1 (5.5-6.5)	20.3 (19.5-21.2)	16.2 (15.8-16.5)
10	Camarhynchus p. parvulus	Indefatigable	60.5 (58.2-62.5)	36.8 (35.5-38.8)	10.0 (9.0-10.8)	5.7 (5.0-6.2)	7.0 (6.5-7.5)	5.9 (5.5-6.2)	20.2 (19.0-21.0)	16.0 (15.5-16.8)
10	Camarhynchus p. parvulus	Charles	59.7 (58.2-61.5)	36.9 (33.2-38.5)	10.1 (9.2-10.8)	5.6 (5.2-6.0)	7.1 (6.8-7.5)	6.0 (5.8-6.2)	20.0 (19.2-21.2)	15.9 (15.2-16.2)
10	Camarhynchus p. salvini	Chatham	61.4 (60.0-63.5)	37.9 (36.0-39.5)	10.5 (9.5-11.0)	6.1 (5.8-6.2)	7.3 (6.8-7.8)	6.2 (6.0-6.5)	20.6 (19.5-22.0)	15.8 (15.0-16.5)

94. Camarhynchus aureus Swarth

Camarhynchus aureus Swarth, 1929, p. 34.

"*Type.*—Male adult, no. 8121, Mus. Calif. Acad. Sci., collected by E. W. Gifford (orig. no. 1944), January 25, 1906, on Chatham Island, Galapagos Archipelago.

"*Characters.*—Generally similar to *Camarhynchus conjunctus* but with slightly heavier bill and more uniform coloration.

"*Description of type and only known specimen.*—In rather worn plumage. Upper parts faded, but evidently originally dull olive green. Remiges and rectrices dusky, narrowly edged with olivaceous. Closed wings, including coverts, uniform with back. There are faint indications of light tips to the greater and middle wing coverts, and in fresh plumage there may have been discernible wing bars. Below, from bill to and including lower tail coverts, almost uniformly pale yellow, broken only by a slightly mottled appearance on the breast, where the blackish bases of the feathers show through, and with sides of breast and flanks slightly darker. The yellow of the under surface spreads over the sides of neck and face, over cheeks and ear coverts, to meet a broad yellow superciliary line that extends from bill and forehead back to a point well behind the eye. Bill blackish, with edges of upper and tip of lower mandible slightly paler. Feet and legs blackish. . . .

"These two new forms from Charles and Chatham islands, *conjunctus* and *aureus*, appear to be closely related, and it might be that adequate series of the two would show plumage variation that would bring them even closer together than is indicated by the scanty material now available. The differences apparent in the skins at hand, however, especially as two rather widely separated islands are represented, are such as to justify the present separation of the two forms.

"In these two puzzling species (*conjunctus* and *aureus*) resemblance to *Certhidea* lies in general size and form and in certain peculiarities of marking. Resemblance to *Camarhynchus* appears in the more finch-like bill and in general coloration, which in *conjunctus* and *aureus* is very close to the unstreaked 'immature' plumage of *Camarhynchus parvulus*. There may be significance in the fact that *C. parvulus salvini* from Chatham Island is strongly tinged with yellow, just as is the one specimen of *C. aureus* from that island.

"It is a debatable point as to whether *conjunctus* and *aureus*

should not be segregated together in a separate genus. Such a genus would have to be based upon the combination of certain characters, some of which in other species occur in *Camarhynchus*, some in *Certhidea*, and the genera already described in the Geospizidæ are so nearly arbitrary in their nature that it seems to me undesirable to add another genus of uncertain definition" Swarth (1929, p. 34-35).

95. Camarhynchus conjunctus Swarth

Camarhynchus conjunctus Swarth, 1929, p. 33.

"*Type.*—Male adult, no. 7713, Mus. Calif. Acad. Sci., collected by R. H. Beck, February 28, 1906, on Charles Island, Galapagos Archipelago.

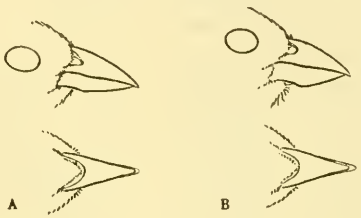


Fig. 51. a, Camarhynchus conjunctus, male (no. 7713, type), Charles; b, Camarhynchus aureus, male (no. 8121, type), Chatham. Natural size.

"*Characters.*—Intermediate in certain outstanding features between *Camarhynchus* and *Certhidea*. In measurements and in bulk lies between the maximum reached in *Certhidea* and the minimum in other species of *Camarhynchus*. The bill in particular is intermediate in shape and size between those of typical *Certhidea* and typical *Camarhynchus*.

"*Description of type.*—In fresh, unworn plumage. Upper parts generally dull olive green, feathers of pileum with dusky centers, giving a blackish appearance to top of head. Sides of head like back; eyelids and faint superciliary line pale yellowish. Remiges and rectrices dusky, edged with olivaceous. Greater and middle wing coverts like back, narrowly edged with yellowish, producing two poorly defined wing bars. Below greenish yellow, paler than back. Sides of breast and flanks, and lower tail coverts, tinged with brownish; middle of belly pale yellowish. Chin and throat

indistinctly marked with tawny of the same shade as is characteristic of the throat patch in species of *Certhidea*. Feathers of throat and upper breast black-centered, producing a streaked appearance, the general effect of which is of poorly defined black lines surrounding a rather nebulous tawny throat patch. 'Bill black; legs dark brown; testes large' (collector's notation on label).

"A second specimen, also an adult male, collected by Beck on the same day, is in rather more worn plumage. Color of upper parts is about as in the type, but below it is paler colored, more whitish and with less of the greenish hue. The black streaks on the breast are obscurely indicated, and the tawny on the throat is washed out and but faintly discernible. The rufous is more widespread than on the type, though, spreading to the sides of the head and invading even the superciliary line. 'Bill black, iris dark brown; legs dark brown; testes large' " (Swarth, 1929, p. 33).

Gifford's field note book, under date of February 28, 1906, contains the following entry pertaining to these birds, which, it is interesting to note, he designated "*Geocerthidea*": "Beck took two birds resembling the one I took on Indefatigable on January 18 [= *Cactospiza giffordi*]. They had similar bills, intermediate between *Cactospiza* and *Certhidea*, and had the reddish-brown on the throat, as my bird did, and as is common to *Certhidea*. Their sexual organs were well-developed. These birds were considerably smaller than the Indefatigable kind." Elsewhere in the note book there is an entry to the effect that they were found above 1000 feet altitude.

MEASUREMENTS IN MILLIMETERS OF *Camarhynchus aureus* AND *G. conjunctus*

C.A.S. No.	Sex Age	Species	Locality	Date	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of bill at base	Tarsus	Middle toe with claw
8121[1]	♂ ad.	Camarhynchus aureus	Chatham Id.	Jan. 25, 1906	58.0	35.0	9.0	6.0	5.5	5.5	21.0	16.5
7713[1]	♂ ad.	Camarhynchus conjunctus	Charles Id.	Feb. 28, 1906	59.0	40.0	10.0	6.2	5.2	5.0	20.0	15.0
7714	♂ ad.	Camarhynchus conjunctus	Charles Id.	Feb. 28, 1906	58.2	38.5	9.5	6.0	5.8	5.0	21.0	17.0

[1] Type

Genus Cactospiza Ridgway

Cactospiza Ridgway, Proc. U. S. Nat. Mus., XIX, no. 1116, March 15, 1897, p. 546. (Type, *Cactornis pallidus* Sclater & Salvin.)

Medium sized Geospizidæ (wing 64-77 mm.); coloration plain gray, olivaceous or dusky, with no conspicuous markings, one species with faint chestnut markings on throat; bill relatively slender, "tanager-like," culmen convex, gonys slightly convex; relative length of "middle toe with claw" to tarsus about 8.5 : 10.

Cactospiza was proposed by Ridgway (*loc. cit.*) as a subgenus under *Camarhynchus*, but was in a later paper (1901, p. 476) sunk into the synonymy of the latter name. Rothschild & Hartert (1899, p. 152) and Snodgrass & Heller (1904, p. 273) object to the generic segregation of this group of species, though the last mentioned authors use the name *Cactospiza* as a subgenus. It is partly on the characters of the birds in question that those several authors merge all of the Galapagos "finches" into the one genus *Geospiza*, the assumption being that *Cactospiza* forms a link between *Geospiza* and *Camarhynchus*. The resemblance lies in the fact that both *G. scandens* and *C. pallida* are slender-billed birds, but I am convinced that this is no more than a fortuitous resemblance, due to the parallel development of rather remote strains. Shape of bill in the two groups differs appreciably in detail, *pallida* with a slightly convex gonys, and the whole bill rather tanager-like in outline, *scandens* with the gonys straight (as in other species of *Geospiza*) and the shape of the bill suggestive of the Icteridæ. In *pallida* and related forms coloration is alike in both sexes, and no black markings are normally present, while in *scandens* and allied species there is found the utmost development of black coloration, with the females nearly as black as the males, as is not the case in most species of *Geospiza*.

96. Cactospiza pallida pallida (Sclater & Salvin)

Cactornis pallida Sclater & Salvin, 1870, pp. 323, 327 (orig. descr.; Indefatigable Id.).—Salvin, 1876, p. 487, fig.—Sharpe, 1888, p. 20.—(?) Ridgway, 1890, p. 109 (James Id.).

Camarhynchus pallidus Ridgway, 1897, p. 565; 1901, p. 487.—Gifford, 1919, p. 253.

Geospiza pallida Rothschild & Hartert, 1899, p. 165; 1902, p. 399, part.—Snodgrass & Heller, 1904, p. 277, part.

C[actornis]. hypoleuca Ridgway, 1890, p. 109, in text (orig. descr.; James Id.).

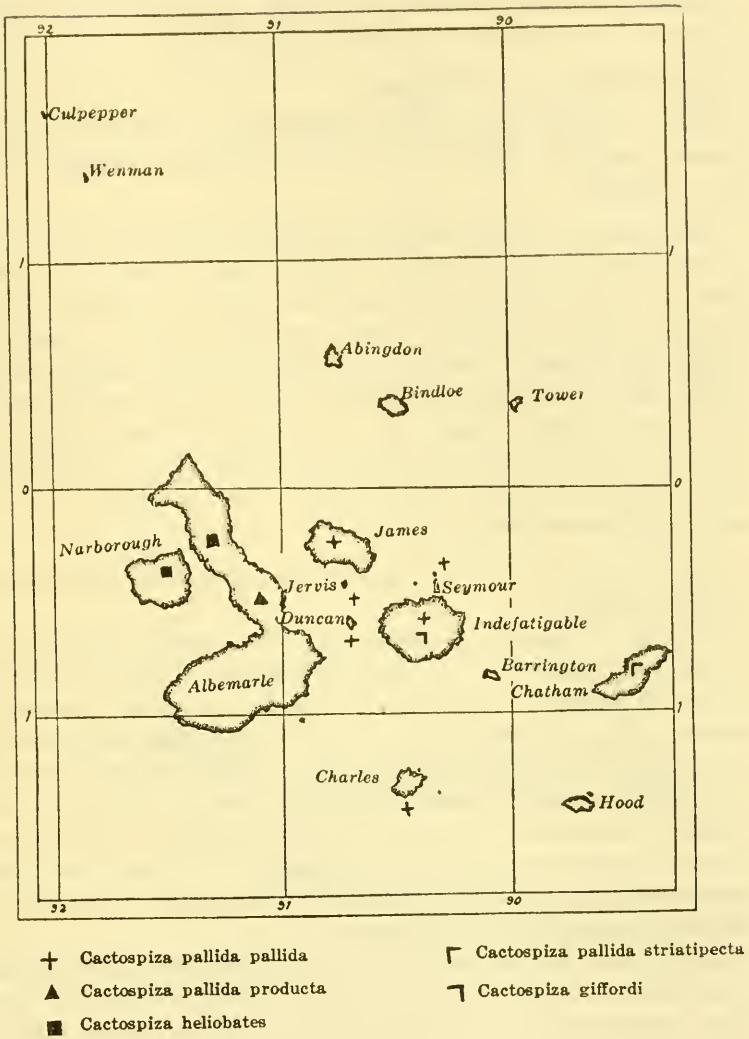


Fig. 52. Map showing distribution of the species and subspecies of *Cactospiza*. Symbols indicate islands where recorded.

CACTORNIS PALLIDA Sclater & Salvin

Cotype.—British Museum, no. 85.12.14.562; ♂; Indefatigable Island; September 9, 1868; Dr. A. Habel.

Cotype.—British Museum (no catalogue number); ♀; Indefatigable Island; September 14, 1868; Dr. A. Habel.

No. 85.12.14.562 indicated by Sharpe (1888, p. 21) as "type of species" and now bearing a red "type label."

Cactornis hypoleuca Ridgway

Type.—United States National Museum, no. 115997; ♂; James Island; April 11 (1888); U. S. Fish Commission, Voyage of Albatross, 1887-88.

Description.—Sexes alike; bill slender, depth at base less than distance from nostril to tip of maxilla. Top of head dirty gray; back olivaceous brown, dorsum with faintly indicated darker streaks, rump immaculate; remiges and rectrices dusky, narrowly edged with olivaceous on outer edges; wing coverts dusky, broadly edged with olivaceous; lores, and a poorly defined area about the eye, dirty whitish; cheeks and ear coverts, mixed whitish and olivaceous; chin and throat almost pure white; rest of ventral surface of body whitish, strongly tinged with yellowish or buffy; under tail coverts buffy.

Habitat.—James, Jervis, Seymour, Indefatigable, Duncan, and Charles islands.

*Cactospiza pallida** (including the three forms, *pallida*, *producta*, and *striatipecta*) is represented in the Academy collection by 163 specimens. I have included under *C. pallida pallida* the specimens from James, Jervis, Seymour, Indefatigable, Duncan, and Charles islands, though in at least some of these series there are minor features apparent that might serve as bases for nomenclatural distinctions. *Cactornis pallida* Sclater & Salvin was based upon specimens from Indefatigable. We have fairly adequate series from James, Indefatigable, Duncan, and Chatham, and abundant material from Albemarle.

Birds from Chatham and Albemarle are sufficiently differentiated to justify the use of separate names, as indicated beyond. Birds from Indefatigable are characterized by a rather strong tinge of olive yellow that suffuses the entire plumage, and by absence of all but the faintest indications of striation below. James Island birds are on the average appreciably more gray, a trifle more streaked on the breast, and have a slightly longer wing. Ridgway (1890, p. 109, in text) applied the name *hypoleuca* to the James Island form on the basis of just these differences. On

*The Academy series of the three subspecies of *C. pallida* and *C. heliobates* are catalogued together, mixed, under the inclusive numbers 7523-7588, 7590-7712.

one adult male in the Stanford University collection (no. 4591, James Island) the breast streaks are developed so as to form a black blotch on the lower throat and upper breast. Duncan Island birds are tinged with olive yellow, as are the Indefatigable birds, but are paler colored. These are average differences that are appreciable in assembled series from the several islands, but they are not present to a distinguishable degree in all individuals. The few specimens from Charles and Jervis islands are not peculiar in any way, but it would require larger series to bring out the sort of variation that appears in our array of skins from the other islands.

The bill is dark or light colored, or of an intermediate hue, according to season, December and January birds being mostly

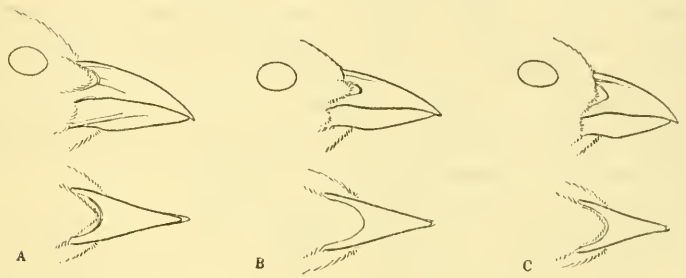


Fig. 53. Cactospiza pallida, males: a, C. p. pallida (no. 7619), James; b, C. p. producta (no. 7697), Albemarle; c, C. p. striatipecta (no. 7681), Chatham. Natural size.

black-billed, July and August specimens yellow-billed. Specimens from James Island were collected during August, December, and January; from Jervis, December 20; from Indefatigable, July, October, November; from Seymour, July 26; from Duncan, August and December; from Charles, October 11. None of these show any sign of molt.

97. Cactospiza pallida producta (Ridgway)

Camarhynchus productus Ridgway, 1894, p. 364 (orig. descr.; Albemarle Id.); 1897, p. 566.—Hartert, 1919, p. 153 (particulars of type specimen, in Rothschild Museum).

Camarhynchus pallidus Ridgway, 1901, p. 487, part.

Geospiza pallida Rothschild & Hartert, 1899, p. 165, part.—Snodgrass & Heller, 1904, p. 277, part.

CAMARHYNCHUS PRODUCTUS Ridgway

Type.—Rothschild Museum; ♂ ; Albemarle Island; July 31, 1891; Dr. G. Baur; orig. no. 404.

DESCRIPTION.—Exactly like *C. pallida pallida* in coloration but with slightly smaller bill.

HABITAT.—Albemarle and (presumably) Narborough islands.

The Academy series includes 118 skins from Albemarle Island. Gifford (1919, p. 254) reports *pallida* from Narborough, but no specimens were collected there and so far as I know there are no skins extant from that island. It is a fair assumption that the form on Narborough would be the same as on Albemarle. *Producta* was described by Ridgway (1894, p. 364) as differing from *pallida* in being smaller (the bill especially) and deeper colored. Ridgway later (1901, p. 489) tentatively placed *producta* as a synonym of *pallida*, and no other writer has recognized the form. It is admittedly a slightly differentiated race, but may be permitted to stand on the basis of the small bill, which is an appreciable and fairly constant character (see table of measurements). The supposed color difference is non-existent.

Our large series of specimens suffices to show the essential features of this bird. The sexes are alike; I can not discern a particle of color difference between them. Compared with other forms of *pallida*, *producta* averages rather pale colored, much like the birds from Duncan, but the range of variation in the series includes a few specimens that are darker even than typical *pallida*. There is an almost total absence of striation on the breast. In only a few cases is it indicated, and then but slightly. There is one specimen entirely in juvenal plumage and others in the post-juvenal molt. The young bird is heavily streaked below and is darker colored, more blackish than in subsequent stages. Molting juveniles are assuming a buffy yellow plumage that is indistinguishable from the adult. The post-juvenal molt, as well as the annual molt of the adults, was taking place during March and April. In the young bird the bill is light colored. In later stages black bills predominate in specimens collected from early November to early March, and there are one or two black-billed specimens collected on May 1. A large part of the series of *producta* was collected in August, and of these the birds taken early in the month have yellowish bills, while some of those taken late in the month have the bill black or beginning to turn dusky.

98. Cactospiza pallida striatipecta, new subspecies

Type.—Male adult, no. 7637, Mus. Calif. Acad. Sci., Chatham Island, Galapagos Archipelago; January 29, 1906; collected by R. H. Beck.

CHARACTERS.—A slightly differentiated form of *Cactospiza pallida*, distinguished by characters of color and structure. Compared with *pallida* and *producta* it is more conspicuously streaked below, and the bill is shorter and heavier.

HABITAT.—Chatham Island.

The Academy series consists of ten specimens, six adult males (one collected September 10, one January 26, four January 29), two adult females (January 29), one apparently immature female (September 8), and one male in juvenal plumage (February 23).

Some specimens of *pallida* from James Island show more ventral streaking than some individuals of *striatipecta*, but the streaked condition is more general and the streaks more sharply defined in the latter series. Just one of the ten specimens is unstreaked below. The best character of the Chatham Island form, however, lies in the bill, which is shorter and heavier than in the other subspecies of *pallida*. Of the seven January specimens, four have the bill black, in three it is dusky. In the September taken male it is dusky; in the September taken female (possibly an immature bird) it is yellowish. In the juvenile it is yellowish. The young bird is lightly streaked below, on a ground that is whitish with a faint yellowish suffusion. It is less heavily streaked than young of *pallida*, in which the adult is immaculate.

The Academy expedition was the first to obtain a series from Chatham Island. Gifford, in his published field notes upon this collection (1919, p. 254) remarks that: "On Chatham they were taken in the humid zone just below the sugar plantations and in the region intermediate between the humid and arid." The only previous allusion to the occurrence of *pallida* on Chatham is the following statement by Rothschild & Hartert (1899, p. 166): "There is also a skin taken out of a jar of spirits said to contain Chatham Island birds only, collected by Messrs. Baur & Adams, but we are inclined to believe that this specimen has by mistake found its way into the Chatham jar." I have seen this bird, which seems without doubt to be of the Chatham Island subspecies.

99. Cactospiza giffordi Swarth

Cactospiza giffordi Swarth, 1929, p. 32.

"*Type.*—Male adult, no. 7522, Mus. Calif. Acad. Sci., collected by E. W. Gifford (orig. no. 1900), January 18, 1906, on Indefatigable Island, Galapagos Archipelago.

"*Characters.*—Evidently nearly related to the *pallida-heliobates* group, but much smaller and with more slender bill than any other described form in that group.

"*Description of type and only known specimen.*—In rather worn plumage. Above brownish, about as in the darker examples of *pallida*, with an olivaceous tinge. Top of head slightly darker than dorsum. A poorly defined superciliary stripe of yellowish from nostril to posterior corner of eye. Sides of head dirty brownish; a poorly defined grayish spot on lower eyelid. Remiges and rectrices dusky, with narrow edgings of greenish olive; under

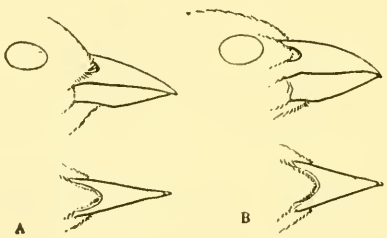


Fig. 54. a, Cactospiza giffordi, male (no. 7522, type), Indefatigable; b, Cactospiza heliobates, male (no. 4186, coll. Stanford Univ., type), Albemarle. Natural size.

wing coverts strongly tinged with yellow. Under parts of body and lower tail coverts plain, unstreaked; whitish, strongly tinged with yellow. Sides of breast and flanks grayish brown. On chin and throat irregular flecks of the tawny color characteristic of the throat color in species of *Certhidea*. Bill black; feet dusky 'Testicles very large' (collector's notation on label)" (Swarth, 1929, p. 32).

"I obtained one bird at about 350 feet elevation which seemed to be intermediate between *Certhidea* and *Geospiza pallida*. It was feeding like a *Geospiza pallida* on a branch of a tree" (E. W. Gifford's manuscript field note book).

100. Cactospiza heliobates (Snodgrass & Heller)

Geospiza heliobates Snodgrass & Heller, 1901, p. 96 (orig. descr.; Tagus Cove, Albemarle Island); 1904, p. 279.—Rothschild & Hartert, 1902, p. 400.

GEOSPIZA HELIOBATES Snodgrass & Heller

Type.—Leland Stanford Junior University, no. 4186; ♂ ad.; Tagus Cove, Albemarle Island; January (wrongly given as June in the original description) 24, 1899; R. E. Snodgrass and E. Heller (Hopkins-Stanford Galapagos Expedition); orig. no. 123.

"*Description of the type.*—Above dark brown with an olive tinge on the rump, all of the feathers of the dorsum with narrow pale olive-grayish edgings. Wing and tail feathers lighter, more smoky brown. Lores, sides of head and underparts dirty buffy-gray, brownish-buff on the sides and flanks. Lores spotted with brown. Feathers of the breast and sides with dark brown central areas forming spots of the same color. Tips of the greater and middle wing-coverts rather indistinctly brownish-rufous, forming two inconspicuous cross bands. Under wing-coverts grayish; under tail coverts brownish-buff with pale grayish edgings. Under surface of wing and tail feathers grayish brown. Bill black. Feet dark brown" (Snodgrass & Heller, 1901, p. 96).

Adult female.—Closely similar to the male but on the average with less indication of ventral streaking. In fresh plumage almost immaculate below.

Juvenal.—Darker than the adult, slaty black in general appearance, with faintly indicated olivaceous edgings on back, wings and tail. Head and chest almost solidly blackish; rest of under parts, except mid-belly, heavily streaked with blackish.

HABITAT.—Albemarle and Narborough islands.

Represented in the Academy collection by twenty-six specimens, including thirteen adult males, eight adult females, and five males in juvenal plumage. One was collected at "S. Albemarle," November 1. The others were all taken on North Albemarle, at the two closely adjacent localities, Tagus Cove and Turtle Point, during March and April. It is a question as to what is the proper way to treat this form nomenclaturally. The relationships of *heliobates* are obviously with *pallida*, and the nature and amount of differences that differntiate the two are such as to argue for sub-

specific treatment. However, as *heliobates* and a form of *pallida* (*producta*) occur on the same island I have regarded them as distinct species.

Heliobates was first described as resembling *pallida* in color but having a smaller bill; subsequently Rothschild & Hartert (1902, p. 400) pointed out the fact that in *heliobates* the breast is striped, as ordinarily it is not in *pallida*. In addition, the general color is different, as between *heliobates* and any form of *pallida*, a difference that is readily appreciable in fresh plumage but that tends to become obscured when the feathers are worn.

Cactospiza pallida is a yellowish colored bird, *heliobates* a slaty colored one. The general color of *heliobates* above is dark, almost uniformly blackish. The feathers on the dorsum show but a faint indication of olivaceous edges, the dark centers producing a correspondingly faintly streaked effect. The under parts are whitish, the feathers on breast and sides conspicuously streaked, with dark centers and whitish edges. As the plumage becomes worn the ventral streaks are more and more conspicuous, sometimes with the effect of an almost solidly black breast. The juvenal plumage is as dark as in the adult, and even more heavily streaked below. The young birds have a distinctly black headed appearance. November, March, and April adults at hand are black-billed, with one exception (March 30), in which the lower mandible is light colored. In juveniles the lower mandible is yellowish, the upper slightly dusky. Three specimens collected one on March 30, two on April 18, are apparently young birds just finished with the post-juvenal molt, and in these the bill is light colored.

Specimens of the species and subspecies of *Cactospiza* in the Academy Collection and (figures in parentheses) in the Stanford University Collection

Name	Island	Male	Female	Young	Sex undetermined
Cactospiza p. pallida	James	8(1)	5		
Cactospiza p. pallida	Jervis	2			
Cactospiza p. pallida	Seymour	1			
Cactospiza p. pallida	Indefatigable	4	7		
Cactospiza p. pallida	Duncan	6	1		
Cactospiza p. pallida	Charles	1			
Cactospiza p. producta	Albemarle	63	36	9	10(1)
Cactospiza p. striatipecta	Chatham	6	3	1	
Cactospiza heliobates	Albemarle	11(14)	7(12)	8(4)	
Cactospiza heliobates	Narborough	(2)	(1)	(4)	(1)
Cactospiza giffordi	Indefatigable	1			

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF SPECIES AND SUBSPECIES OF *Cactospiza*

MALES

Number of specimens	Name	Island	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
8	Cactospiza p. pallida	James	75.0 (73.5-77.0)	46.0 (43.0-48.0)	16.7 (16.0-17.2)	9.6 (9.0-10.0)	9.0 (8.5-9.5)	7.2 (7.0-7.5)	24.3 (24.0-25.0)	20.2 (19.0-21.0)
2	Cactospiza p. pallida	Jervis	70.0-71.0	42.0-43.5	16.0-16.0	9.0- 9.5	8.0-9.2	7.0-7.0	24.0-24.0	20.5-21.0
5	Cactospiza p. pallida	Indefatigable	71.0 (71.0-72.5)	44.2 (42.0-46.0)	16.3 (16.0-17.0)	9.3 (9.0-10.0)	8.8 (8.5-9.0)	7.1 (7.0-7.2)	23.5 (23.0-24.5)	19.7 (17.5-21.0)
6	Cactospiza p. pallida	Duncan	71.0 (70.0-72.5)	42.6 (40.0-45.5)	15.4 (15.0-16.2)	9.2 (8.5-10.0)	8.6 (8.2-9.0)	7.1 (7.0-7.2)	23.6 (23.0-24.0)	20.1 (19.0-21.0)
1	Cactospiza p. pallida	Charles	69.5	43.2	16.5	10.0	8.2	7.0	24.2	19.0
10	Cactospiza p. producta	Albemarle	69.9 (67.5-72.0)	43.3 (41.0-45.2)	14.9 (14.0-15.5)	8.4 (8.0- 8.8)	7.8 (7.0-8.5)	6.8 (6.2-7.0)	23.4 (23.0-24.0)	18.8 (17.0-20.0)
6	Cactospiza p. striatipecta	Chatham	70.3 (69.0-71.5)	44.1 (42.0-47.0)	13.9 (13.5-14.2)	7.9 (7.5- 8.0)	8.3 (8.0-8.5)	6.9 (6.5-7.2)	23.1 (22.5-24.0)	19.8 (17.5-21.0)
10	Cactospiza heliobates	Albemarle	71.5 (70.0-73.5)	43.4 (42.2-45.2)	13.8 (12.2-14.5)	7.8 (7.5- 8.0)	7.6 (7.2-8.0)	6.7 (6.2-7.0)	22.0 (21.0-23.0)	19.1 (18.0-20.0)
1	Cactospiza giffordi	Indefatigable	64.0	41.5	13.5	8.2	6.5	5.0	22.5	17.0

FEMALES

5	Cactospiza p. pallida	James	70.8 (69.0-72.0)	43.3 (41.5-45.0)	16.4 (16.0-17.0)	9.1 (9.0- 9.2)	8.7 (8.5-9.2)	7.5 (7.2-8.0)	23.6 (23.0-24.0)	20.6 (20.0-21.5)
7	Cactospiza p. pallida	Indefatigable	68.9 (67.0-70.0)	41.0 (37.0-43.0)	15.8 (15.0-17.0)	9.2 (9.0-10.0)	8.5 (8.2-9.0)	7.0 (6.8-7.2)	23.1 (22.0-24.2)	19.7 (19.0-20.2)
1	Cactospiza p. pallida	Duncan	66.0	43.2	15.8	8.8	8.0	7.2	23.2	19.2
10	Cactospiza p. producta	Albemarle	68.5 (66.0-72.0)	41.7 (39.5-43.5)	14.9 (14.0-16.2)	8.7 (8.2- 9.2)	7.7 (7.2-8.5)	6.6 (6.2-7.2)	22.7 (22.0-23.5)	19.2 (18.2-20.5)
3	Cactospiza p. striatipecta	Chatham	69.1 (68.0-70.2)	42.1 (41.2-43.2)	14.9 (14.5-15.5)	8.2 (8.0- 8.5)	8.6 (8.2-9.0)	7.0	22.7 (21.5-23.5)	19.9 (19.2-20.5)
10	Cactospiza heliobates	Albemarle	69.1 (65.0-72.2)	40.6 (37.0-43.2)	13.7 (12.0-14.5)	7.9 (7.5- 8.0)	7.5 (7.0-8.5)	6.6 (6.2-7.0)	22.0 (20.5-23.0)	18.9 (17.2-20.5)

Genus Certhidea Gould

Certhidea Gould, Proc. Zool. Soc. London, pt. V, 1837, p. 7. (Type, *C. olivacea* Gould.)

Small Geospizidæ (the smallest of the family), with slender, acute bill (more so than in any other of the family); coloration usually plain, without striking color patterns, ranging from pale gray (almost white) to brownish, olive and yellowish; a tawny throat patch appears in greater or less distinctness in most of the forms. (See Ridgway, 1902, p. 761, for structural details.)

Represented in our collection by 430 specimens. In this material I find myself able to recognize eight forms of the genus. The most satisfactory nomenclatural treatment of these several forms is a far more difficult matter to determine upon than is the recognition of the features that characterize birds from the different islands, and any system at all that may be adopted is open to some adverse criticism. *Certhidea* occurs throughout the Galapagos Archipelago, upon all of the larger islands and on most of the small ones. Island variation affects color and pattern almost entirely, structural differences being very slight.

Variation between islands, and variation in series from any one island, is such as to suggest subspecific treatment of the different forms, and, in fact, it would be quite possible and logical, upon the basis of overlapping through individual variation, to regard the group as a monotypic genus and to treat all of the forms of *Certhidea*, widely different as some of them are, as subspecies of one species, *Certhidea olivacea* Gould. To do this, however, would in some instances necessitate the acceptance of intergradation between series from widely separated islands, with diverse forms interposed between, and it seems doubtful if such an arrangement would indicate in fact the actual relationships and the true manner of divergence between the several forms, as it would appear to do.

It would be possible again to make a fairly satisfactory arrangement of the forms in groups. One species, *C. olivacea*, with several possible subspecies, would occupy the central islands (James, Jervis, Albemarle, Narborough, Duncan, Indefatigable, and Charles); another, *C. fusca*, with subspecies, would occupy outlying islands north and east (Culpepper, Wenman, Abingdon, Bindloe, Tower, Barrington, and Hood). The bird of Chatham Island (easternmost of the archipelago), *C. luteola*, would then be regarded as a third species; its resemblances lie toward typical *C. olivacea*. The

objections to this course are about the same as those of the first alternative, of regarding all the forms as subspecies of one species. The group divisions would have to be arbitrary to a certain extent.

One other method of treatment remains, that adopted by Ridgway (1902, p. 761), to regard each distinguishable form as a separate species. There are strong objections to this procedure also, for between certain of the described forms there exists individual intergradation just as we find between mainland birds that are accorded subspecific status, and there is also great variation in the amount of difference between different named forms. Nevertheless, despite the strong predilection that I felt for subspecific

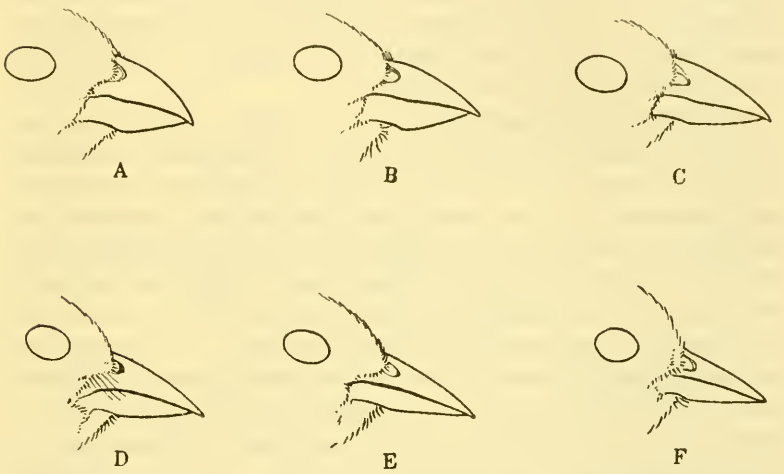


Fig. 55. Species of *Camarhynchus* and *Certhidea* showing intergradation in bill structure between the two genera. Slightly larger than natural size. A, *Camarhynchus parvulus parvulus* (no. 7756). B, *Camarhynchus aureus* (no. 8121). C, *Camarhynchus conjunctus* (no. 7713). D, *Certhidea ridgwayi?* (no. 4862). E, *Certhidea ridgwayi* (no. 4643). F, *Certhidea olivacea* (no. 4538).

treatment at the outset, it is Ridgways' course, of using a binomial for each form, that I have finally adopted. As a matter of fact, the outcome of a careful weighing of pros and cons in the different possible nomenclatural methods of treatment of *Certhidea*, is an almost total abandonment on my part of any attempt at expressing relationship through names. Binomials are used simply as a means of referring to the *Certhidea* population on the several islands or aggregation of islands that are inhabited by distinguishable forms.

A summary of the course of variation in *Certhidea* will perhaps help toward an understanding of the sort of complications that are encountered. There is one set of facts, and apparently just one, that can serve as a point of departure. These are the facts tending to show that it is on Charles Island that we must look for the best evidence of close relationship between *Certhidea* and *Camarhynchus*. A species of *Camarhynchus* (*C. conjunctus*) on Charles Island shows unmistakable likeness toward *Certhidea*, and the Charles Island *Certhidea* (*C. ridgwayi*) differs from other *Certhidea* in having a larger bill, in the juvenal plumage being distinctly streaked, and in traces of streaking dorsally remaining in older plumages, all of these features showing relationship toward *Camarhynchus*. The Certhidean resemblances of *ridgwayi* are toward *olivacea*, and to understand this approach a second start must be made from typical *olivacea*.

James Island is accepted as the type locality of this form, and I have lumped the birds from Jervis, Indefatigable, Seymour, Duncan, Albemarle, and Narborough islands under the same name. As it happens, it is on James Island that *olivacea* characters are developed to their greatest extreme; on some of the other islands there is variation from this standard almost sufficient to justify recognition subspecifically. Perhaps the outstanding feature of this "group" is the cinnamon-tawny throat patch, of most frequent occurrence and of greatest intensity on James Island specimens. Birds from Albemarle have this marking less deeply colored, on those from Indefatigable it is still more poorly defined, and on Charles Island birds (*ridgwayi*) this feature is even less distinct, though present, more or less dilute, on practically all our adult males. So, in a graded series resemblances can be traced in this regard, island by island, between the two extremes, on James and on Charles.

North and east of the *olivacea* aggregation is the "*Certhidea fusca* group," characterized by duller, more uniform coloration. Curiously, it is the northernmost, most remote birds, those on Culpepper and Wenman (*becki*), that show the first step from *olivacea*. In *becki* there is still a slight trace of the tawny throat of *olivacea*, and the general olivaceous color is not unlike that of James Island birds. The form on Abingdon and Bindloe islands (*fusca*) is much less olivaceous, being decidedly leaden gray in general color tone. The throat patch has nearly disappeared; in many cases

it is quite gone, and when present at all it is merely as a pale yellowish suffusion. The Tower Island bird (*mentalis*) exhibits

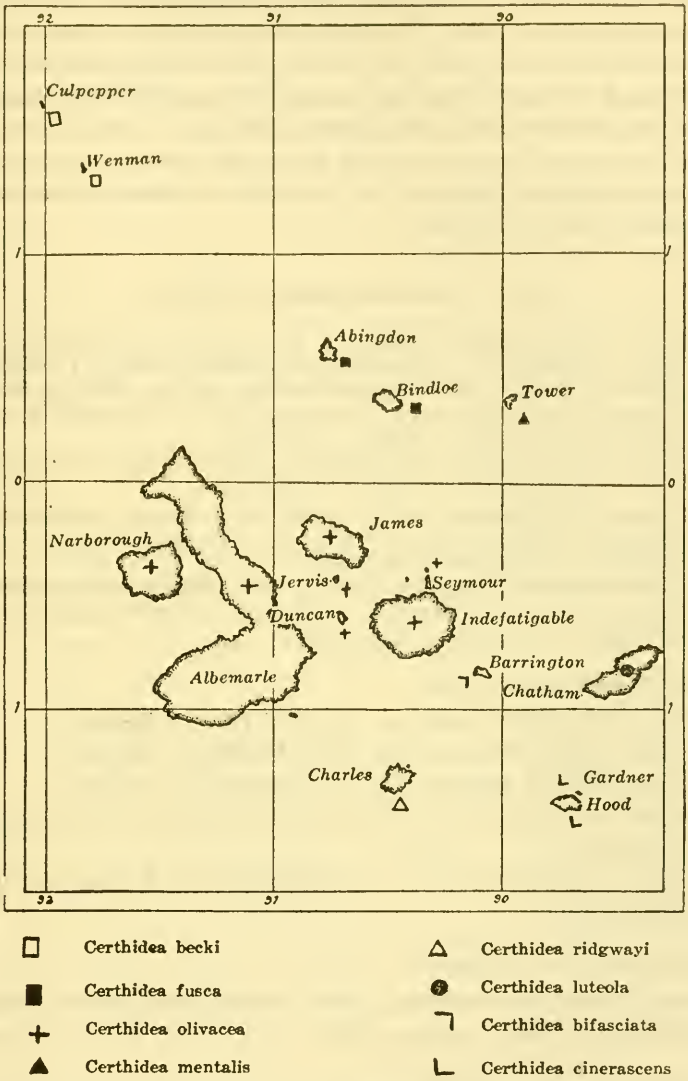


Fig. 56. Map showing distribution of the species of *Certhidea*. Symbols indicate islands where recorded.

an accentuation of the features of *fusca*, being still more grayish; the throat patch is about the same. On Hood Island, farthest to

the southward, the form *cinerascens* (superficially closely similar to *fusca*) passes from grayish to whitish, and the last vestige of color on the throat is lost. On Barrington Island the form *bifasciata* exhibits the extreme of whitish coloration in the genus, being pure white below and pale gray above. On Chatham, the easternmost island of the archipelago, a distinctly marked form, *luteola*, occurs, an intensely olive and yellow colored bird. This olivaceous coloration is an intensification of the shade seen in more richly colored examples of *olivacea*, but in *luteola* the tawny throat patch of *olivacea* does not appear.

101. Certhidea olivacea Gould

Certhidea olivacea Gould, 1837a, p. 7 (orig. descr.; Galapagos Ids.); 1841, p. 106, pl. 44 ("Chatham and James islands").—Sclater & Salvin, 1870, p. 323 (Indefatigable).—Salvin, 1876, p. 476.—Sclater, 1886, p. 28, part.—Ridgway, 1890, p. 105; 1897, p. 498; 1902, p. 763.—Gifford, 1919, p. 220, part.

Certhidea olivacea olivacea Rothschild & Hartert, 1899, p. 148; 1902, p. 384.—Snodgrass & Heller, 1904, p. 350.

Certhidea salvini Ridgway, 1894, p. 358 (orig. descr.; Indefatigable Id.); 1897, p. 500.—Hartert, 1919, p. 172 (particulars of type specimen, in Rothschild Museum).

Certhidea albemarlei Ridgway, 1894, p. 360 (orig. descr.; Albemarle Id.); 1897, p. 500.—Hartert, 1919, p. 172 (particulars of type specimen, in Rothschild Museum).

CERTHIDEA OLIVACEA Gould

Cotype.—British Museum, no. 55.12.19.120; C. Darwin.

Cotype.—British Museum, no. 55.12.19.127; C. Darwin.

Cotype.—British Museum, no. 55.12.19.164; C. Darwin.

Neither sex, locality, nor date are upon the labels of the above three specimens.

Cotype.—British Museum, no. 1837.2.21.408; Galapagos; Burnett and Fitzroy.*

CERTHIDEA SALVINI Ridgway

Type.—Rothschild Museum; ♂ ad.; Indefatigable Island; August 6, 1891; Dr. G. Baur; orig. no. 438.

CERTHIDEA ALBEMARLEI Ridgway

Type.—Rothschild Museum; (im., sex?); Albemarle Island; July 21 (1891); Dr. G. Baur; orig. no. 633.

In the description of this species Ridgway (1894, p. 360) gives

*James Island. Not a cotype. N.B.K.

the original number as 595 (see Hartert, 1919, p. 172), probably a slip of the pen, but suggesting also the possibility of the existence of another specimen, bearing that number.

Certhidea olivacea was described by Gould (1837a, p. 7) as from the "Galapagos Islands", no type indicated; described and figured later (1841, p. 106, pl. 44), and assumed to be from Chatham and James. In the British Museum there are four specimens that may be regarded as co-types, three collected by Darwin, one by Burnett and Fitzroy. Two of the Darwin specimens are "dismounted", with glass eyes and wired legs, and all four are dingy and discolored in appearance. Only one shows even a trace of cinnamon on the throat, a marking that is conspicuously present in Gould's colored plate, and in three of the four the bill is appreciably heavier than the average in James Island birds. Despite discrepancies (and apparently none of these birds is the original of Gould's plate) they are more nearly like James Island birds than any others, and James Island must be accepted as the type locality.

Description.—Adult male (James Island): Upper parts generally ranging (in different individuals) from drab to buffy brown, tending toward grayish on top of head, toward olivaceous on dorsum and rump. Exposed portions of wing coverts, remiges and rectrices of the same olive brown coloration. Lores, superciliary stripe, circle about eye, throat and upper breast, forming a fairly well defined area, vinaceous tawny in highly marked individuals, and ranging through paler stages to yellowish white, uniform with rest of under parts. Median portion of abdomen and under tail coverts, buffy yellow. Sides and flanks, brownish; the tawny throat patch extends down upon sides of breast to a greater or less extent. *Adult female* (James Island): Generally paler than the male. Grayish brown above, faintly tinged with olivaceous; almost uniformly buffy yellow below, slightly brighter on throat, paler on belly, and darker on sides. No trace of the cinnamon tawny throat patch appears on any female in our series from James Island. *Juvenal*: Three young birds from Albemarle, molting from juvenal plumage, are still mostly in that stage. The juvenal plumage is darker colored below than in the later stages, and cinnamon buffy edgings to the wing coverts give an effect of faintly indicated wing bars. There is no trace of spots or streaks on the ventral surface; they are uniformly colored below.

Habitat.—James, Jervis, Indefatigable, Seymour, Duncan, Albemarle, and Narborough islands.

Represented in the Academy collection by 124 specimens (nos. 4537-4611, 4806-4840), collected during the following months. James Island: January, July, August, December. Albemarle Island: March, April, May, August, November. Indefatigable Island: January, July, October, November. Duncan Island: August, December. Jervis Island: December. South Seymour Island: July, November.

Although I am placing the birds from these several islands under the one name, *Certhidea olivacea*, there is some justification for Ridgway's (1894) separation of the forms occurring on Indefatigable and Albemarle. These are the two islands, besides James, that are adequately represented in our collection, and it might be that more extensive series from Jervis and Duncan would prove minor average differences to be existent in specimens from those islands as well.

Male birds from James Island show the most extreme development of the cinnamon-tawny throat patch. It is of more common occurrence than is the case on other islands, only two of the fifteen males from James Island not having the marking conspicuously present, and in the brightest colored specimens it is deeper colored than in any from other islands. Females from all the islands as a rule lack any indication of the throat patch; occasionally it is faintly shadowed. Albemarle birds (*Certhidea albemarlei* Ridgway) in comparable plumage are more olivaceous, compared to the more grayish colored James Island specimens, and the cinnamon-tawny throat is not so deeply colored. The throat patch is as commonly present as in the James Island series, but the marking is less conspicuous. Many of the Albemarle series have the greater and middle wing coverts with bright rufous tips, a marking that does not occur on James Island birds. The Indefatigable series (*Certhidea salvini* Ridgway) is again of an olivaceous color, but paler than the Albemarle birds, and the throat patch is even less conspicuous. It is present on perhaps two-thirds of the male birds, but on most of these it is scarcely more than indicated, and the brightest colored Indefatigable specimen is comparable to one of the dullest from James Island.

Briefly to summarize, James Island birds are grayish in body hues, especially dorsally, and the cinnamon throat patch is at its maximum development. Albemarle birds are olivaceous in body hues, with rufous wing bars commonly present, and with

the cinnamon throat patch reduced in intensity. Indefatigable birds are olivaceous in body hues, though slightly paler than those from Albemarle, and the cinnamon throat patch is less commonly present than in series from either of the other islands, and never so deeply colored as on James Island specimens.

The three specimens from South Seymour are, of course, indistinguishable from Indefatigable birds. The series from Jervis is inadequate for the drawing of any conclusions. In the Duncan Island series, as on birds from the nearby Indefatigable Island, the cinnamon throat patch is very slightly developed, but the birds are in such worn plumage that had they ever possessed the olivaceous body color of the Indefatigable form, it is not now to be discerned. I have seen no specimens from Narborough, but presumably those would resemble the form upon Albemarle. Birds from the three large islands, James, Albemarle and Indefatigable, are thus shown to vary along certain definite lines, and to a sufficient degree so that the three forms might be regarded as deserving of separate names. The nature and extent of the differences, however, are such that it seems to me best to keep the three under one name. Even the most widely separated variants of this group are capable of segregation together as distinct from the other forms of *Certhidea*.

There are three birds in juvenal plumage from Albemarle Island, collected on March 19, April 14, and April 26, respectively. In these the bill is light colored. In midsummer birds (from May to August), some of which must be young of the year, the bill is light colored, except that in some late August specimens it is beginning to turn dusky. Undoubtedly mature males, that is with bright cinnamon throat patch, and adult females, taken in July and August, have the bill light colored, though with some dusky on the upper mandible. Male and female alike, taken from December to March almost invariably have the bill black. There are a few exceptions, in which the bill is dusky above and light colored below, but it may be said that black-billed birds are taken only during the time indicated, which is the breeding season. The annual molt takes place from late April probably into June.

102. Certhidea fusca Sclater & Salvin

Certhidea fusca Sclater & Salvin, 1870, pp. 323, 324 (orig. descr.; "Abingdon and Bindloe islands").—Salvin, 1876, p. 477.—Sclater, 1886, p. 28.—Ridgway, 1890, p. 105; 1897, p. 502; 1902, p. 766.
Certhidea olivacea fusca Rothschild & Hartert, 1899, p. 151; 1902,

p. 385.—Rothschild, 1902a, p. 46 (nest and eggs).—Snodgrass & Heller, 1904, p. 352.
Certhidea olivacea Gifford, 1919, p. 220, part.

CERTHIDEA FUSCA Sclater & Salvin

Cotype.—British Museum, no. 75.4.2.56; ♂; Abingdon Island; December 29, 1868; Dr. A. Habel; orig. no. 97.

Cotype.—British Museum, no. 85.4.1.190; ♂; Abingdon Island; December 30, 1868; Dr. A. Habel; orig. no. 97.

Cotype.—British Museum, no. 85.4.1.191; ♂; Bindloe Island; November 12, 1868; Dr. A. Habel; orig. no. 83.

Certhidea fusca was based upon one specimen from Bindloe, three from Abingdon, no type or type locality designated. In the Catalogue of Birds (vol. XI, p. 28) Sclater lists three specimens, indicating one from Abingdon and one from Bindloe as "types of the species". There is nothing upon the labels to distinguish the type, but in the British Museum register no. 190 is so indicated. That bird is from Abingdon, which island may thus be accepted as the type locality.

The species *fusca* is described as having "rostro graciliore", compared with *olivacea*, and the bill is more slender than in Darwin's specimens that are the basis of *olivacea*. It is not more slender, though, than the mode of recently collected series of James Island birds.

DESCRIPTION.—*Adult male and female*: Sexes alike. A uniformly grayish appearing bird. Upper parts generally close to buffy olive; paler, more grayish, below; sides and flanks tinged with brownish. Eye ring and lores whitish.

HABITAT.—Abingdon and Bindloe islands.

Represented in the Academy collection by 10 specimens from Abingdon, 18 from Bindloe (nos. 4669-4674, 4798-4799, 4881-4900). Those from Abingdon were collected September 18 to 22, those from Bindloe, September 17 and 18. Of this series, 20 have the bill black or mostly black, in 8 it is light colored to a varying extent.

A grayer colored bird than *becki*, of Culpepper and Wenman, to the northward, but not so uniformly leaden colored as *mentalis*, of Tower Island, the most closely adjacent form and the one that *fusca* most nearly resembles.

103. Certhidea becki Rothschild

Certhidea becki Rothschild, 1898, p. liii (orig. descr.; Wenman Id.).—Ridgway, 1902, p. 767.—Hartert, 1919, p. 172 (particulars of type specimen, in Rothschild Museum).
Certhidea olivacea becki Rothschild & Hartert, 1899, p. 149; 1902, p. 385.—Snodgrass & Heller, 1904, p. 354.
Certhidea olivacea mentalis Snodgrass & Heller, 1904, p. 353, part (Culpepper Id.).
Certhidea olivacea Gifford, 1919, p. 220, part.
Certhidea drownei Rothschild, 1898, p. liii (orig. descr.; Culpepper Id.).—Ridgway, 1902, p. 767.—Hartert, 1919, p. 172 (particulars of type specimen, in Rothschild Museum).
Certhidea olivacea drownei Rothschild & Hartert, 1899, p. 150.

CERTHIDEA BECKI Rothschild

Type.—Rothschild Museum; ♂ ad.; Wenman Island; July 31, 1897; C. D. Hull (Webster-Harris expedition); orig. no. 236.

CERTHIDEA DROWNEI Rothschild

Type.—Rothschild Museum; ♂ ad.; Culpepper Island, July 27, 1897; R. H. Beck (Webster-Harris expedition); orig. no. 148.

DESCRIPTION.—*Adult male and female*: Sexes alike. Upper parts generally close to light brownish olive, less olivaceous on head, more so on dorsum. Face, throat and upper breast, pale ochraceous (in varying degree in different specimens) over a vaguely defined area; middle of abdomen and under tail coverts whitish; sides and flanks olivaceous, slightly paler than back. Wing coverts, remiges and rectrices dusky, margined with olivaceous.

HABITAT.—Culpepper and Wenman islands.

Represented in our collection by eight specimens from Culpepper and five from Wenman, the Culpepper series collected on September 25, the Wenman series on September 24 and 25 (nos. 4675-4676, 4693, 4800-4802, 4901-4906, 4909). Of these specimens, nine have the bill black or dusky, in four it is mostly light colored.

The Certhidea occurring on Culpepper and Wenman is sufficiently distinct from the olivaceous aggregation of the central islands, and from *fusca* and *mentalis*, of Abingdon, Bindloe, and Tower, to justify its recognition, but our series shows no points of difference between the birds of Culpepper and Wenman. The forms *becki* (Wenman Island) and *drownei* (Culpepper Island) were described in the same paper; I am using the name *becki* as having priority on the page on which they both appeared.

Becki is the darkest colored, most olivaceous, of the forms of *Certhidea*. Occurring at the northernmost extreme from the central islands where *olivacea* is found, it differs from the mode of *olivacea* in much the same way as does the bird at the southernmost extreme —*ridgwayi*, of Charles Island. These two widely separated forms have similarly acquired nearly uniform coloration, but each with enough trace of the tawny throat remaining to indicate close relationship to *olivacea*. *Becki* is appreciably darker colored, and has even less of the throat patch than *ridgwayi*; in *becki*, in fact, it is barely indicated. In two of the five specimens from Wenman Island (nos. 4800, 4801) the bill is light colored, the plumage is more worn than in the rest of the series (from both islands) and they still show traces of molt. These birds are grayer than the rest, approaching *mentalis* in appearance. Possibly these are young-of-the-year, a possibility that is borne out by the fact that they are the only ones of the *becki* series with distinctly light colored bills.

104. Certhidea mentalis Ridgway

Certhidea mentalis Ridgway, 1894, p. 359 (orig. descr.; Tower Id.); 1897, p. 504; 1902, p. 766.—Hartert, 1919, p. 172 (particulars of type specimen, in Rothschild Museum).
Certhidea olivacea mentalis Rothschild & Hartert, 1899, p. 150.—Snodgrass & Heller, 1904, p. 353.
Certhidea olivacea Gifford, 1919, p. 220, part.

CERTHIDEA MENTALIS Ridgway

Type.—Rothschild Museum; ad., sex.?; Tower Island; September 2, 1891; Dr. G. Baur; orig. no. 594; "from spirits."

DESCRIPTION.—*Adult male and female*: Sexes alike, and almost uniformly colored. In fairly fresh plumage close to drab on the upper parts, which fades to a clearer gray in worn specimens. Under parts paler, tinged with olivaceous brown on sides. Eye ring and lores whitish, upper throat sometimes faintly tinged with buffy. A freshly molted bird (Stanford Univ. Museum, no. 5186, female, June 23, 1899) is slightly more brown above and more buffy on the breast, than is the case in our September-taken specimens.

HABITAT.—Tower Island.

Represented in our collection by 18 specimens, collected on

September 14, 15 and 18 (nos. 4677-4692, 4907-4908). The bill is black throughout the series except for three birds in which the lower mandible is light colored basally.

This is a well marked form, distinguished by its almost uniformly dull leaden coloration. There is a faint suggestion of a paler area on the throat, a reminder of the tawny throat patch of *olivacea*, and the center of the belly is dull whitish, in slight contrast to the leaden gray sides. Some individuals of *C. fusca* from Abingdon and Bindloe approach *mentalis* in being of a more uniformly gray coloration than is the mode of *fusca*, but the two series, lined up in opposing rows of skins, are readily distinguished. *Fusca* is distinctly more whitish below and with more of an olivaceous tinge throughout, *mentalis* is uniformly leaden gray.

105. Certhidea ridgwayi Rothschild & Hartert

Certhidea olivacea ridgwayi Rothschild & Hartert, 1899, p. 149 (orig. descr.; Charles Island.)—Snodgrass & Heller, 1904, p. 352.—Hartert, 1919, p. 149 (particulars of type specimen, in Rothschild Museum).
Certhidea ridgwayi Ridgway, 1902, p. 765.
Certhidea olivacea Gifford, 1919, p. 220, part.

CERTHIDEA OLIVACEA RIDGWAYI Rothschild & Hartert

Type.—Rothschild Museum; ♂ ad.; Charles Island; November 5, 1897; C. D. Hull (Webster-Harris expedition); orig. no. 2308.

DESCRIPTION.—*Adult male*: Generally similar to the corresponding stage in *C. olivacea*, but more gray on upper parts and paler, less yellowish, below. Cinnamon-tawny marking on face and throat present as in *olivacea* but paler, more dilute, and more restricted as to area. *Adult female*: As in *C. olivacea* but generally paler colored. *Juvenal*: Sexes alike. Widely different from young *olivacea* in being heavily streaked below, faintly streaked on the back. Top of head blackish; feathers of upper parts (dorsum, scapulars, etc.) with blackish centers, margined to a varying extent with olivaceous; wing coverts edged with cinnamon rufous, producing two fairly well defined bars across the wing; remiges and rectrices dusky, margined with rufescent or olivaceous edgings; throat dirty whitish, unmarked; sides of face blackish; fairly well defined blackish malar streaks; under parts in general (except throat, mid-abdomen, and lower tail coverts) whitish, with heavy longitudinal blackish streaks; sides with a brownish tinge.

Habitat.—Charles Island.

Represented in our collection by 53 specimens (nos. 4642-4668, 4795-4797, 4858-4880), collected during February, March, May, June, and October. Black bills predominate in birds taken during October, February, and March, though there are a few in each month in which it is light colored or dusky. All young birds and all adults collected in May and June have the bill light colored.

This form, in the further reduction of the tawny throat patch, represents a step beyond that reached by *olivacea* of Indefatigable Island. Practically all of the adult males of *ridgwayi* in our series show more or less distinct traces of this marking, but the color is pale and washed out, widely spread over the breast in many cases but with poorly defined boundaries. *Ridgwayi* is paler colored throughout than *olivacea*, especially below. The wing bars are on the average distinctly marked and bright rufous, as in *olivacea* from Albemarle. I can not verify the supposedly broader whitish tips to the rectrices of *ridgwayi*, as described by Rothschild & Hartert. I can, however, uphold the statement of those authors regarding the bill of *ridgwayi*, that it "is perhaps generally a little stouter." It is appreciably heavier than in any other form of *Certhidea*, among which there is otherwise little variation in bill structure, and this is a character of some significance, considered in connection with the interrelationships of *Certhidea* and *Camarhynchus*.

The juvenal plumage of *ridgwayi* differs from the later stages in being streaked above and below. This condition persists to some extent through the later plumage stages, for many adults of *ridgwayi* show traces of such markings, in contrast to the uniformly plain coloration in all other forms of *Certhidea*. Specimens of young *olivacea* at hand are plain colored, with no streaks above or below, a juvenal of *mentalis* at hand (in the Stanford University collection) is also plain colored below, and published descriptions of the young of other forms describe them as plain colored, similar to the adults. The streaked condition of the young of *ridgwayi* is again of significance as regards the relationship of *Certhidea* and *Camarhynchus*. Young of *ridgwayi* and young of some forms of *Camarhynchus* are closely similar in color and markings.

Some young males of *ridgwayi* undergoing the post-juvenal molt are acquiring on the breast buff-colored feathers that are distinctly

richer colored than in the adult female. Apparently they are assuming the tawny throat patch in nearly as full intensity as is ever attained in this form.

In its general resemblance to *olivacea*, and from the manner in which the adult male of *ridgwayi* apparently exemplifies a stage differing from *olivacea* of James Island but a step farther than does the male of Indefatigable, it might be assumed that *ridgwayi* should be treated as a subspecies of *olivacea*, as has been done by Rothschild & Hartert and by Snodgrass & Heller. The difference in the juvenal plumage, however, seems to preclude any such treatment, and the difference in thickness of bill, too, though apparently a slight feature, is nevertheless of sufficient importance to weigh heavily against subspecific treatment.

There is one specimen in the series (no. 4862, female, May 29, 1906) that I can only tentatively regard as an example of *ridgwayi*. The bill of this bird is so much heavier than normal as to suggest the possibility of its being an immature example of *Camarhynchus conjunctus*, of which only the adult male plumage is known. In the bird in question the bill is shaped as in *Certhidea ridgwayi*, but is both heavier and longer. It is as heavy as in *Camarhynchus*, but differently shaped, being somewhat longer. (See fig. 55, D.)

106. Certhidea luteola Ridgway

Certhidea luteola Ridgway, 1894, p. 360 (orig. descr.; Chatham Id.); 1897, p. 501; 1902, p. 764.—Hartert, 1919, p. 172 (particulars of type specimen, in Rothschild Museum).
Certhidea olivacea luteola Rothschild & Hartert, 1899, p. 149; 1902, p. 385.—Snodgrass & Heller, 1904, p. 351.
Certhidea olivacea Sclater, 1886, p. 28, part.—Ridgway, 1890, p. 105, part.—Gifford, 1919, p. 220, part.

CERTHIDEA LUTEOLA Ridgway

Type.—Rothschild Museum; ♂ ad.; Chatham Island; June 17, 1891; Dr. G. Baur; orig. no. 56.

DESCRIPTION.—*Adult male and female*: Sexes alike. A yellowish appearing bird. Upper parts generally close to buffy citrine in fresh plumage, approaching light brownish olive in more worn condition. Under parts paler, more yellowish; middle of abdomen and lower tail coverts whitish; sides and flanks tinged with brownish. Eye ring and lores whitish or yellowish. Upper throat sometimes tinged with brighter saffron than rest of under parts.

A young bird (juvenal plumage) in the Rothschild Museum is uniformly colored below, but another in juvenal plumage in the United States National Museum (no. 316948) is heavily streaked, as in the young of *C. ridgwayi*. For this lack of uniformity there is no explanation at present.

Habitat.—Chatham Island.

Represented in the Academy collection by 51 specimens (nos. 4612-4641, 4791-4794, 4841-4857), collected during January, February, July, September, and October. The bill in all July specimens (5 in number) is light colored; in September and October birds it is mostly light colored, in a few it is black and in a few intermediate; in January and February birds (19 in number) the bill is black in all but two.

In this form the sexes are alike, both lacking the rufous throat marking that is seen on the male of *C. olivacea*. According to Rothschild & Hartert (1899, p. 149) and Snodgrass & Heller (1904, p. 351) an indication of this feature is occasionally present on Chatham Island birds, but no trace of it is to be seen among the males of our series, though there is in some cases an intensification on the throat of the generally yellowish ventral coloration. In general coloration *luteola* resembles the non-rufous throated examples of *olivacea*, as represented on Albemarle and Indefatigable, but it is even brighter olivaceous above and brighter yellow below. Neither the juvenal plumage nor the molts are represented in our series.

107. Certhidea cinerascens Ridgway

Certhidea cinerascens Ridgway, 1890, p. 105 (orig. descr.; Hood Id.); 1897, p. 503; 1902, p. 768.—Gifford, 1919, p. 223, part.
Certhidea cinerascens cinerascens Rothschild & Hartert, 1899, p. 151.—Snodgrass & Heller, 1904, p. 354.
Certhidea olivascens (*lapsus calami*) Ridgway, 1890, p. 124.

Certhidea cinerascens Ridgway

Type.—United States National Museum, no. 116069; ♂ ad.; Hood Island; April 7 (1888); U. S. Fish Commission, Voyage of Albatross, 1887-88.

Description.—*Adult male and female*: Sexes alike. A uniformly grayish appearing bird. Upper parts generally close to grayish olive; whitish below. Eye ring and lores whitish. Slightly paler edges to wing coverts produce faintly indicated wing bars.

HABITAT.—Hood Island and Gardner-near-Hood.

Our series consists of 34 skins from Hood Island, and 58 from Gardner-near-Hood (nos. 4694-4747, 4803-4804, 4910-4945). The Hood Island series was collected on January 31, February 1 and 3, June 23 and 28, July 2, and September 25 and 27. The Gardner Island series was collected on February 3, June 23 and 27, September 28, 29, and 30. In January and February birds (28 in number) the bill is black in nearly every case; in a few individuals the lower mandible is light colored basally. In June and July specimens (16) the bill is light colored. In September specimens (48) the bill is light colored in nearly every case; in a few it is dusky, in just one is it as black as in January and February skins.

On a basis of resemblance *cinerascens* and *fusca* might well be regarded as two slightly differentiated subspecies. Birds from Abingdon and Bindloe (*fusca*) on the one hand, and from Hood and Gardner (*cinerascens*) on the other, are, in fact, so closely similar that were the islands closely adjoining they might all be placed under one name. There is no greater difference in the two lots than there is between specimens of *olivacea* from James and Albemarle islands.

In the Abingdon-Bindloe series there is a greater number of darker, more grayish colored birds, in the Hood-Gardner series a larger proportion of paler, more whitish colored ones. But there are many skins in comparable plumage in the two lots that are indistinguishable in appearance. Similarly as to the supposed differences in length of bill (*fusca* has been described as having a slightly longer bill), there is a greater proportion of specimens of *fusca* in the entire series that approach the maximum measurements and a greater number of *cinerascens* that approach the minimum, but there are many in the two lots that are exactly alike. The differences between *fusca* and *cinerascens*, remote as are their island habitats, are slight and elusive, and are only apparent at all in large series of skins.

108. Certhidea bifasciata Ridgway

Certhidea bifasciata Ridgway, 1894, p. 359 (orig. descr.; Barrington Id.); 1897, p. 504; 1902, p. 768.—Hartert, 1919, p. 171 (particulars of type specimen, in Rothschild Museum).

Certhidea cinerascens bifasciata Rothschild & Hartert, 1899, p. 151.—Snodgrass & Heller, 1904, p. 356.

Certhidea cinerascens Gifford, 1919, p. 223, part.

CERTHIDEA BIFASCIATA Ridgway

Type.—Rothschild Museum; ad., sex?; Barrington Island; Dr.

G. Baur; orig. no. 593; "from spirits." In Ridgway's description the date of capture is given as July 9, 1891; there is no date upon any of the three labels now attached to the specimen.

Description.—*Adult male and female*: Sexes alike. The palest colored form of *Certhidea*. A uniformly whitish appearing bird. Upper parts generally gray with scarce a tinge of olivaceous. Below pure white, tinged with grayish on flanks and occasionally with a faint tinge of yellowish on throat. Lores, eye ring, and a fairly well defined superciliary stripe white. *Juvenal* (male, coll. Stanford University Museum, no. 4922; May 29, 1899): Essentially like the adult, but not so purely white below and darker on the flanks. Upper surface rather darker than in the adult, and feathers of dorsum with obscurely indicated dusky cross bars.

Habitat.—Barrington Island.

Our series comprises 53 skins (nos. 4748-4790, 4805, 4946-4968). Forty-six specimens were collected from October 20 to 24, the remaining seven on July 9 and 10. One of the July specimens has the bill dusky, and on ten of the October birds it is black or mostly dusky. *Bifasciata* is a well marked form, the palest colored of any of the *Certhidea*. The color characters hold good nearly throughout the series, but the gap between *cinerascens* and *bifasciata* is definitely bridged by individual variants in both lots.

Specimens of the species of *Certhidea* in the Academy Collection and (figures in parenthesis) in the Stanford University Collection

Name	Island	Male	Female	Young	Sex undetermined
Certhidea becki	Culpepper	2	6		
Certhidea becki	Wenman	1(1)	1		3
Certhidea fusca	Abingdon	3	7		
Certhidea fusca	Bindloe	3	13		2
Certhidea mentalis	Tower	16	2(1)		
Certhidea olivacea	James	15	8		2
Certhidea olivacea	Jervis	3	1		
Certhidea olivacea	Seymour	2			1
Certhidea olivacea	Indefatigable	28	19		8
Certhidea olivacea	Duncan	7	2		2
Certhidea olivacea	Albemarle	18(1)	5	3	(1)
Certhidea bifasciata	Barrington	30(2)	22(2)	(1)	1
Certhidea luteola	Chatham	30	17		4
Certhidea cinerascens	Hood	19(3)	15		1
Certhidea cinerascens	Gardner-near-Hood	36(4)	20		1
Certhidea ridgwayi	Charles	20	19	12	1

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF THE SPECIES OF *Certhidea*

Number of specimens	Species	Island	Wing	Tail	Culmen	Tarsus	Middle toe with claw
			MALES				
2	Certhidea becki	Culpepper	55.0-56.5	37.0-38.5	9.2-10.0	21.0-21.0	14.0-14.5
2	Certhidea becki	Wenman	51.5-54.5	37.5-38.0	9.0-10.0	19.2-20.0	14.0-14.5
3	Certhidea fusca	Abingdon	49.3 (48.0-50.0)	31.2 (32.5-36.0)	9.5 (9.0-10.2)	20.1 (19.0-21.0)	13.9 (13.2-14.5)
3	Certhidea fusca	Bindloe	53.7 (53.0-54.0)	36.2 (33.5-39.0)	9.3 (9.2- 9.5)	19.0 (19.0-19.0)	13.6 (13.2-14.0)
10	Certhidea mentalis	Tower	53.3 (52.5-54.2)	37.1 (35.5-38.2)	9.9 (9.5-10.0)	19.9 (19.2-20.2)	13.6 (13.0-14.0)
10	Certhidea olivacea	James	52.5 (50.5-55.0)	35.5 (34.5-37.0)	9.2 (8.5-10.0)	20.6 (20.0-21.2)	13.6 (12.5-14.0)
10	Certhidea olivacea	Indefatigable	53.0 (52.0-54.5)	36.7 (36.0-38.5)	9.8 (9.0-10.2)	20.6 (20.0-21.0)	13.8 (13.0-15.0)
7	Certhidea olivacea	Duncan	51.6 (51.0-52.2)	35.5 (34.5-37.5)	9.9 (9.5-10.2)	19.8 (19.0-20.5)	13.9 (13.2-14.5)
10	Certhidea olivacea	Albemarle	52.4 (51.0-53.2)	37.0 (35.0-40.0)	9.6 (9.2-10.0)	20.8 (20.0-22.0)	13.9 (13.0-14.5)
10	Certhidea luteola	Chatham	52.5 (51.0-54.2)	37.4 (36.0-38.5)	9.9 (9.5-11.0)	20.6 (20.0-21.0)	13.7 (13.0-14.0)
10	Certhidea ridgwayi	Charles	53.7 (51.2-55.2)	37.5 (36.0-40.0)	9.7 (9.2-10.0)	20.6 (20.0-21.2)	13.9 (13.0-14.5)
10	Certhidea cinerascens	Hood	51.9 (50.2-53.0)	39.7 (37.2-41.5)	9.4 (9.0-10.0)	18.9 (18.0-19.5)	13.7 (13.0-14.0)
10	Certhidea cinerascens	Gardner-near-Hood	52.4 (51.0-54.0)	40.2 (38.5-41.5)	9.8 (9.2-10.5)	19.0 (18.5-19.5)	14.1 (13.2-14.8)
10	Certhidea bifasciata	Barrington	51.4 (50.5-53.5)	38.0 (37.0-39.2)	9.1 (8.8-10.0)	19.1 (18.2-19.8)	13.7 (13.2-14.5)
			FEMALES				
6	Certhidea becki	Culpepper	54.9 (54.0-55.5)	38.6 (36.0-40.0)	10.2 (9.5-10.5)	19.7 (19.0-20.0)	14.5 (14.5-14.5)
1	Certhidea becki	Wenman	55.0	39.5	10.0	20.0	14.0
7	Certhidea fusca	Abingdon	49.9 (49.0-50.5)	34.3 (32.0-36.0)	10.0 (9.0-10.5)	19.6 (19.0-20.2)	13.7 (13.0-14.2)
10	Certhidea fusca	Bindloe	52.4 (51.0-55.0)	36.3 (35.0-38.0)	10.5 (9.5-12.5)	19.7 (19.0-20.0)	13.8 (13.0-14.5)
2	Certhidea mentalis	Tower	53.0-53.5	36.0-37.5	10.0-10.8	19.8-20.0	14.2-14.5
8	Certhidea olivacea	James	52.0 (51.2-53.2)	34.2 (31.5-36.0)	10.3 (10.0-11.0)	20.6 (20.0-21.2)	14.2 (13.5-15.0)
10	Certhidea olivacea	Indefatigable	52.2 (50.2-55.0)	35.9 (34.5-38.8)	10.6 (9.5-11.0)	20.5 (20.0-21.0)	14.2 (13.2-15.0)
2	Certhidea olivacea	Duncan	49.0-50.0	32.5-36.5	11.0-11.5	20.0-21.0	15.0-15.0
5	Certhidea olivacea	Albemarle	51.3 (50.5-52.0)	34.5 (33.0-36.0)	10.1 (9.5-10.5)	19.9 (19.0-21.5)	14.9 (14.5-15.5)
10	Certhidea luteola	Chatham	51.9 (49.5-54.4)	36.1 (33.0-38.5)	10.4 (9.8-11.0)	20.5 (19.8-21.5)	15.1 (14.2-16.0)
10	Certhidea ridgwayi	Charles	52.4 (51.5-53.0)	36.2 (34.5-38.0)	10.7 (10.0-11.0)	20.3 (19.5-21.2)	14.6 (14.0-15.0)
10	Certhidea cinerascens	Hood	52.1 (51.0-53.0)	38.3 (36.8-42.0)	10.8 (9.5-11.5)	19.7 (19.0-20.5)	13.9 (12.8-14.5)
10	Certhidea cinerascens	Gardner-near-Hood	51.5 (49.8-53.0)	39.2 (37.8-41.5)	10.4 (9.8-11.0)	18.6 (18.2-19.0)	14.2 (14.0-14.5)
10	Certhidea bifasciata	Barrington	50.9 (50.2-52.0)	35.9 (34.2-37.0)	10.3 (9.8-10.8)	19.3 (18.2-20.0)	13.6 (13.0-14.0)

Genus Pinaroloxias Sharpe

Pinaroloxias Sharpe, Cat. Birds Brit. Mus., X, 1885, p. 52, fig. (Type, *Cactornis inornata* Gould.)
Cocornis Townsend, Bull. Mus. Comp. Zool., XXVII, no. 3, 1895, p. 123. (Type, *Cocornis agassizi* Townsend.)

Geospizidæ of medium size (wing about 68 mm.); coloration, in the adult male uniformly black except that the under tail coverts are varied with buff; female and young streaked (plumage in its several variations essentially as in *Geospiza*); bill slender, sharp-pointed and decurved, culmen curved, gonys straight; tarsus relatively long, ratio of "middle toe with claw" to tarsus about 8 : 10. (See Ridgway, 1901, p. 516, for structural details.)

Pinaroloxias inornata (Gould)

Cactornis inornata Gould, 1843, p. 104 (based upon a specimen supposed to have come from Bow Island, Low Archipelago, Polynesia); 1844, p. 42, pl. 25.
Loxops inornata Gray, 1859, p. 28.
[Genus ?] *inornata* Salvin, 1876, p. 485 (discussion of systematic position).
Pinaroloxias inornata Sharpe, 1885, p. 52, fig. (establishment of genus *Pinaroloxias*); 1909, p. 193 (Cocos Id.).—Richmond, 1902, p. 247 (important discussion of history and nomenclature).—Gifford, 1919, p. 242 (life history).
Cocornis agassizi Townsend, 1895, p. 123, col. pl. (Cocos Id.; new genus and species; type in U. S. Nat. Mus.).—Ridgway, 1901, p. 516.—Rothschild, 1902, p. 6.—Snodgrass & Heller, 1902, p. 518.

Habitat.—Cocos Island, Costa Rica.

Cactornis inornata Gould

Type.—British Museum, no. 56.3.15.8; (♀?); "Bow Island" (= Cocos Island, Costa Rica); (no date); received from Dr. Hinds.

Cocornis agassizi Townsend

Type.—United States National Museum, no. 131680; ♂ ad.; "Cocos Island, Pacific Ocean;" February 28, 1891; C. H. Townsend.

Description.—*Adult male.*—Uniform black except that the lower tail coverts are generally more or less broadly margined with pale buffy. These buffy margins are sometimes so broad as to almost entirely hide the black centers of the feathers, sometimes (rarely) so nearly absent as to be discerned with difficulty. *Adult female.*—Dusky olivaceous in general appearance. Feathers of upper parts

blackish, edged (broadly, narrowly, or hardly at all) with olivaceous. Feathers of rump so broadly margined as to hide the basal dark color, and rump consequently uniformly olivaceous, or (in very dark colored specimens) cinnamomeus. Under parts yellowish buff, paler on the abdomen, brownish on sides and flanks. Below generally streaked with dusky, most heavily on breast and sides, least on throat and lower belly. Under tail coverts buffy yellow, unmarked or with a few faint streaks. Greater and median wing coverts tipped with cinnamomeus, producing two well defined wing bars. Remiges dusky, narrowly edged with olivaceous; edgings broader and more cinnamomeus on tertials. Rectrices dusky, edged and tipped with olivaceous and cinnamomeus. There is considerable variation in general coloration (some darker, some paler), and in amount and extent of ventral streaking.

Males that are presumably immature are in a streaked plumage indistinguishable from females. Eleven males at hand are in parti-colored plumage, blotched with black and with streaked feathers

Fig. 57. Pinaroloxias inornata, male (no. 7422), Cocos Island.

in various degrees. These birds are not molting apparently, for no pin feathers are to be seen. No birds in juvenal plumage are in the series.

There are at hand 120 specimens in the Academy collection (nos. 7408-7521, 30633-30638) and seven from the Stanford University collection. Of the Academy series, 114 were collected September 4 to 13, 1905, and six on December 9, 1927; the Stanford University series was collected on June 30, 1899. The Academy series consists of 44 black males, 11 parti-colored males, 19 streaked males, 39 females, 7 sex not determined.

Of the black males, one September bird has a parti-colored bill; in all the others it is black. Of the parti-colored males (September), all have the bill dusky, not black. Of the streaked males (September), one has a jet black bill, one dusky, 17 pale colored.

Of the 39 females (September), 23 have a black bill, 16 pale colored or (a few) dusky. Of the Stanford Museum specimens, collected June 30, the two black males have the bill black, two streaked males dusky, two females pale colored.

There seems to be no reason to doubt that *Pinaroloxias* belongs to the Geospizidæ, the only member of the group found elsewhere than in the Galapagos Islands. Its plumages, so far as they are known, parallel those of *Geospiza;* in bill structure and general size it is more nearly like *Certhidea.*

MEASUREMENTS IN MILLIMETERS (AVERAGE, MINIMUM AND MAXIMUM) OF *Pinaroloxias inornata*

Number of specimens	Wing	Tail	Culmen	Gonys	Depth of bill at base	Width of mandible at base	Tarsus	Middle toe with claw
				MALES				
10	65.9 (63.8-68.5)	41.8 (40.0-44.2)	12.9 (12.0-13.5)	8.1 (7.8-8.5)	5.6 (5.2-6.2)	5.1 (5.0-5.2)	21.4 (21.0-22.2)	17.4 (17.0-18.0)
				FEMALES				
10	63.8 (62.2-65.0)	40.0 (39.0-42.0)	13.0 (12.2-13.5)	8.1 (7.8-8.2)	5.4 (5.2-5.5)	4.9 (4.5-5.2)	20.4 (19.8-21.2)	16.4 (15.5-17.0)

Literature Cited

1837a. Gould, John. [Remarks on a series of "ground finches" from Mr. Darwin's collection, with descriptions of new species.] Proc. Zool. Soc. London, pt. v, pp. 4-7.

Descriptions of one genus and three subgenera (which, however, are treated as full genera), under the following names: *Geospiza* (type, *G. magnirostris*, and including also *G. strenua*, *G. fortis*, *G. nebulosa*, *G. fuliginosa*, *G. dentirostris*, *G. parvula*, *G. dubia*); *Camarhynchus*, subgenus (type, *C. psittacula*, and including also *C. crassirostris*); *Cactornis*, subgenus (type, *C. scandens*, and including also *C. assimilis*); *Certhidea*, subgenus (type, *C. olivacea*).

1837b. Gould, J. [Remarks on raptorial birds in Mr. Darwin's collection, with descriptions of new species.] Proc. Zool. Soc. London, pt. v, pp. 9-11.

New Galapagos species described are *Polyborus galapagoensis* and *Otus* (*Brachyotus*) *galapagoensis*.

1837c. Gould, J. [Descriptions of new species of fissirostral birds in Mr. Darwin's collection.] Proc. Zool. Soc. London, pt. v, p. 22.

Includes *Hirundo concolor*, from the Galapagos.

1837d. Gould, J. [Two new species of the genus *Sterna*, a species of cormorant, and three species of the genus *Orpheus* from the Galapagos, in the collection of Mr. Darwin.] Proc. Zool. Soc. London, pt. v, pp. 26-27.

Orpheus trifasciatus, *O. melanotis*, and *O. parvulus* are named, with no more exact locality given than "the Galapagos."

1839. Darwin, Charles R. Journal of researches into the Geology and Natural History of the various countries visited by H. M. S. Beagle.

(I have not seen the first edition of this work. The quotations cited were found in Chapter XVII, on different pages in different American editions consulted. They apparently do not appear in the "Narrative", of which the "Journal of researches" was a popular re-issue.)

1840. Neboux, Adolphe Simon. Descriptions d'oiseaux nouveaux recueillis pendant l'expedition de la Venus. Revue Zool., III, pp. 288-291.

1841. Gould, J. The | zoology | of | the voyage of H. M. S. Beagle, | under the command of Captain Fitzroy, R. N., | during the years | 1832 to 1836. | Published with the approval of | the Lords Commissioners of Her Majesty's Treasury. | Edited and Superintended by | Charles Darwin, Esq. M. A. F. R. S. Sec. G. S. | Naturalist to the expedition. | — | Part III. | Birds, | by | John Gould, Esq. F. L. S. | — | London: | Published by Smith, Elder and Co. 65, Cornhill. | MDCCCXLI. Pp. ii + 156 + 8,

50 col. pl. The separate parts were issued as follows: pp. 1-16, July, 1838; pp. 17-32, January, 1839; pp. 33-56, July, 1839; pp. 57-96, November, 1839; pp. 97-164, March, 1841. (See Sherborn, Ann. Mag. Nat. Hist., XX, sixth series, 1897, 483.)

"Most of the Galapagoan species had been previously described by Mr. Gould in Proc. Zool. Soc. London, Pt. V, 1837, pp. 4-7, 9-11, 22, and 26-27, but the following are additional thereto: *Strix punctatissima*, "G. R. Gray," p. 34, pl. IV (James Island); *Pyrocephalus nanus*, p. 45, pl. VII; *Pyrocephalus dubius*, p. 46; *Myiobius magnirostris*, p. 48, pl. VIII (Chatham Island); *Sylvicola aurcola*, p. 86, pl. XXVIII; *Zenaida galapagoensis*, p. 115, pl. XLVI; *Totanus fuliginosus*, p. 130; *Zapornia spilonata*, p. 132, pl. XLIX; *Larus fuliginosus*, p. 141. (The locality, except where otherwise stated above, is given simply as 'Galapagos Archipelago.') The following previously described species are figured: *Craxirex galapagoensis*, pl. II; *Otus galapagoensis*, pl. III; *Progne modestus*, pl. V; *Mimus trifasciatus*, pl. XVI; *M. melanotis*, pl. XVII; *M. parvulus*, pl. XVIII; *Geospiza magnirostris*, pl. XXXVI; *G. strenua*, pl. XXXVII; *G. fortis*, pl. XXXVIII; *G. parvula*, pl. XXXIX; *Camarhynchus psittacula*, pl. XL; *C. crassirostris*, pl. XLI; *Cactornis scandens*, pl. XLII; *C. assimilis*, pl. XLIII; *Certhidea olivacea*, pl. XLIV. *Craxirex* (type, *Polyborus galapagoensis*, Gould), p. 22, is described as a new genus" (Ridgway).

1841. Gray, George Robert. (See Gould, J.)

1843. Gould, J. Descriptions of nine new species of birds collected during the recent voyage of H. M. S. Sulphur. Proc. Zool. Soc. London, pp. 103-106.

One of the newly described forms is *Cactornis inornata*, supposedly from Polynesia, but shown at a much later date (Richmond, 1902) to be the same bird that was named by Townsend (1895) *Cocornis agassizi*, from Cocos Island.

1844. Gould, John. The | zoology | of | the voyage of H. M. S. Sulphur, | under the command of | Captain Sir Edward Belcher, R.N., C.B., F.R.G.S., etc. | during the years 1836-42. | Published under the authority of the Lords Commissioners of the Admiralty. | — | Edited and Superintended by | Richard Brinsley Hinds, Esq., Surgeon, R.N., Fell. Roy. Col. Surg. | attached to the expedition. | — vol. 1. — | Mammalia, by J. E. Gray, Esq. F.R.S., &c. — Birds, by J. Gould, Esq. F.R.S., &c. | Fish, by J. Richardson, M.D., F.R.S., &c. | — | London: | Published by Smith, Elder and Co., 65, Cornhill. | MDCCCXLIV.

Birds. | By | John Gould, Esq., F.R.S., etc. Pp. 39-49, pls. 19-34. *Cactornis inornatus* (= *Pinaroloxias inornata*), p. 42, pl. 25; *Coccyzus ferrugineus*, p. 46, pl. 29.

1844. Gray, G. R. List of the specimens of birds in the collection of the British Museum. Part III. Gallinæ, Grallæ, and Anseres. Pp. 1-209.

1848. Gray, G. R. List of the specimens of birds in the collection of the British Museum. Part I. Accipitres. (Second edition). Pp. i-viii + 1-120.

1853. [Bonaparte, C. L.] "Ch. L. Bonaparte's Classification der Vögel, Conspectus Larinarum, und neue Arten." Journ. für Orn., 1853, pp. 46-47.

1859. Darwin, Charles. On the Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. London.

Chapter XII contains observations upon, and deductions from the occurrence and distribution of birds on the islands of the Galapagos Archipelago.

1859. Gray, George Robert. Catalogue of the birds of the tropical islands of the Pacific Ocean, in the collection of the British Museum. Pp. 1-72.

1859. Sclater, Philip Lutley. A Synopsis of the Thrushes (Turdidæ) of the New World. Proc. Zool. Soc. London, pp. 321-347.

Includes *Mimus trifasciatus* (Charles Island), *M. melanotis* (Chatham and James islands), and *M. parvulus* (Albemarle Island).

1869. Gray, G. R. Notes on the Bills of the Species of Flamingo (Phœnicopterus). Ibis, pp. 438-443, pls. XIII-XV.

Naming *Phœnicopterus glyphorhynchus*, new species, from the Galapagos Archipelago.

1869. Habel, Dr. [A.] [Exhibition of, and remarks upon, some birds from the Galapagos Islands.] Proc. Zool. Soc. London, p. 433.

1869. Sundevall, Carl J. Œfversigt of fogelslägtet Dendroeca. Œfvers. af K. Vetensk. Ak. Förhandl., Stockholm, pp. 605-618. (Not seen by me.)

1870. Sclater, P. L., and Salvin, Osbert. Characters of new Species of Birds collected by Dr. Habel in the Galapagos Islands. Proc. Zool. Soc. London, pp. 322-327, 6 text figs.

"Based on a collection made by Dr. A. Habel, of New York, the total number of specimens being 460, representing three islands, as follows: Indefatigable Island (267 specimens); Bindloe Island (94); Abingdon Island (84); island unspecified (15). A list of the 37 species is given on page 323, showing the number of specimens collected of each, and also the number of specimens procured on each island. The new species described are as follows: (1) *Certhidea fusca*, p. 324, fig. 1, Abingdon and Bindloe islands; (2) *Camarhynchus variegatus*,

p. 324, fig. 2, Abingdon and Bindloe islands; (3) *Camarhynchus habeli*, p. 325, fig. 3, Abingdon and Bindloe islands; (4) *Camarhynchus prosthemelas*, p. 325, fig. 4, Indefatigable Island; (5) *Cactornis abingdoni*, p. 326, fig. 5, Abingdon Island; (6) *Cactornis pallida*, p. 327, fig. 6, Indefatigable Island; (7) *Nycticorax pauper*, p. 327, Indefatigable Island" (Ridgway).

1870. Sclater, P. L. Further Notes on the Cuckoos of the Genus *Coccyzus*. Proc. Zool. Soc. London, pp. 165-169.

1871. Sundevall, Carl J. On Birds from the Galapagos Islands. Proc. Zool. Soc. London, pp. 124-130.

"Based on collections made by Dr. Kinberg, zoologist and surgeon of the Swedish frigate *Eugenie* (Commander Virgin), during nine days of May, 1852. Twenty-six species are enumerated, of which the following are described as new: (1) *Ardea plumbea*, pp, 125, 127, James Island; (2) *Spheniscus mendiculus*, pp. 126, 129, James Island" (Ridgway).

1872-1873. Sundevall, Carl J. Methodi naturalis Avium disponendarum tentamen. Forsok till Fojelklassens naturenliga uppstallning. (Appendix.) Pp. [vi,] lxix, 187 (12): 1 pl.

There is an English translation, with notes, by Francis Nicholson (London: R. H. Porter, 1889).

1873. Sclater, P. L., and Salvin, O. Nomenclator avium neotropicalium sive avium quæ in regione neotropica hucusque repertæ sunt nomina systematice disposita adjecta sua cuique speciei patria accedunt generum et specierum novarum diagnoses. London, 1873, viii + 163 pp.

1874. Sharpe, Richard Bowdler. Catalogue of the Accipitres, or diurnal birds of prey, in the collection of the British Museum. Cat. Birds Brit. Mus., vol. I, 1874, xiii + 479 pp., XIV pls., text figs.

1875. Sharpe, R. B. Catalogue of the Striges, or nocturnal birds of prey, in the collection of the British Museum. Cat. Birds Brit. Mus., vol. II, 1875, xi + 325 pp., XIV pls., text figs.

1876. Salvin, O. On the Avifauna of the Galapagos Archipelago. Trans. Zool. Soc. London, IX, pt. 10, pp. 447-510, pls. LXXXIV-LXXXIX, text figs.

See Ridgway, 1897, p. 664, for a half-page abstract of this publication, beginning "This most important contribution to our knowledge of Galapagos ornithology is a masterly treatment of the subject." One species (*Œstrelata phæopygia*, p. 507, pl. LXXXVIII, fig. 1) described as new.

1876. [Sclater, P. L.] "Extract from a Report by Commander Cookson, R. N., of a visit by H. M. S. 'Peterel' to the

Galapagos Islands in July 1875." Proc. Zool. Soc. London, pp. 178-179.
Casual mention of birds.

1877. Reichenow, A. Systematische Uebersicht der Schreitvögel (*Gressores*), einer natürlichen, die *Ibidæ*, *Ciconidæ*, *Phœnicopteridæ*, *Scopidæ*, *Balaenicipidæ* und *Ardeidæ* umfassenden Ordnung. Journ. für Orn., no. 139, Juli, pp. 225-277.
First application (p. 253) of the name *Ardea sundevalli* to the Galapagos Green Heron.

1877. Sharpe, R. B. Birds. *In* Günther, A. Account of the Zoological Collection made during the visit of H. M. S. "Peterel" to the Galapagos Islands. Proc. Zool. Soc. London, pp. 65-66.

1878. Saunders, H. On the Larinæ or Gulls. Proc. Zool. Soc. London, pp. 155-212, 16 figs. in text.

1879. Sharpe, R. B. *In*: An account of the petrological, botanical, and zoological collections made in Kerguelen's Land and Rodriguez during the Transit of Venus expeditions, carried out by order of Her Majesty's government in the years 1874-75. Philos. Trans. Royal Soc. London, vol. 168 (extra volume), 1879, IX + 579 pp., 50 pls. Note on Anous (supplementary to "Birds" [of Rodriguez]), pp. 467-469.
Anous galapagensis, new species, from Dalrymple Rock, Chatham Island.

1879. Wolf, Theodor. Title page as follows: 9/10. | Ein Besuch | der | galápagos-Inseln. | von | Dr. Theodor Wolf, | Staatsgeologe der Republik Ecuador in Guayaquil.
Inner cover, preceding title page, as follows: Sammlung von Vorträgen | für das deutsche Folk. | Herausgegeben | von | Wilhelm Frommel, Professor in Heidelberg, und Dr. Friedrich Pfaff, Professor in Erlangen. | | — Erster Band. | — | Heidelberg. | Carl Winter's Universitätsbuchhandlung. | 1879. Pp. 257-300 (also separately paged 1-44), 3 pls. (map of the Archipelago, map of Charles Island, drawing of Cormorant Spit, Charles Island).
A narrative account of a visit to Charles and Chatham islands in August, 1875. Passing mention of animal life, including a little about birds.

1880. Markham, A. H. A Visit to the Galapagos Islands in 1880. Proc. Royal Geog. Soc. new ser., vol II, pp. 742-755.
Casual mention of birds.

1880. Salvin, O. Notes on Captain Markham's "Visit to the Galapagos Islands." Proc. Royal Geog. Soc., new ser., vol. II, pp. 755-758.

1881. Sharpe, R. B. Catalogue of the Passeriformes, or perching birds, in the collection of the British Museum. Cichlomorphæ: Part III. Containing the first portion of the family Timeliidæ (Babbling-Thrushes). Cat. Birds Brit. Mus., vol. VI, xiii + 420 pp., XVIII pls., text figs.

1883. Salvin, O. A List of the Birds collected by Captain A. H. Markham on the West Coast of America. Proc. Zool. Soc. London, pp. 419-432.
Contains original description of *Diomedea irrorata*, from Callao Bay, Peru; various species from Charles Island.

1885. Sharpe, R. B. Catalogue of the Passeriformes, or perching birds, in the collection of the British Museum. Fringilliformes: Part I. Containing the families Dicæidæ, Hirundinidæ, Ampelidæ, Mniotiltidæ, and Motacillidæ. Cat. Birds Brit. Mus., vol. X, xiii + 682 pp., XII pl., text figs.

1885-1894. Sharpe, R. Bowdler. A monograph of the Hirundinidæ or family of swallows. London: Henry Sotheran & Co. Vol. I, pp. i-lxx + 1-355, pls. 1-64; vol. II, pp. l-vii + 357-673, pls. 65-129.
Progne concolor, pp. 463, 487, pls., 81 (map), 90.

1886. Ridgway, Robert. Description of a new species of oyster-catcher from the Galapagos Islands. Auk, III, p. 331.
Hæmatopus galapagensis, from Chatham Island.

1886. Sclater, P. L. Catalogue of the Passeriformes, or perching birds, in the collection of the British Museum. Fringilliformes: Part II. Containing the families Coerebidæ, Tanagridæ, and Icteridæ. Cat. Birds Brit. Mus., vol. XI, xvii + 431 pp., XVIII pls., text figs.

1887. Ridgway, R. Description of a recently new oyster-catcher (*Hæmatopus galapagensis*) from the Galapagos Islands. Proc. U. S. Nat. Mus., 1886, pp. 325-326.

1888. Sclater, P. L. Catalogue of the Passeriformes, or perching birds, in the collection of the British Museum. Oligomyodæ, or the families Tyrannidæ, Oxyrhamphidæ, Pipridæ, Cotingidæ, Phytotomidæ, Philepittidæ, Pittidæ, Xenicidæ, and Eurylæmidæ. Cat. Birds Brit. Mus., vol. XIV, xix + 494 pp., XXVI pls., text figs.

1888. Sharpe, R. B. Catalogue of the Passeriformes, or perching birds, in the collection of the British Museum. Fringilliformes: Part III. Containing the family Fringillidæ. Cat. Birds Brit. Mus., vol. XII, xv + 871 pp., xvi pls., text figs.

1890. Ridgway, R. Scientific results of explorations by the U. S. Fish Commission Steamer Albatross. . . . No. 1. Birds collected on the Galapagos Islands in 1888. Proc. U. S.

Nat. Mus., XII, 1889 (Feb. 5, 1890), pp. 101-128, 6 text figs.

"Based upon a collection made, in April, 1888, by Prof. Leslie A. Lee, naturalist of the expedition, assisted by Mr. Charles H. Townsend and Mr. Thomas Lee.

"Forty-seven species are mentioned, of which the following are described as new: (1) *Nesomimus* (new genus: Type, *Orpheus melanotis*, Gould) *macdonaldi*, Hood Island, p. 103, fig. 1; (2) *Nesomimus personatus*, Abingdon Island, p. 104; (3) *Certhidea cinerascens*, Hood Island, p. 105; (4) *Geospiza conirostris*, Hood Island, p. 106, fig. 2; (5) *Geospiza media*, Hood Island, p. 107, fig. 3; (6) *Cactornis brevirostris*, Charles Island, p. 108, fig. 4; (7) *Camarhynchus townsendi*, Charles Island, p 110, fig. 5; (8) *Camarhynchus pauper*, Charles Island, p. 111, fig. 6; (9) *Pœcilonetta galapagensis*, Charles Island, p. 115. Besides these, two other species were named provisionally, as follows: *Cactornis hypoleuca* (if distinct from *C. pallida*, Sclater and Salvin), James Island, p. 109, in text; *Pyrocephalus minimus*, Chatham Island, p. 113, in text" (Ridgway).

1890. Townsend, C. H. Scientific results of explorations by the U. S. Fish Commission steamer Albatross. No. XIV. Birds from the coasts of western North America and adjacent islands, collected in 1888-89, with descriptions of new species. Proc. U. S. Nat. Mus., XIII, Sept. 9, 1890, pp. 131-142.

1891a. Baur, George Hermann Carl Ludwig. On the origin of the Galapagos Islands. Am. Nat., XXV, pp. 217-229, 307-319.

"Dr. Baur's theory is that the Galapagos are continental islands, originated through subsidence. . . . This paper was written before Dr. Baur visited the Galapagos" (Ridgway).

1891b. Baur, G. [Comments upon the distribution of birds and reptiles on the Galapagos Islands.] Am. Nat., XXV, pp. 902-907.

1891. Shelley, G. E. Catalogue of the Picariæ in the collection of the British Museum. Scansores and Coccyges, containing the families Rhamphastidæ, Galbulidæ, and Bucconidæ, by P. L. Sclater, and the families Indicatoridæ, Capitonidæ, Cuculidæ, and Musophagidæ, by G. E. Shelley. Cat. Birds Brit. Mus., vol. XIX, xii + 485 pp., XIII pls., text figs.

1892. Agassiz, Alexander. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission Steamer "Albatross", Lieut. Commander Z. L. Tanner, U. S. N., commanding. II. General sketch of the expedition of the "Albatross", from

February to May, 1891. Bull. Mus. Comp. Zool., XXIII, no. 1, pp. 1-89, pls. I-XXII.

"This important work contains no special reference to birds, but excellent descriptions of the several islands are given besides other information of much interest in connection with the subject" (Ridgway). It was followed by a series of reports dealing with the various biological collections that were made.

1893. Ridgway, R. Remarks on the avian genus Myiarchus, with special reference to M. yucatanensis Lawrence. Proc. U. S. Nat. Mus., XVI, pp. 605-608.

Includes description of the genus *Eribates*, with the one species, *E. magnirostris*.

1893. Salvadori, Tommaso. Catalogue of the Columbæ, or pigeons, in the collection of the British Museum. Cat. Birds Brit. Mus., vol. XXI, xvii + 676 pp., XV pls.

1894. Lucas, Frederic Augustus. Notes on the anatomy and affinities of the Cœrebidæ and other American birds. Proc. U. S. Nat. Mus., XVII, pp. 299-312, 13 text figs.

1894. Ridgway, R. Descriptions of twenty-two new species of birds from the Galapagos Islands. Proc. U. S. Nat. Mus., XVII, pp. 357-370.

"The new species herein described were contained in the very large and valuable collection of Galapagos birds made by Dr. G. Baur and Mr. C. F. Adams, in 1891, which was referred to the author for determination of the species soon after the return of those gentlemen from their highly successful exploration of that remarkable island group. Many of the specimens having been collected on islands never before visited by a collector, the number of new species found among them was, as might be expected, unusually large. The new forms described are the following: (1) *Nesomimus bauri*, Tower Island, p. 357; (2) *Nesomimus bindloei*, Bindloe Island, p. 358; (3) *Nesomimus adamsi*, Chatham Island, p. 358; (4) *Certhidea salvini*, Indefatigable Island, p. 358; (5) *Certhidea bifasciata*, Barrington Island, p. 359; (6) *Certhidea mentalis*, Tower Island, p. 359; (7) *Certhidea albemarlei*, Albemarle Island, p. 360; (8) *Certhidea luteola*, Chatham Island, p. 360; (9) *Geospiza barringtoni*, Barrington Island, p. 361; (10) *Geospiza propinqua*, Tower Island, p. 361; (11) *Geospiza bauri*, James Island, p. 362; (12) *Geospiza albemarlei*, Albemarle Island, p. 362; (13) *Geospiza fratercula*, Abingdon Island, p. 363; (14) *Geospiza debilirostris*, James Island, p. 363; (15) *Geospiza acutirostris*, Tower Island, p. 363; (16) *Camarhynchus rostratus*, James Island, p. 363; (17) *Camarhynchus productus*, Albemarle Island, p. 364; (18) *Camarhynchus salvini*, Chatham Island, p. 364; (19) *Camarhynchus affinis*, Albemarle Island, p. 365; (20) *Pyrocephalus*

carolensis, Charles Island, p. 365; (21) *Pyrocephalus intercedens*, Indefatigable Island, p. 366; (22) *Pyrocephalus abingdoni*, Abingdon Island, p. 367.

"There are also critical remarks (p. 361) on the '*Cactorni*' of Indefatigable, Albemarle, and Jervis islands, which collectively were doubtfully identified with *Cactornis assimilis*, Gould, and *Pyrocephalus dubius*, Gould (pp. 368-370), to which the Chatham Island form is referred, and of which detailed descriptions and full synonymy are given" (Ridgway).

1894. Sharpe, R. B. Catalogue of the Fulicariæ (Rallidæ and Heliornithidæ) and Alectorides (Aramidæ, Eurypygidæ, Mesitidæ, Rhinochetidæ, Gruidæ, Psophiidæ, and Otididæ) in the collection of the British Museum. Cat. Birds Brit. Mus., vol. XXIII, xiii + 353 pp., IX pls.

1894. Stone, Witmer. A revision of the genus Anous. Proc. Acad. Nat. Sci. Phila., pp. 115-118.

1895. Salvadori, T. Catalogue of the Chenomorphæ (Palamedeæ, Phoenicopteri, Anseres), Crypturi, and Ratitæ in the collection of the British Museum. Cat. Birds Brit. Mus., XVII, xv + 636 pp., XIX pls.

1895. Townsend, Charles Haskins. Birds from Cocos and Malpelo islands, with notes on petrels obtained at sea. = Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission Steamer "Albatross", during 1891, Lieut. Commander Z. L. Tanner, U. S. N., commanding. XVII. Bull. Mus. Comp. Zool., XXVII, 1895, pp. 121-126, 2 col. pls. (*Cocornis agassizi* and *Nesotriccus ridgwayi*).

"Three species of *Procellariidæ* from the Galapagos Archipelago are mentioned: *Oceanodroma cryptoleucura* (off Wenman Island), *Procellaria tethys* (off Chatham Island), and *Puffinus 'tenebrosus*, Pelz.,' = *P. subalaris*, Townsend, this paper, p. 650 (off Chatham and Wenman islands)" (Ridgway).

Cocornis agassizi (= *Pinaroloxias inornata*) and *Nesotriccus ridgwayi* are described as new species (and new genera) from Cocos Island.

1896. Ridgway, R. Preliminary description of some new birds from the Galapagos Archipelago. Proc. U. S. Nat. Mus., XVIII, pp. 293-294.

"These new forms are the result of further examination of specimens in Dr. Baur's collection as well as National Museum specimens collected by the naturalists of the *Albatross* in 1888 and 1891. They are as follows: (1) *Geospiza pachyrhyncha*, Tower Island, p. 293; (2) *Geospiza fatigata*, Indefatigable Island, p. 293; (3)

Camarhynchus bindloei, Bindloe Island, p. 294; (4) *Camarhynchus compressirostris*, Jervis Island, p. 294; (5) *Camarhynchus ineertus*, James Island, p. 294" (Ridgway).

1896. Saunders, Howard, and Salvin, O. Catalogue of the Gaviæ and Tubinares in the collection of the British Museum. Gaviæ (terns, gulls, and skuas) by Howard Saunders. Tubinares (petrels and albatrosses) by Osbert Salvin. Cat. Birds Brit. Mus., vol. XXV, xv + 475 pp., VIII pls., text figs.

1896. Sharpe, R. B. Catalogue of the Limicolæ in the collection of the British Museum. Cat. Birds Brit. Mus., XXIV, xii + 794 pp., VII pls., text figs.

1897a. Baur, G. H. C. L. New observations on the origin of the Galapagos Islands, with remarks on the geological age of the Pacific Ocean. No. 1. Am. Nat., XXXI, pp. 661-680; No. II, *ibid.*, pp. 864-896 (incomplete).

A further elaboration of Dr. Baur's argument that the Galagapos Islands were at one time connected with the American continent (see Baur, 1891). The second part is marked "to be continued" but no further chapters follow. Dr. Baur's death occurred at about this time and presumably the paper was never finished. See part 1, p. 662, for a list of Baur's publications dealing with his theories regarding the origin of the Galapagos and their animal and plant life.

1897b. Baur, G. H. C. L. Birds of the Galapagos Archipelago: a criticism of Mr. Robert Ridgway's paper. Am. Nat., XXXI, pp. 777-784. [Not seen by me.]

1897. Ridgway, R. Birds of the Galapagos Archipelago. Proc. U. S. Nat. Mus., XIX, no. 1116, 1896 (March 15, 1897), pp. 459-670, pls. LVI-LVII, many figs. in text.

The outstanding treatise upon Galapagos birds, the introductory statement that it "is intended to embody practically all that is known of the avifauna of the Galapagos Archipelago" being abundantly justified. The new subject matter here presented is based chiefly upon collections made by "the naturalists of the *Albatross* in 1888 and 1891, and Messrs. Baur and Adams in 1891." Dr. Baur's collection eventually went to the Rothschild Museum, Tring, England. In the introduction there are discussions of the relations of the Galapagos species, lists of the genera upon the Galapagos and as compared with other regions, and lists of the species reported from each island. In the body of the paper, under each species are given synonymies, detailed descriptions, lists of specimens, in many cases line cuts of structural features, and maps showing distribution. A bibliography lists nearly all publications pertaining to the avifauna of the Gala-

pagos that had appeared up to that time, with illuminating comments and explanatory notes upon each one.

My personal copy of this publication is of interest. It is inscribed upon the cover (presumably in Dr. Baur's handwriting), "G. Baur. April 3rd 97 Chicago;" upon the first page (in Mr. Ridgway's handwriting), "March 30, 1897. Dr. G. Baur: with kind regards of Robert Ridgway." The text is interspersed with comments and alterations, some in pencil, some in red ink, inserted by Dr. Baur.

1898. Ogilvie-Grant, W. R. (See Sharpe, R. B.)

1898. Ridgway, R. Birds of the Galapagos Archipelago. Am. Nat., XXXII, pp. 386-389. Under "correspondence". Replying to criticisms of Dr. Baur.

1898a. Rothschild, Walter. [Descriptions of new species of birds from the Galapagos Islands.] Bull. Brit. Orn. Club, VII, no. LIV, May 25, pp. li-liii.

The following species named: *Phalacrocorax harrisi*, Narborough Island, p. lii; *Sula websteri*, "Clarion Island, Galapagos, and the neighboring seas," p. lii; *Nesomimus hulli*, Culpepper Island, p. liii; *Nesomimus affinis*, Narborough Island, p. liii; *Certhidea becki*, Wenman Island, p. liii; *Certhidea drownei*, Culpepper Island, p. liii.

1898b. Rothschild, W. [Description of a new species of Nesomimus.] Bull. Brit. Orn. Club, VIII, no. LVI, Oct. 31, p. vii.

Nesomimus carringtoni [typographical mistake for *barringtoni*], Barrington Island.

1898. Sharpe, R. B., and Ogilvie-Grant, William Robert. Catalogue of the Plataleæ, Herodiones, Steganopodes, Pygopodes, Alcæ, and Impennes in the collection of the British Museum. Plataleæ (Ibises and Spoonbills) and Herodiones (Herons and Storks), by R. Bowdler Sharpe. Steganopodes (Cormorants, Gannets, Frigate-Birds, Tropic-Birds, and Pelicans), Pygopodes (Divers and Grebes), Alcæ (Auks), and Impennes (Penguins), by W. R. Ogilvie-Grant. Cat. Birds Brit. Mus., XXVI, xvii + 687 pp., VII pls., text figs.

1899. Rothschild, Walter, and Hartert, Ernst. A review of the ornithology of the Galapagos Islands. With notes on the Webster-Harris expedition. Novit. Zool., VI, pp. 85-205, pls. V-VI, many text figs.

A contribution of great importance, based upon "not less than 3075 skins from the recent expedition under Mr. Harris, and the Baur collection of about 1100 skins," besides which the authors "had constant access to Gould's and Salvin's types in the British Museum" (pp. 141-142). Introductory chapters include the diaries of some of the collectors, a brief list of publications, and "general

remarks about the fauna of the Galapagos Islands." New forms are described as follows: *Certhidea olivacea ridgwayi*, Charles Island, p. 149; *Geospiza darwini*, Culpepper Island, p. 158; *Geospiza dubia simillima*, Charles Island, p. 161; *Geospiza fuliginosa minor*, Bindloe and Abingdon islands, p. 162; *Geospiza scandens septentrionalis*, Wenman and Culpepper islands, p. 165; *Nesopelia galapagoensis exsul*, Wenman and Culpepper islands, p. 184; *Creciscus sharpei*, Indefatigable Island, p. 185.

1899. Sharpe, R. Bowdler. A hand-list of the genera and species of birds, vol. I, xxi + 303 + 20 pp.
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Includes a list of Dr. Baur's writings, which contains a number of important papers on the Galapagos Islands.

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New forms of Galapagos and Cocos islands birds described as follows: *Nesomimus melanotis dierythrus*, North Seymour Island, p. 74; *Geospiza scandens rothschildi*, Bindloe Island, p. 75; *Geospiza fortis platyrhyncha*, Iguana Cove, Albemarle Island, p. 75; *Micranous diamesus*, Cocos Island, p. 76.

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1902. Beck, R. H. A letter from the Galapagos expedition. Condor, IV, pp. 50-52.

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Demonstrating the fact that the recently named *Cocornis agassizi* Townsend (described from Cocos Island) is synonymous with *Cactornis inornata* Gould, mistakenly supposed to be from a Polynesian island.

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The species described are *Certhidea olivacea fusca*, *Geospiza fuliginosa*, *Pyrocephalus dubius*, and *Nesomimus adamsi*.

1902b. Rothschild, W. [Exhibition of and comments upon certain birds of Cocos and the Galapagos islands.] Bull. Brit. Orn. Club, XIII, Oct. 31, 1902, pp. 6-7.
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Largely devoted to life history, and containing descriptions of nests and eggs of many of the land birds. An "annotated list of the birds of the Galapagos Islands" (pp. 416-418) numbers 108 forms.

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1925. Mathews, Gregory M. The Birds of Australia. Bibliography of the birds of Australia, part 1. Pp. viii + 96, one pl. April 6, 1925.

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Certhidea placed in the Fringillidæ as a near relative of *Geospiza*.

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ERRATUM

Page 21, line 11, *for* fig. 18, p. 290 *read* opp. p. 138

PACIFIC OCEAN

THE GALAPAGOS ISLANDS

SOUNDINGS IN FATHOMS
HEIGHTS IN FEET
Underlined figures in the water in parentheses indicate the height above the plane of high water of the adjacent island or rock
By W M Griffen

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