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# ANTILLEAN TERRAPINS

BY

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WITH NINE PLATES

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## INTRODUCTION

It would be foolish to say that the last word concerning the systematic status of the various West Indian terrapins is said in this paper. There is no strong possibility that this is the case. The picture we present is by no means completely satisfactory. We admit the inherent improbability of a new form being found in the Rio Jobabo and the common widespread form being found in the Rio Cauto in Cuba, but this seems to be the case, and no explanation can be offered but that one small population has suddenly, as it were, differentiated to where the degree of differentiation is almost specific. The possibility of hybridization between populations of terrapins is by no means to be cavalierly passed aside, but this whole matter is very little understood and extremely difficult to demonstrate. We lack material from too many areas to do more than sketch an outline. We believe, however, that inasmuch as we have been able to see more material than has ever been gathered together before, our conclusions are not improbably essentially correct so far as they go.

For many years the senior author has been collecting specimens and having them illustrated, until a considerable number were accumulated. Administrative duties and the fact that he could by no stretch of the imagination pose as a specialist with regard to studying Pseudemys led him to ask the junior author, who was so qualified, to be kind enough to associate himself with this study. He consented so to do and has made three long visits to Cambridge in this connection. The senior author has, however, had enough of a "finger in the pie" so that he can in no wise dodge responsibility for the conclusions which have been reached.

The line drawings illustrating this paper, as well as some of the colored figures, were done by Mr. Eugene N. Fischer who is well known for the painstaking care with which he has illustrated many publications of this Museum. Other colored illustrations are by the competent hand of Miss Jessie Sawyer.

It is quite impossible to thank all of the host of friends who have helped us with material or information. First and foremost Doctor Leonhard Stejneger gave us photographs of Shaw's type of *Testudo rugosa* no. 990 in the collection of the Royal College of Surgeons in London, while Mr. H. W. Parker provided similar photographs of the type of Gray's *Emys decussata* in the British Museum. Doctor Wilson Popenoe, of the United Fruit Company, helped us to secure

[1] Printed with the aid of a special gift from Mr. George R. Agassiz.

material from Jamaica. The Honorable Norman Armour, formerly American Minister at Port-au-Prince, and Mr. F. H. Baker, formerly of the United States Department of Agriculture, helped us to secure specimens in Haiti. In Cuba Mr. Charles H. Thrall, formerly Executive Officer of the Cuban Sugar Club, Mr. R. M. Grey of Soledad, Mr. Norcott S. Henriquez, Comprador for several sugar companies in Havana and Agent there for Harvard University, Dr. C. G. Aguayo and Mr. Gaston S. Villalba all secured terrapins for us, collecting themselves or from friends in various parts of the Island. Messrs. Wilton G. Albury and J. V. Malone aided several officers of the Museum, collecting in the Bahamas, in procuring specimens both on Cat Island and Great Inagua. To all these, and others besides, our cordial thanks are given.

Our material from the Dominican Republic is obviously inadequate and we thank the authorities of the Field Museum of Chicago for loaning us three specimens from Sanchez. One of these is made the type of a new form. The United States National Museum and the Museum of Zoology at the University of Michigan at Ann Arbor have also kindly loaned us specimens from time to time and their so doing is appreciated.

The West Indian terrapins of the genus *Pseudemys* comprise a section of the wide-ranging *scripta* group, being most closely allied to the Central American *Pseudemys scripta ornata*. This close relationship was recognized by Boulenger (1889), who combined the West Indian forms under the name *rugosa* and listed them as a "variety" of *Chrysemys scripta*. In a recent paper the junior author has pointed out that the *scripta* group is distributed, through a series of intergrading forms, from North Carolina into South America. Although each island in the Greater Antilles (and each of two of the Bahamas) has one or more recognizable forms, the differences between these stocks are not great; likewise the characters differentiating the island forms from Honduranian *ornata*, which appears to be the annectant continental stock, are relatively slight. Indeed, in most of the distinguishing features there may be found complete overlapping, and were it not for a few minor characters which appear not to intergrade, it would seem necessary to reduce the insular forms to subspecific standing.

The characters common to insular and continental stocks are as follows:

*Skull.* The jaws are smooth—not cusped, and without marked serrations, and the cutting edges of the maxillae meet at the symphisis at a vertical angle, where an auxiliary notch of varying depth is often present. The alveolar surfaces of the upper jaw are relatively smooth, and their median ridges low and but slightly denticulate.

*Markings.* The most conspicuous head stripes are the supratemporal and the orbito-mandibular; the lines on the top of the head are reduced or lacking. The completely developed plastral pattern is the most extensive in the genus. The markings on the bridge and marginals are identical.

*Melanism.* Found in old males throughout the *scripta* group.

*P. s. ornata* appears to be more or less intermediate between the two subgroups of West Indian terrapins defined later in the text. These two groups, distinguished from one another by somewhat subtle but apparently consistent differences, combine the Cuban, Jamaican, and Cat Island forms on the one hand, and those on Porto Rico, Hispaniola, and Great Inagua on the other. All things considered, the Cuban *decussata* is perhaps the form which approaches *ornata* most closely, but it differs in the absence or great reduction of markings on the carapace and in the obsolescence of stripes on head and legs.

In general, the distribution of this group of turtles on the islands of the West Indies and the relationships with continental forms which they show, present a picture entirely compatible with what is known of the paleogeography of the Antillean region and with zoogeographic generalities which the herpetological fauna as a whole indicates. The group presents certain minor anomalies of distribution, such as the puzzlingly close *apparent* relationship between the Jamaican and Cat Island forms, a relationship which appears to be much more intimate than that between *P. d. decussata* and the strikingly differentiated but intergrading form, *P. d. plana,* but such disparity in reaction to the effects of barriers and time of separation may quite properly be interpreted as a peculiarity inherent in pseudemyd germ plasm, for the North American forms afford ample basis for such an interpretation.

It seems to us quite logical to assume that the *scripta* complex originated in and has radiated from a Mississippi Valley center, perhaps in the lowlands bordering the Embayment during Tertiary time, and that during the time of its connection with the Central American land mass, Antillea became populated with the stock which subsequent submergence has reduced to a series of insular populations. The history of the Antillean forms may in this way be inferred with some conviction, but that of the two known Bahamian species (*malonei* and *felis*) must await a more thorough understanding of the relative paleophysiography of Antillea and the Bahamian plateau.

## Taxonomic Arrangement

In the present paper the following forms are recognized: The *terrapen* sub-group

*P. terrapen* (Lacépède)—Jamaica.

*P. felis* Barbour—Cat Island, Bahamas.

*P. decussata decussata* (Gray)—Cuba, except Rio Jobabo and southern Pinar del Rio: Isle of Pines.

*P. decussata plana* new subspecies—Rio Jobabo, Oriente Province, Cuba.

*P. decussata angusta* new subspecies—Caribbean drainage in Pinar del Rio Province, Cuba.

The *stejnegeri* sub-group

*P. stejnegeri stejnegeri* Schmidt—Porto Rico and (fide Grant 1932) Vieques Island.

*P. stejnegeri vicina* new subspecies—Hispaniola.

*P. decorata* new species—Haiti.

*P. malonei* Barbour and Carr—Great Inagua, Bahamas.

In deciding between binominals and trinominals for the several forms the overlapping or failure to overlap of characters has been our only criterion. Thus, the trinominal has been used for *vicina* which is markedly distinct from *decorata*, the other Hispaniolan form, but which intergrades apparently connect with *stejnegeri*, and for *angusta* and *plana*, since variations in *decussata* encroach slightly on their distinguishing characters.

Of the *scripta* group, we regard Mississippi Valley *troostii* as the most generalized, and as probably closest to the ancestral stock, while typical *P. s. scripta* appears to be the most specialized form in the complex. Among the West Indian terrapins, as is mentioned above, *P. d. decussata* possesses the most features in common with *P. s. ornata* (and also with *troostii*) and so may be regarded as the most primitive of the insular forms. *P. malonei*, having departed farthest from what seems to us to be the prototypic condition, is apparently the most advanced stock.

We regard *E. vermiculata* Gray as based on the melanistic male of *decussata*, *E. jamao* Vilaró (Duméril, nomen nudum) as the non-melanistic male of *decussata*, and *E. gnatho* Vilaró (Cope, nomen nudum) as the old female of *decussata*.

Since Shaw's description is inadequate and his types not identifiable, the name *rugosa* is not used.

The name *T. palustris* Gmelin is apparently a pure synonym of *T. terrapen* Lacépède.

## Taxonomic Characters in West Indian Pseudemys

The characters employed by the older writers in attempting to give diagnoses of turtles are, in many instances, obviously trivial and valueless. For want of clear-cut, tangible features individual and sexual variations have been repeatedly used and much time and paper has been expended in the listing of generic and even family characters as specific diagnoses.

The characters which we have found to be of more or less taxonomic significance and which have been used extensively in the present paper, are as follows:

*Shell proportions.* The many unsuccessful attempts to distinguish forms of *Pseudemys* on the basis of shell proportions have been due in large measure to failure to compare comparable stages and sexes. Such ratios are often of the greatest help when individuals of one sex and of similar size are compared; they are, however, almost useless in juvenile specimens.

*Stripes on head and limbs.* Of great value in other groups in the genus, the number and nature of stripes on the head and legs are less revealing in West Indian forms, because of their exasperating tendency to lose all markings with age.

*Conformation and modelling of the skull.* Although there are no significant osteological differences in the structure of the skulls of the forms, there are slight but constant differences in the shape and proportions of the snout and in the modelling of the surface of the maxilla. It is partly on the basis of such differences that we have distinguished the *terrapen* and *stejnegeri* sub-groups. It should be pointed out that previous writers who have used snout characters have in nearly every instance been confused by the normal sexual disparity in snout length.

*Plastral pattern.* In *Pseudemys* generally, and particularly in the *scripta* group, the dusky figure on the plastron, although neglected by most taxonomists, is undoubtedly of value in determining relationships. The extensive *rassenkreis* extending from *scripta* in the southeastern United States to the neotropical *ornata* involves a progressive increase in the complexity of this pattern. Intermediates have demonstrated the nature of the change from the pair of simple gular smudges of typical *scripta* to the extensive and complex figure of *ornata*. This intricate design, as found in much the same detail in *ornata*, young specimens of Cuban *decussata*, and in *P. d'orbignyi*, which we believe will eventually prove to be the southernmost extension of the *scripta* complex, is unique for the genus, but is closely approached by the plastral pattern of certain forms of *Chrysemys*.

## Sexual Dimorphism—The "rugosa" Phase

The taxonomic confusion which for more than a hundred years has surrounded the Antillean terrapins has been due in large part to the marked sexual dichromatism which the group displays, and to the fact that this dichromatism does not distinguish the sexes at all ages.

The first author who applied a proper binominal name to one of the group was Lacépède (*Testudo terrapen*, see discussion, page 393), who described the Jamaican form in 1788. The next year Gmelin (1789), apparently unaware of Lacepédè's work, introduced the name *T. palustris* for the same turtle. In 1802 Shaw proposed the name *T. rugosa* for a pair of specimens now in the collection of the Royal College of Surgeons, London (no. 990). These specimens, photographs of which have been furnished us through the courtesy of Doctor Stejneger, are the shells of what undoubtedly are West Indian *Pseudemys*, although they are without locality data. One of the shells, apparently that of a mature female, is unidentifiable; the other, that of a male showing advanced melanism and likewise specifically unidentifiable, is evidently the specimen on which Shaw's figure was based and which served to establish the name *rugosa* for melanistic males of the group no matter on which island they were found by subsequent writers.

Given prestige by the writings of Gray (1831, 1844, 1855, 1870, 1873) who described *decussata* without locality and retained the name *rugosa* for melanistic males, Duméril and Bibron (1835), Sagra (1843), Gosse (1851), Strauch (1865), and others and by the plates of Sowerby and Lear (1865), the error has persisted until the present time, although the actual status of the melanistic individuals has been suggested numerous times.

Apparently the first writer who expressed any doubt of the distinctness of the melanistic form was Vilaró (April and May 1867, p. 119–121) who advanced the opinion that *rugosa* and *decussata*, in Cuba, were probably male and female of the same species. However, his subsequent remarks, quoted below, hardly help to clarify the situation: [it should be understood that three vernacular names have been applied to the Cuban terrapins, jicotea to the females, jarico to the melanistic males, and jamao apparently to males which show no melanism or as Gundlach (1880) states, to "unos individuos que tienen uñas largas y el color de ambos sexos igual al de la Jicotea"] "Al hacer una especie de las Emys *rugosa* y *decussata*, y otro de la *Emys* jamao,[1] descansamos principalmente en un dato

[1] In explanation of his use of this name Vilaró, in November 1867, writes as follows: "En la pagina 120 de esta tomo cito el Jamao con el nombre de Emys jamao, secundum Poey, como inscrito de esta manera

negativo, cual es el no haber hallado hasta ahora un ejemplar feminino con los colores del Jarico. Si se llega a encontrar, podrá resultar que las dos Jicoteas, *rugosa* y *decussata*, sean dos buenas especies y que el Jamao venga a ser el macho de la ultima." A few pages further on in the same publication (p. 104) Gundlach expresses the opinion that "el macho se llama Jarico, la hembra, Jicotea."

In October of the same year Vilaró asserts that Duméril now agrees with him that *rugosa* and *decussata* are the same species, and introduces and briefly describes a fourth form, *E. gnatho* (*Trachemys gnatho* Cope, nomen nudum). This name was applied to an extraordinary phase occurring in certain females of *decussata* and occasionally seen in other forms. This is apparently merely a manifestation of extreme age, the most striking feature is the enormous and disproportionate growth of the head. The snout becomes greatly shortened, and augmented by a marked increase in the width of the angle at which the maxillae meet, the whole region anterior to the eyes is relatively so broadened as hardly to resemble the head of a turtle. We have specimens of *decussata* from several localities exhibiting this freakish condition.

In two publications (1875 and 1880) Gundlach makes further mention of the several forms but relegates them all to the synonymy of *rugosa*. Fowler (1918) discusses melanism in the Porto Rican form, and Danforth (1925) says: "There is a popular idea that there are two species, a green one and a black one, but I have found specimens forming all sorts of intergrades between the two". Barbour and Ramsden (1919) say that, "In spite of popular belief, there is but one species of Jicotea found in Cuba."

More recently De Sola and Greenhall (1932) have undertaken to settle the matter once and for all in a paper entitled, "Two Species of Terrapin in Cuba; The Antillean Terrapin, *Pseudemys rugosa*, and the Cuban Terrapin, *Pseudemys decussata*." In the preface to this paper the reader learns that "Some solution may now be given to the long standing and perplexing problem concerning the terrapins of Cuba, and the multiplicity of West Indian forms", but any optimism that this remark may engender is soon dispelled by our reading that, "It is interesting that all our material was collected in a restricted locality near Martí, in the Province of Camaguey, Cuba, for our specimens *separate into two* distinct groups (!). . ."

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en los catálogos del Sr. Aug. Dumeril. Con mas exactitud puedo decir ahora en vista de una carta reciente del Sr. Dumeril á D. F. Poey, que aquel nombre aparece en una lista de los Reptiles que vivieron en el Jardin de Plantas de Paris, intercalada en una 2ª. noticia publicado por Dumeril en los Archivos del Museo, t X, en Setiembre de 1861, p. 435, con la inscripcion de num. 27, *Emys Jamao*, A. Dum., segun F. Poey, macho y hembra, Habana, 2 individuos."

One of these "distinct groups", the old male group, is described under the name *P. rugosa*. The characters presented as distinguishing it are merely those of a melanistic male, the specimen selected as typical of the form (American Museum 44876) is "an adult male" as are the other specimens which they mention as having examined, and finally, reference is made to Sowerby and Lear's plate of *rugosa* which De Sola and Greenhall reproduce and which is merely the melanistic phase of some indeterminate species of West Indian *Pseudemys*, and is also obviously a male.

*P. decussata* is summarily dismissed with the remark that its range is "only known as Rio Tana and Rio Jobabo in the Province of Camaguey, Cuba," and that "all the specimens in this group agree with the original description of Gray that adequately differentiates *P. decussata* from *P. rugosa*," followed by a quotation of these characters which really do nothing but distinguish females and young males from melanistic individuals. We are then referred to Sowerby and Lear's plate of *decussata*, also reproduced, which probably really does represent the Cuban form. It is a female.

Next there comes a "Key to the Cuban Species of *Pseudemys*" which is quite a satisfactory key to the sexes of nearly any of the West Indian terrapins, and finally we read that "Some confusion has been caused by a failure on the part of many to recognize the sex characters present in *Pseudemys*. For example, several Cuban naturalists, who believe in the presence of two species on their island, offered by way of proof a male and a female of the same species. . . This type of error is also encountered in our own country, so the following key may not be amiss." The time-honored tail and toe-nail sex characters are then presented.

In 1934 Grant and De Sola approach the problem from a slightly different angle, the argument being that there are two species of *Pseudemys*, *rugosa* and *decussata*, approximately coextensively distributed throughout the Greater Antilles. But here again *rugosa* is nothing more than the old male—so there is really nothing at all surprising about the two species having coextensive distribution.

Grant and De Sola point out that De Sola and Greenhall state that "the nails of the fore feet of males of *decussata* are elongated", but that "their figure after Sowerby and Lear does not show the nails long enough." It is true that the nails in the figure are not long enough for a male, but this is no indictment of the delineator or the lithographer, since the specimen figured is quite obviously a female.

Grant and De Sola are further impressed by the fact that "the postocular stripe is red and present in both sexes of *P. decussata*" but is lacking in *rugosa*. This condition is illustrative of the situation which has apparently been the chief source of confusion to Messrs. De Sola, Grant and Greenhall, and to many earlier workers as well. Had *all* their males been melanistic, and all their females normally colored, they would probably not have been confused at all. But unfortunately melanism seems to be a condition which is visited upon the males, not at the age of puberty or of sexual maturity, or on attaining length, but at some quite indefinite and variable time during adult life. Thus, one finds some males colored like the females and others like *rugosa* (and others in between), and all about the same size. Moreover, we have seen certain indications that an occasional male lives to a ripe old age without ever becoming melanistic.

This phenomenon of melanism in old males is not peculiar to the West Indian terrapins. It is found to a marked degree in other forms of *Pseudemys*, especially in *scripta*, *troostii* and *elegans* and to a lesser extent in *mobiliensis*, *nelsoni* and *rubriventris*. The evolution of the definitive melanistic pattern appears to be a similar process in the West Indian forms and in the races of *scripta*.

The first indications of incipient melanism are rarely found in specimens under 150 mm. in length. There is some evidence that, once begun, the process may be relatively rapid. The thin lines along the bridge and those forming the marginal concentric figures darken and begin to break up. The black borders of the stripes on the head and the limbs darken and broaden. Flecks of black pigment are deposited along and between the plastral sutures, at first in the form of a somewhat vague but symmetrical figure, which progressively grows more conspicuous, in one phase the entire plastron becoming vermiculate with pigment, and in another the pigment remaining confined to the region of the sutures. Deposition of pigment on the carapace begins on the anterior plates and progresses posteriorly; in many specimens the anterior half of the carapace is heavily vermiculate and the posterior portion untouched. As the black flecks anastomose and come to occupy more area than the ground color, the latter changes from the original olive or brown to slate blue, horn-color or light yellow, the result being a black shell speckled with yellow or bluish. Nearly the same process takes place on the plastron, except in certain individuals in which, as stated above, the black pigment apparently remains permanently confined to the sutures. Meanwhile, the black lines bordering the yellow stripes on head and limbs have broadened and broken up, as have the yellow stripes themselves. With the fragmentation of

the yellow markings the yellow pigment increases markedly in intensity and often in amount. Eventually all the original markings are obliterated, and the legs and head are vermiculate, entirely black, or entirely yellow.

*Key to the West Indian Terrapins*

1. Snout of adult rounded terminally, not constricted beneath anterior margin of orbit; maxillae smoothly rounded ..... 2
   Snout of adult flattened at the tip, nearly straight from nostrils to edge of jaws, somewhat constricted before orbits; anterior surface of maxilla usually more or less concave beneath anterior margin of orbit ..... 6

2(1) Ground color of head and limbs slate gray; carapace either straight-sided and somewhat wedge-shaped or nearly circular from dorsal aspect ..... 3
   Ground color of head and limbs light greenish to olive-brown; carapace oval or elongate-oblong from dorsal aspect ..... 4

3(2) Carapace short, the widest point at about middle, high (length/height, av., males 2.57, females 2.42) and with few, very deep longitudinal rugosities ..... *Pseudemys felis*
   Carapace widest posteriorly (the posterior lateral marginals flaring) straight-sided and wedge-shaped from dorsal aspect; longitudinal rugosities numerous but relatively shallow ..... *Pseudemys terrapen*

4(2) Carapace broad, very low (length-height, av., males 3.25, females 3.09) and with the dorsal line often nearly straight from middle of first to middle of fourth vertebrals in lateral aspect ..... *Pseudemys decussata plana*
   Carapace oval or elongate-oblong, not strikingly low, dorsal line strongly arched from lateral aspect ..... 5

5(4) Ground color of soft parts light greenish to olive; carapace usually oval in dorsal aspect (if oblong, then not narrow), its ground color greenish or chestnut; stripes on head and limbs obsolescent; melanistic male usually evenly vermiculate ..... *Pseudemys decussata decussata*
   Ground color of soft parts very dark brownish olive; stripes usually distinct; carapace narrow, straight-sided or constricted from dorsal aspect, elongate and high, its ground color very dark brown; large areas on shell and soft parts often solid black in melanistic males ..... *Pseudemys decussata angusta*

6(1) Plastral pattern composed of from several to numerous small circular or concentric markings; dorsal pattern evident, at least in part, ..... *Pseudemys decorata*
   Plastral pattern a single, more or less unified figure, often obsolescent between the bridges; dorsal markings not evident ..... 7

7(6) Shell short, broadly elliptical from dorsal aspect, the widest point at or very near the middle; vertebral line elevated by a smooth, continuous keel, highly arched from lateral aspect, especially in females (average length/height ratio in females 2.35) ..... *Pseudemys malonei*
   Shell rather elongate, its widest point usually behind middle, posterior marginals flaring; vertebrals mostly flattened, not highly arched from lateral aspect (average length/height ratio in females 2.50) ..... 8

8(7) Anterior elements of plastral figure not following the sutures, often occupying much of the anterior portions of the gulars, and tending to reach antero-median margins of

gulars and to continue dorsally onto the upper surface of the gulars; head of female not noticeably broadened (width of head at anterior margins of tympana contained in length of carapace 7.8–8.0 times), rather shallow (depth of snout, including mandible, at anterior margins of orbits contained in length of carapace 12.0–14.4 times)..... *Pseudemys stejnegeri stejnegeri*

Plastral pattern essentially following the sutures anteriorly—usually with no part of it extending to antero-median margins of gulars; head of female very broad (breadth at anterior edges of tympana contained in length of carapace 7.0–7.2 times), snout short and very deep (depth, including mandible, at anterior margins of orbits contained in length of carapace 12.0–14.4 times)..... *Pseudemys stejnegeri vicina*

### The terrapen sub-group

*Characters.* Snout blunt, rounded, slightly depressed; its anterior surface broad and smoothly curving, the curve nearly continuous with the arch of the lateral surface of the maxillae. Snout not noticeably constricted beneath anterior margin of orbit. Plastron somewhat truncate anteriorly, gulars not projecting much beyond anterior corners of humerals, and not constricted and upturned laterally. Plastral pattern, if evident, following sutures anteriorly and usually not reaching anterior margin of gulars.

### Pseudemys terrapen (Lacépède)

*Testudo terrapen* Lacépède, 1788, Hist. Nat. Quadr. Ovip. Serp., I, Syn. Meth., p. 444.—Bonnaterre 1789, Tab. Encycl. Erpét., p. 30. (not *T. terrapen* Schoepff, 1792).

*Testudo palustris* Gmelin, 1789, Syst. Nat., I, iii, p. 1041.—*Trachemys palustris* Baur, 1893, Amer. Nat., XXVII, p. 276.

*Testudo rugosa* Shaw, 1802, Gen. Zool., III, i, p. 28, pl. IV.[1]—*Emys rugosa* Gosse, 1851, Nat. Soj. Jamaica, p. 189.

*Emys decussata* Gosse, 1851, Nat. Soj. Jamaica, p. 187.

*Chrysemys scripta* var. *rugosa* Boulenger, 1889 (part), Cat. Chel. Brit. Mus., p. 79.

*Pseudemys palustris* Barbour, 1910, Bull. Mus. Comp. Zool., LII, p. 301.

*Type.* Not designated.

*Type locality.* Jamaica.

*Distribution.* Jamaica.

*Diagnosis.* Carapace relatively short, straight-sided, and somewhat wedge-shaped from dorsal aspect, widest and flaring posteriorly; all markings greatly reduced, barely or not discernible on sides and top of head in mature specimens; supra-temporal stripe, when present, white in preserved specimens; ground color of head and limbs slate gray. Most closely approached by *P. felis*, the Cat Island form, from which it may be distinguished by the proportions and sculp-

[1] Although *T. rugosa* Shaw is unidentifiable, we believe that the above is the most satisfactory disposal that can be made of the name.

turing of the carapace (carapace short, high, more nearly circular and with extensive keel and few, deep longitudinal rugosities in *felis*).

*Description. Body proportions:* Length/width, males 1.25–1.33, av. 1.29, females 1.20–1.29, av. 1.25; length/height, males 2.56–2.66, av. 2.61, females 2.42–2.62, av. 2.51; width/height, males 1.92–2.13, av. 2.02, females 1.89–2.09, av. 1.99. Average length, males 163 mm., females 182 mm. *Carapace:* Short, rather low and broad, the widest point lying in the flaring posterior third; costals with numerous longitudinal wrinkles, especially in the adult female; radial wrinkles, often conspicuous on the costals of young specimens, are obliterated with age; first vertebral somewhat domed, first and last nearly smooth, the others flattened and with a narrow keel. Ground color grayish brown to dark gray, markings, including marginal blotches, often entirely obsolete. *Plastron:* Not noticeably constricted at anterior ends of humerogular sutures; ground color cream or grayish white; dusky pattern nearly or completely lacking in our specimens, although the arrangement of the rudiments present in one or two specimens suggests a close affinity with Cuban *decussata* in this respect; lower marginal blotches and markings on bridge indistinct or lacking; projecting upper surface of gulars not marked. *Head:* Snout short, not pointed in either sex; upper jaw with a slight, rounded terminal notch and with a low ridge on the alveolar surface. Stripes obsolescent or lacking; supratemporal white in preserved specimens when discernible; orbital and mandibular confluent beneath the tympanum when discernible; no accessory stripes between supratemporal and orbital. Throat light, the stripes faded. Stripes on anterior surface of front foot faded and ill-defined; upper surface of hind foot dark gray or black—not striped; terminal third of tail dark above.

Although our series does not include a male showing advanced melanism the occurrence of the phenomenon among the Jamaican terrapins is indicated by the following statement from Gosse (1851); "Along with the above described (*Emys decussata*), frequenting the same situations, having the same habits, and nearly equally common, another species is taken, *E. rugosa*, distinguished by having the pale yellow plates of the sternum each edged with a broad border of dark brown. Cuba possesses both species in common with Jamaica." Moreover, Doctor Stejneger writes, "I find that we have both the *rugosa* and the *decussata* styles in Jamaica as well as in Cuba."

*Habits.* Gosse (l.c.) describes the habitat as follows: "Between Shrewsbury and Content is a pond of about one acre in extent, choked up with *Potamogeton* and covered with duckweed. . . A giant Cottontree rises from the margin, and

the long branches of a vigorous bastard-cedar reach almost quite across it. A luxuriant gourd called the Duppy's melon has entwined in the limbs of the cedar, and sends down a hundred vines which dip their tangled mazes into the water . . . on the logs and branches that from time to time have fallen from the overhanging trees, and now project here and there from the green surface, the turtles may be seen sitting to enjoy the sunshine in the heat of the day." The same author describes catching the turtles in a rat-trap on the end of a pole baited with meat, preferably "a small bird with the feathers singed."

*Localities.* Jamaica: Rio Cobre, "12 miles from Kingston", Mus. Comp. Zool. 29700–4; Port Antonio, Mus. Comp. Zool. 7377, 26786.

A careful comparison of the early works in which the Jamaican terrapin is mentioned has made it evident that the name *palustris*, used by Stejneger (1904), Schmidt (1928) and others, is a synonym of *Testudo terrapen* Lacépède. These writers have no doubt followed Baur (1893) who, in discussing the name of the diamondback terrapin (*Malaclemmys*), says: "The name *M. terrapen* Schoepff, 1793, cannot be used [i. e. for the diamondback]. The same name (*Testudo terrapen*) was given by Bonnaterre (1789) to the *Trachemys rugosa* Shaw, 1802, of Jamaica. Already in the year 1788, however, Gmelin introduced the name *Testudo palustris* for the Jamaica tortoise; I therefore use the name *Trachemys palustris* Gmelin for the Jamaica tortoise. . ." Information available today, but apparently not in Baur's time, indicates that the several parts of Gmelin's edition of the Systema Naturae (the animal kingdom) did not all appear in 1788, but over a period of five years, from 1788 to 1792. According to Hopkinson (1907), part three, in which the name *T. palustris* is to be found, was published November 20, 1789.

In Lacépède's Synopsis Methodica (in vol. 2 of his Histoire Naturelle, etc., p. 444) in a table with one column headed "species" and the other "charactères", following *T. orbicularis* and preceding *T. serpentina*, we find the name "*Terrapen*" without the generic abbreviation. Although this arrangement gives the impression of a departure from the binominal system the fact that the name occurs under an initial heading, "Testudo", makes it evident that the omission of the "T" was inadvertent; moreover had Lacépède intended to use a vernacular name, it would have been "Terrapène." The characters given, "Testa superiore planiusculâ & ovata" would be insufficient to establish the name with no locality stated but in Volume 1, page 161–168, under the heading "La Terrapène" we are told that "On la trouve aux Antilles & particulièrement à la Jamaique . . . très commune dans les lacs. . ."

Bonnaterre (1789) refers to Lacépède, but gives the name of the Jamaican terrapin as *T. "terrapène"*.

The earliest reference to the Jamaican species, and that constituting the basis for both Lacépède's and Gmelin's descriptions, is made by Browne (1756), who gives the habitat of the creature and says, "It is often served up at gentlemen's tables in that island and looked upon as delicate wholesome food by many people."

### Pseudemys felis Barbour

*Pseudemys felis* Barbour, 1935, Occ. Papers Boston Soc. Nat. Hist., VIII, p. 205.

*Type.* Museum of Comparative Zoology 38385, mature female.

*Paratypes.* Museum of Comparative Zoology 38386–8.

*Type locality.* Tea Bay, Cat Island, B. W. I.

*Distribution.* Known only from the type locality.

*Diagnosis.* Most closely allied to the Jamaican *P. terrapen*, from which it is distinguished by the relatively shorter, higher and more nearly circular carapace, by the more pronounced keel, continuous on all the vertebrals, and by the relatively few, very deep rugosities on the costals in adult females. Differs from *decussata* in the shape of the carapace and in the gray color of limbs and head.

*Carapace.* Very short, broad and high, smoothly rounded, costals arched; a smooth, broad keel usually extending the length of the carapace; first vertebral strikingly embossed; costals deeply and coarsely rugose longitudinally; ground color grayish-tan to brown; no markings evident in adults.

*Plastron.* All markings, including lower marginal and bridge figures, lacking or very feebly expressed. Individuals of both sexes usually exhibit broad, irregular deposits of dark pigment along the posterior sutures; in other forms this is a feature of only the old male.

*Head and limbs.* Ground color of head gray in preserved specimens; stripes faint or lacking; supratemporal, when evident, not pigmented; orbital and mandibular confluent or separate; no stripes evident between orbital and supratemporal. Snout relatively short and terminally rounded; upper jaw not, or but slightly, notched mesially. Ground color of legs gray, markings obsolescent.

*Melanism.* Two males in our series are markedly melanistic, two others partially so. The manner of deposition of black pigment is essentially similar to that in *decussata*.

*Habits.* The following is an excerpt from an article by Dr. L. A. Hodsdon

which appeared in the Nassau Guardian, May 19, 1934 (as quoted by Barbour and Shreve, 1935):

"They [the pond turtles] live in a small area at Tea Bay, Cat Island, in fresh water rain puddles and miniature ponds which dry up in the dry season, during which time they hibernate in mud at the bottom of the puddles and pot holes where they work into the mud which extends under the rock at the shelving edges of the pools.

"I think this fact of adaptation to so unfavorable a condition is indicative of long residence of this race of turtles and such isolation of a species under unusual conditions tends strongly towards evolution [sic!]. Another point is that of diet. These turtles are practically fruit eaters. Their favorite fruit is custard apples, a fruit that grows on trees about the ponds and they are about the only fruit obtainable there. Of custard apples the turtles are very fond, and the natives catch them in the day time on hooks baited with bits of custard apple."

*Specimens examined.* Tea Bay, Cat Island, Bahamas, Mus. Comp. Zool. 38385–6, 38995–005, 39003a.

This form represents the extreme in the tendency of the *terrapen* sub-group to lose markings on head, limbs and shell.

As was pointed out by Barbour and Shreve (1935), the Bahamian fauna is extensively derived from Cuba. There is no marked general similarity between it and the faunas of any of the other Greater Antillean islands. Thus, it is surprising to note that, although there is close structural similarity, probably indicating a not-too-remote genetic identity, among the Cat Island, Jamaican and Cuban terrapins, the relationship between *felis* and *terrapen is* APPARENTLY much closer than that between either of these and *decussata*. Moreover, *felis* shows little in common, relatively speaking, with *malonei*, the other Bahamian form. Such anomalies in apparent affinity at once suggest the possibility of accidental dispersal or of introduction by man. While neither of these explanations can be discounted completely, there are numerous objections to both. The fortuitous traversal, by a qualified colonizer, of the more than four hundred miles of island-bestrewn waters separating Jamaica and Cat Island may have somehow been effected, but this seems very unlikely. Although concepts of the lengths of time involved in the evolution of even the lowest catagories of animals are for the most part highly subjective, it is difficult to refrain from forming them on occasion. Thus we state the opinion that, although the specific characters of *felis* are slight, they are definite and constant, and it does not appear satisfactory to regard them as the result of recent isolation by the hand of the white man. The extent

and effects of pre-Columbian traffic among the Indians are largely a matter of conjecture, but the occurrence of such traffic, and the gastronomic interest of Indians, ancient and modern, in terrapins, are well known, and may possibly explain the presence of these creatures in unexpected places—and also their absence in regions where they may once have lived. However, in view of the scarcity of reliable information concerning local vicissitudes of, and relationships between, the Antillean and Bahamian regions during Cenozoic time, we do not feel that human agency must necessarily be appealed to in accounting for minor peculiarities in distribution.

### Pseudemys decussata decussata (Gray)

*Emys decussata* Gray, 1831, Synops. Rept., p. 28; 1855, Cat. Shield Rept. Brit. Mus., p. 30.—Griffith, 1831, Cuvier's Animal Kingd., pl. opp. p. 76.—Bell, 1835, Monogr. Testud. Pts. 4–5, pl. 6.—Cocteau, 1838, in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., p. 14; Atlas, Rept., pl. 1.—Duméril, 1851 (part), Cat. Méth. Rept. Mus. Paris, I, p. 11—*Ptychemys decussata* Agassiz, 1857, Contr. Nat. Hist. U. S. Amer., I, p. 434.—*Clemmys decussata* Gundlach, 1881, Anal. Soc. Espan. Hist. Nat., X, p. 307.—*Pseudemys decussata* Gray, 1870, Suppl. Cat. Shield Rept. Brit. Mus., p. 47.—De Sola and Greenhall, 1932, Copeia, no. 3, p. 132—Grant and De Sola, 1934 (part), Copeia, no. 2, p. 75.

*Emys rugosa* Cocteau, 1838, in Sagra's Hist. Fis. Po. Nat. Cuba, IV, Rept., p. 17; Atlas, 1838, Rept., pl. 11.—Gundlach, April 1867, in Poey's Repert. Fisico-Nat. Cuba, II, 5, p. 104; 1880, Contrib. Erp. Cubana, p. 9; 1881, Anal. Soc. Espan. Hist. Nat., IV, p. 349.—Vilaró, April 1867, in Poey's Repert, Fisico-Nat. Cuba, II, 5, p. 120.—Garman, 1887 (part) Proc. Amer. Philos. Soc., XXIV, p. 286.—Barbier, 1905, Bull. Soc. Etude Sci. Nat., XXIII, p. 91, pl. 3. *Trachemys rugosa* Agassiz, 1857, Contr. Nat. Hist. U. S. Amer., I, p. 436.—Gray, 1870, Suppl. Cat. Shield, Rept. Brit. Mus., p. 48.—*Pseudemys rugosa* De Sola and Greenhall, 1932 (part) Copeia, no. 2, p. 129.

*Emys vermiculata* Gray 1844, Cat. Tort. Brit. Mus., p. 25; 1855, Cat. Shield. Rept. Brit. Mus., pl. 13.

*Emys jamao* Duméril, 1861, Arch. Mus. d'Hist. Nat. Paris, X, pp. 435–445 (nomen nudum).—Vilaró, May 1867, in Poey's Repert, Fisico-Nat. Cuba, II, 6, p. 121; ibid. Nov. 1867, 10, p. 228.

*Emys gnatho* Vilaró, Oct. 1867, in Poey's Repert, Fisico-Nat., II, 9, p. 204.

*Pseudemys palustris* Barbour and Ramsden, 1919, Mem. Mus. Comp. Zool., XLVII, 2, p. 200.

*Type.* In British Museum.

*Type locality.* "America boreali."

*Distribution.* Cuba, except southern Pinar del Rio and Rio Jobabo; Isle of Pines.

*Diagnosis.* Distinguished from *felis* and *terrapen* by the consistently greenish color of soft parts and by the oval or elongate-oblong lateral outline of the carapace.

*Description. Carapace:* Rather broad and moderately domed; from dorsal aspect either short and oval, with widest point near middle of long axis (western phase), or elongate and oblong, with widest point well behind middle (eastern phase). Costals longitudinally rugose and usually with other wrinkles radiating

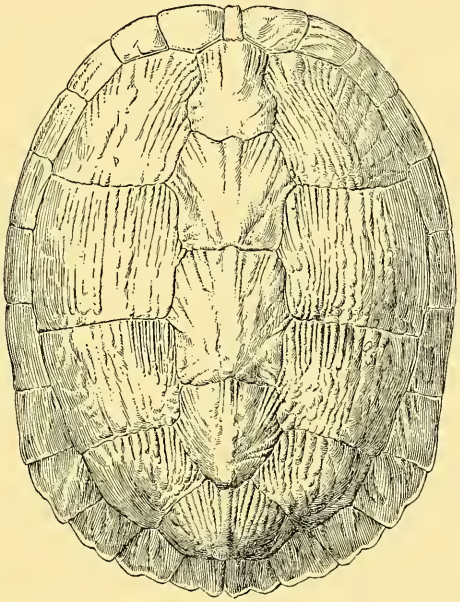

Fig. 1. Carapace of *Pseudemys d. decussata,* ad. ♀, M.C.Z. no. 34165. ½ nat. size.

from the median-dorsal region of each plate; in some specimens the radial furrows are as deep and clearly defined as the longitudinal ones. First vertebral but slightly domed; a keel present posteriorly, but usually not extending onto second vertebral; marginals usually longitudinally rugose. Ground color olive brown or greenish to medium brown; usually lacking definite markings except in young individuals, where rudiments of the typical *scripta* pattern are sometimes evident. *Plastron:* Anterior ends of gulars not markedly extended or laterally constricted. Plastral pattern of the *ornata* type, tending to follow the sutures anteriorly (not

running off anterior-median edges of gulars) and to cover most of the area between bridges with dusky, broad-lined, longitudinal markings; intermarginal sutures bisecting concentric figures; bridge with longitudinal dark bands or irregular concentric markings. Full expression of the ventral pattern is usually to be found only in young specimens. *Head:* Upper jaw with or without a notch at symphisis; snout blunt, rounded, usually depressed. Ground color greenish to olive-brown; stripes often obsolescent, the supratemporal broad, light (in preserved specimens), and usually very faint, orbital and mandibular joined or separate. *Limbs:* Ground color that of the head, with white or yellowish stripes, two of which are usually discernible on outer surface of toes 2 and 4; other faint lines rarely present on outer surface of forelimb; outer surface of hind foot olive, not striped.

The Cuban terrapins in no way detract from the notoriety of the Genus *Pseudemys* as an extremely difficult group. In a recent paper (1938) the junior author has mentioned some of the problems presented by the *floridana* group in the United States. The points mentioned there—the extensive local and individual variation, often involving characters more conspicuous than those distinguishing the geographic races, the simultaneous occurrence of concurrently and independently intergrading characters in individuals from inter-racial areas, the nodal nature of connecting gradients and occurrence of numerous feebly differentiated sub-racial colonies, due probably to their partial isolation in stream systems and lakes—are all encountered in the Cuban population. And an analysis of the situation in Cuba is even more difficult, because the terrapins there have a discouraging tendency to lose the markings of the head and those of the carapace, both very valuable as diagnostic characters.

The forms grouped here under *P. d. decussata* are probably far from being as homogeneous a lot as the nomenclatural treatment would indicate. However, even though we have examined fairly extensive Cuban material, it seems evident that further taxonomic subdivision of the population would be unwise, unless based on collections including specimens from all the drainage systems of the island.

The *scripta* group has often been characterized as having the upper jaw notched at the symphisis. Actually this is by no means always true. Where the character has been used the condition really referred to has usually been the angular junction of the maxillary rami, as contrasted with the straight or slightly arched symphisis in most of the forms of the *floridana* group; this character is of considerable value, but should not be called a notch. In many specimens and

local populations of the *scripta* group, however, there really is a notch, the slope of the rami changing abruptly just prior to their joining, to form an acute median emargination. Individual and local variation with regard to the presence and relative acuteness of this emargination is extensive and quite illogical throughout the group. Often among the Cuban terrapins the differential distribution of this character is very eccentric. Generally speaking, the notch is present in a majority of eastern specimens (those from Camaguey and Oriente), and lacking in a majority of the Cienfuegos series. In Pinar del Rio, however, the situation is anomalous, the notch being present and very acute in nearly all our specimens from the Caribbean drainage, and absent in those from the Gulf slope.

There seems also to be some slight east-west differentiation in the number of lines on the anterior surface of the front foot. While this character is of considerable taxonomic importance in other groups of *Pseudemys*, the above-mentioned obsolescence of color pattern in mature Antillean individuals renders it less usable. Where evident, these stripes are usually six or seven in Camaguey specimens, three to five in the Cienfuegos series, and two or three in specimens from the Gulf drainage of Pinar del Rio. It is of interest to note that here, again, specimens from the Caribbean drainage of Pinar del Rio agree most closely with those from Camaguey, usually having seven stripes.

Variation in the condition of the orbito-mandibular head stripe is even more erratic in its distribution. In most forms in the genus this stripe is formed by the confluence, behind the angle of the jaw, of one conspicuous stripe from the middle of the lower edge of the orbit (orbital) and another from the lower surface of the mandible (mandibular). In the Antillean forms this confluence does not always take place, the two stripes often continuing separately along the side of the neck. The stripes are quite often obsolete in adults. The following table illustrates the condition insofar as it can be ascertained in our Cuban series.

*Orbital and mandibular head stripes*

| Locality | Joined | Separate |
|---|---|---|
| Pinar del Rio (Gulf drainage) | 1 | 5 |
| Pinar del Rio (Caribbean drainage) | 2 | 9 |
| Cienfuegos | 12 | 21 |
| Western Camaguey | 0 | 8 |
| Rio Jobabo (Western Oriente) | 0 | 6 |
| Central Oriente | 6 | 1 |

The conformation of the carapace in *P. d. decussata* is also subject to graded variation along an east-west axis, as indicated in the foregoing description of the form. Nearly perfectly oval in specimens from Pinar del Rio (Gulf drainage),

Cienfuegos and western Camaguey, the outline from the dorsal aspect becomes distinctly oblong in the Central Oriente population. The most extensive reduction of color pattern occurs in specimens from Soledad and Camaguey.

In the following table average lengths and shell proportions of series from six localities are compared.

| Locality | Length | | *Length* Width | | *Length* Height | | *Width* Height | | Number of Specimens | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ |
| Pinar del Rio, Caribbean slope | 174 | 226 | 1.41 | 1.42 | 2.73 | 2.60 | 1.92 | 1.83 | 7 | 5 |
| Pinar del Rio, Gulf slope | 180 | 139 | 1.34 | 1.32 | 2.65 | 2.57 | 1.96 | 1.94 | 6 | 1 |
| Soledad, Cienfuegos | 147 | 200 | 1.33 | 1.36 | 2.76 | 2.50 | 2.05 | 1.82 | 13 | 39 |
| Camaguey | 179 | 250 | 1.38 | 1.44 | 2.99 | 2.60 | 2.15 | 1.79 | 9 | 9 |
| Rio Jobabo | 165 | 165 | 1.37 | 1.37 | 3.25 | 3.09 | 2.35 | 2.26 | 4 | 3 |
| Central Oriente | 186 | 217 | 1.36 | 1.41 | 2.92 | 2.74 | 2.15 | 1.98 | 8 | 6 |

*Habits.* Regarding the habits of *P. d. decussata,* Gundlach writes as follows, (1880):

"The jicotea lays its eggs away from the water in a hole or pit which it makes with the hind feet, and then covers the eggs with earth. The egg in my collection measures 45 mm. by 25 mm.; it is white, with a soft shell like parchment, and if left exposed in a dry place loses its fullness.

"I have observed that in the Cienaga de Zapata the jicoteas, after a hard shower, leave the lake to eat the ripe fallen fruit of the Bagá (*Anona palustris*), which often grows on the shores of the ponds. On one occasion only I have observed, on the bank of a pond on the farm where I used to live, many jicoteas of all sizes eating the mature fallen fruit of the Jobo (*Spondias lutea*). On that occasion I captured two large specimens, those being all that my hands could hold. I returned on other days and at other times and never again saw the jicoteas out of the pond. When the water dries up in the ponds or in the Cienaga the jicoteas look for woods or scrub or tall grass and burrow beneath the leaf-mold; but when the rains begin and fill the ponds the turtles return to them. While they are beneath the leaf-mold they fast and are in a kind of lethargy. It is well known that they can live a long time after being mutilated."

A female specimen collected by the senior author in Baragua, Camaguey Province, laid seven eggs in the laboratory at the Museum of Comparative Zoology during September, 1932. The eggs are almost perfectly elliptical and have the following dimensions: 38 x 25, 40 x 24, 38 x 24, 38 x 24, 39 x 24, 39 x 25, 39 x 25. The shell is creamy white and very minutely granular.

Ponds and lakes are relatively rare in Cuba, and many of the former are simply temporary catchbasins which persist for a while after heavy rains and then disappear by subterranean drainage. As might be expected turtles are not found in these localities. Such large and more or less permanent bodies of water as Lakes Ariguanabo and Bacuranao support a surprisingly small chelonian population. This is probably due to the fact that there has been persistent hunting carried on for many years by the natives who, naturally, appreciate the delicious flavor of these turtles when cooked. A rather large number of sluggish rivers in Cuba, often with deep pools and which not infrequently run through areas of sparse population, are the places where turtles are most often to be seen.

The situation at the Harvard Botanical Garden at Soledad is particularly interesting. About thirty years ago a very small stream was dammed to form a small lake for growing aquatic plants. Within a short time a large population of turtles appeared in this pond to the immense detriment of the water lilies, especially. Then, after some twenty-five years, five other dams were built above the original structure, forming two series of ponds along narrow and rather shallow valleys, from the combined drainage of which the original pond received its water supply. Now all of these ponds have a large population of turtles in spite of intermittent efforts to reduce their numbers. The original stock must have reached the garden area from the Arimao River which is connected by a shallow, winding brook, the outlet of our system of garden ponds. This brook is almost dried for a good half of the year and at other times is a raging torrent after heavy rains, against which no Pseudemys could possibly swim.

No one has ever seen turtles travelling along this brook and it is hard to see what might incline them to investigate its source. Nevertheless they arrived in all these artificial ponds in a short time and in great numbers.

Although the senior author was for a long time disinclined to believe it, there seems to be little question but that our garden turtles perhaps are vegetarian, pure and simple. They do not seem to feed extensively on mollusks, as had at first been thought probable, and they certainly do not bother the hordes of small fish which swarm almost miraculously as soon as a new pond is completed. The fact that crawfish and "langostinos" (Macrobrachium) do not flourish in our garden ponds, although they are occasionally seen, I suspect is due to the fact that turtles would almost unquestionably also appreciate these delicate and rather easily captured morsels.

The adult individuals, especially, are extremely shy and wary. Each group has its favorite basking spot where its members come ashore and pile up in quite

characteristic fashion when the gardens are perfectly quiet. At other times they take the sun sprawled out on the surface of the water, their hind legs fully extended and the head protruding a short distance above the surface. The approach of a visitor, even if at a very considerable distance, is the signal for a complete disappearance of all turtles on land and afloat and they remain submerged for a considerable time before coming up to peek about and see whether the coast is clear.

*Localities.* (Cuba) Camaguey: Baragua, Mus. Comp. Zool. 34140–5; Rio Chambras, Mus. Comp. Zool. 34388–99; "Camaguey", Mus. Comp. Zool. 36870–1. Oriente: Rio Cauto, Mus. Comp. Zool. 34136–9; Rio Sagrada, Tanamo, Mus. Comp; Zool. 34357–65, 34367–9; Rio la Mora, Holguin, Mus. Comp. Zool. 36867, Rio las Calabazas, 36868–9. Santa Clara: Soledad, Mus. Comp.; Zool. 18022–4, 18889–90, 29276–9, 33395–409, 33432–6, 34181–6, 34147–73, La Legua, Mus. Comp. Zool. 34174–80. Pinar del Rio: Orozco, Mus. Comp. Zool. 34348; Rio de la Plata, Mus. Comp Zool. 34351–2; Cabanas, Mus. Comp. Zool. 34346–7; Rio San Felipe, Mus. Comp. Zool. 34350. Isle of Pines; Nueva Gerona, Mus. Comp. Zool. 10985; Los Indios, Mus. Comp. Zool. 11735.

Although the type of *Emys decussata* Gray (see pl. 1) is without locality data, it seems to us quite evidently a representative of the *terrapen* series. Moreover, the proportions of the carapace indicate strongly that it came from Cuba—very likely from Camaguey or Oriente. Although this conclusion is necessarily somewhat conjectural we consider the grounds sufficient to warrant retaining this widely used name for the Cuban form.

Of the numerous more or less different populations of Cuban terrapins two, besides typical *decussata*, seem to possess characters warranting their recognition as subspecies; these are described below.

### Pseudemys decussata angusta new subspecies

*Type.* Museum of Comparative Zoology 34,340; mature female, length 194, width 134, height 75.

*Paratypes.* Museum of Comparative Zoology 34334–45, 33984.

*Type locality.* Taco River, Pinar del Rio, Cuba.

*Diagnosis.* Closely related to *P. d. decussata*, but distinguished as follows: ground color of soft parts darker; ground color of carapace darker; carapace narrow and elongate, nearly straight-sided (sometimes laterally constricted) from dorsal aspect; upper jaw usually acutely and deeply notched; top of head

dark brown; stripes on limbs more distinct; melanistic male with hind half of carapace solid black and soft parts much blacker than in *P. d. decussata*, not vermiculate.

*Description. Dimensions:* length/width, males 1.36–1.48, av. 1.41, females 1.34–1.47, av. 1.42; length/height, males 2.57–2.85, av. 2.73, females 2.45–2.73, av. 2.60; width/height, males 1.78–2.05, av. 1.92, females 1.78–1.85, av. 1.82. *Carapace:* Elongate, narrow and slightly constricted laterally; sixth marginal nearly or quite in the vertical plane; widest point usually at about posterior half

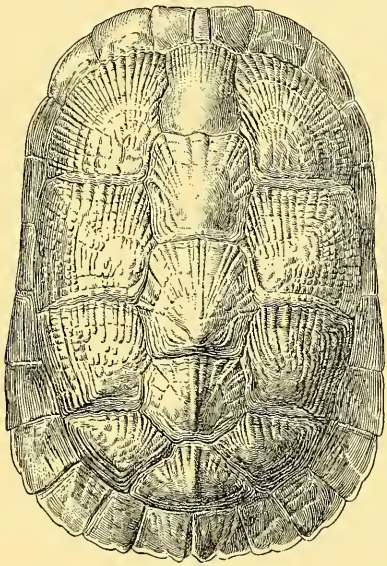

Fig. 2. Carapace of *Pseudemys d. angusta*, ad. ♀, M.C.Z. no. 34340. ½ nat. size.

of eighth marginal; middle marginals rugose along their upper halves; costals extremely rugose longitudinally and with grooves radiating from a point in the posterio-dorsal corner of each plate; first vertebral usually embossed and usually longer than wide, the second nearly flat, the third, fourth, and fifth slightly to strongly keeled; vertebrals mostly longitudinally, radially, and transversely rugose; nuchal with sides approximately parallel. *Plastron:* Light yellow, with portions of a dusky figure usually present; the bars of this figure follow the sutures anteriorly but extend longitudinally across the middle of the abdominal and

femoral plates. Bridge nearly covered with a series of broad longitudinal lines. Intermarginal sutures bisecting concentric figures. *Head:* Ground color brownish olive to nearly black, darkest above; sagittal and supratemporal stripes usually present, but obsolescent, other stripes lacking on top of head; mandibular and orbital stripes not confluent behind angle of jaw. Snout short and blunt, depressed anteriorly; upper jaw usually with a deep, acute notch at symphysis. *Limbs:* Ground color dark olive with usually distinct greenish-white stripes; five to seven stripes usually present on anterior surface of fore foot, the stripe extending onto the second toe much the broadest; outer surface of hind foot not striped.

*Melanistic male. Carapace:* Similar in proportions and sculpturing to that of the female, but less rugose, the marginals in old specimens being nearly smooth, and in some individuals less constricted laterally. Melanism becomes first apparent on the posterior surface, which is usually nearly solid black, the black background being broken with a few irregular unpigmented patches. Apparently the whole carapace darkens gradually until black and then small areas begin to lose pigment, whereas in specimens of *P. d. decussata* from eastern Cuba the black is deposited in isolated patches, and areas of the juvenile ground color often persist among the black and pigmentless patches. *Plastron:* Light yellow, without vermiculations. There are usually deposits of black pigment along the sutures, these being particularly heavy on the intermarginals. *Head and limbs:* In specimens exhibiting the completely developed melanistic condition the sides and top of the head are entirely black with the exception of the supratemporal and (sometimes) the sagittal stripes, which thus stand out in marked contrast with the background. Limbs black or speckled; toe-nails on the fore limbs black with yellow tips.

The largest West Indian terrapin that we have seen (Mus. Comp. Zool. 33948) is a specimen of this race. This individual, a female which weighed in life 22½ pounds emphasizes the characters of the race. The carapace is 388 mm. long, 246 mm. wide, and 16 mm. in height; it is very deeply and profusely wrinkled, the radial furrows on the lower halves of the costals being especially accentuated. Spurs from the fifth and seventh marginals extend upward between the costals an inch or more above the dorsal ends of the other marginals. The nuchal is extremely slender, and the first marginals heavy and knob-like. The plastron, bridge, and lower marginals are unmarked.

*Localities.* Pinar del Rio: Santa Cruz River, Mus. Comp. Zool. 34341, 34343–5; San Cristobal River, Mus. Comp. Zool. 34334–6, 34342, 33948; Taco River, Mus. Comp. Zool. 34337–40.

### Pseudemys decussata plana new subspecies

*Pseudemys decussata* De Sola and Greenhall, 1932 (part), Copeia, no. 3, p. 132.

*Type.* Museum of Comparative Zoology 34,134; mature male, length 181 mm., width 132 mm., height 51 mm.

*Paratypes.* Museum of Comparative Zoology 34128–35.

*Type locality.* Rio Jobabo, Western Oriente, Cuba.

*Distribution.* Known only from the type locality.

*Diagnosis.* Closely related to *P. d. decussata*, but with the carapace broad and greatly flattened (length/height ratios: males, 2.76–3.55, av. 3.25; females, 3.02–3.21, av. 3.09), and with the vertebral line elevated and nearly straight from lateral view for most of the length of the carapace. In males and young specimens the posterior end of the first vertebral is greatly elevated and the vertebral line is straight from this point to the posterior end of the fourth vertebral. Lateral margins of carapace straight from dorsal aspect for much of the length of the shell.

*Description. Dimensions:* (length/height ratios given above) length/width, males 1.31–1.45, av. 1.37, females 1.31–1.47, av. 1.37; females 1.31–1.47, av. 1.37; width/height, males 2.11–2.59, av. 2.35, females 2.08–2.31, av. 2.26. *Carapace:* Somewhat rugose longitudinally but relatively smooth, lacking irregu-

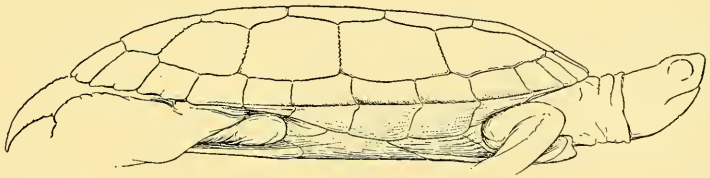

Fig. 3. Lateral aspect of *Pseudemys d. plana*, ♂, M.C.Z. no. 34134. ½ nat. size.

lar protuberances and elevations; oblong from dorsal aspect, or very slightly broadened posteriorly; sides straight (from dorsal view) from fourth to eighth marginals; ground color olive to dark brown. *Plastron:* Nearly perfectly flat (more so than that of *decussata*) from posterior edges of gulars to its hind margin. Markings on plastron, bridge, and lower marginal sutures, when present, as in *decussata*. *Head and limbs:* Snout very short, blunt, and rounded, depressed even in males. Supratemporal stripe white or cream colored, in preserved speci-

mens, bordered with black; orbital and mandibular stripes not confluent behind angle of jaw. Ground color olive. A few faint stripes discernible between orbital and mandibular.

Mus. Comp. Zool. 34,128 is an incompletely melanistic male. The top of the head, the anterior marginals, and the anterior half of the plastron are vermiculate; the markings on the anterior surface of the fore leg are vague and diffuse. There is a smudge-like, semi-elliptical figure on the posterior half of the plastron, the closed posterior end crossing the inter-anal suture.

*Localities.* Rio Jobabo, Western Oriente, Cuba, Mus. Comp. Zool. 34128–35.

### The stejnegeri sub-group

*Characters.* Snout relatively deep, flattened at the tip, nearly straight from nostrils to cutting edge in lateral aspect, somewhat constricted before the orbits; in males snout often markedly extended, upturned, and with the anterior surface sharply retreating. Anterior surface of maxillae usually concave beneath anterior margin of orbits. Upper jaw usually with a bevelled median notch, from which there extends upward a shallow groove which is usually a different color from the background. Plastron not truncate anteriorly, the gulars usually somewhat produced and constricted at their anterio-lateral corners.

The plastral patterns of *P. s. stejnegeri*, *P. decorata* and *P. malonei*, as described below, are quite different from that common to the forms of the *terrapen* sub-group; that of *P. s. vicina*, however, is almost identical with the characteristic *terrapen* figure, to this extent the two groups are linked.

### Pseudemys stejnegeri stejnegeri Schmidt

*Clemmys decussata* Peters, 1876, Mon. Acad. Wiss. Berlin, p. 705.—Gundlach, 1881, Anal. Soc. Espan. Hist. Nat., X, p. 307.—*Pseudemys decussata* Grant and De Sola, 1934, Copeia, no. 2, p. 75.

*Emys rugosa* Gundlach, 1881, Anal. Soc. Espan. Hist. Nat., X, p. 307.—Stahl, 1882, Fauna Puerto Rico, p. 68.—Garman, 1887 (part), Proc. Amer. Philos. Soc. XXIV, p. 286.

*Pseudemys palustris* Stejneger, 1904, Rep. U. S. Nat. Mus., 1902, p. 710, fig. 179–186.—Fowler, 1918, Papers Dept. Marine Biol., Carnegie Inst., XII, p. 15.

*Pseudemys stejnegeri* Schmidt, 1928, Sci. Surv. P. R. and Virg. I., Amer. Mus., X, 1, p. 147, fig. 51.

*Type.* United States National Museum 25642, mature female.

*Type locality.* San Juan, Porto Rico.

ERRATA

Page 407. Caption of Fig. 4 should read: Plastrons of *Pseudemys s. stejnegeri* and *Pseudemys d. decussata;* young specimens, M. C. Z. nos. 37296 and 34176. x 5/7.

*Distribution.* Porto Rico and probably Vieques Island (Grant 1932).

*Diagnosis.* Distinguished from *decorata* by the nature of the plastral pattern and from *malonei* by the proportions of the carapace and the color of head and limbs.

*Description. Body proportions:* Length/width, male (our series includes only one fully mature male) 1.17, female 1.18–1.37, av. 1.30; length-height, male 2.71, female 2.49–2.70, av. 2.56; width-height, male 2.34, female 1.82–2.27, 1.97; average length, females 236. *Carapace:* Moderately elongate; not markedly rugose; widest point well behind middle of long axis, posterior marginals flaring; first vertebral but slightly domed, second nearly flat, third, fourth and fifth keeled; ground color reddish brown in all our specimens, unmarked in adults.

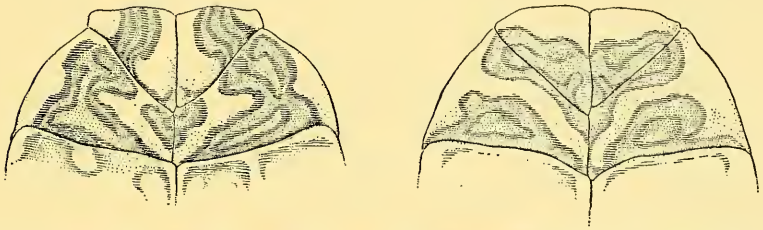

Fig. 4. Variation in plastrons of *Pseudemys s. stejnegeri;* young specimens, M.C.Z. nos. 37296 and 34176. x 5/7.

*Plastron:* Constricted at anterior ends of humero-gular sutures, with the gulars anteriorly extended and concave-upward, forming a projecting shelf beneath the neck. Pattern usually present anteriorly in adults, obsolescent or lacking between the bridges, but when present following the sutures closely; markings on gulars usually extending over onto the upper surfaces of the plates. *Head and limbs:* Ground color brown or brownish-olive; supratemporal stripe, when discernible, brownish in preserved specimens, other stripes yellow; orbital usually not confluent with mandibular behind angle of jaw; several inconspicuous stripes usually present between orbital and supratemporal. Dorsal surface of hind toes not striped; distal part of tail brown dorsally, not striped.

*Habits.* Of the habits of *stejnegeri*, Schmidt writes, "Nothing is known of the habits of this species except for the observations of Danforth (1925), which I quote: 'By April they were laying eggs. For that purpose they come out on land at night, and the natives choose that time to hunt them with the aid of lights. They are sold for food. These turtles are rarely seen sunning themselves.' " To

this Grant and De Sola (1934) add: "Danforth (1925) mentions that the Puerto Rican form is seldom seen sunning itself, and on a trip to the Cartegena lagoon, Danforth and the senior author were surprised to see a terrapin which had climbed into a dead bush at the shore. Many others were seen basking on masses of vegetation."

We have seen one specimen showing advanced melanism.

*Specimens examined.* Puerto Rico: Guanica Lagoon, Mus. Comp. Zool. 37291–4; Rio Piedras, Mus. Comp. Zool. 37295–8; Porto Rico, 5833–4.

The characters used by Schmidt in his diagnosis of this form were small size and the failure of the axial plate to come in contact with the fifth marginal. Grant and De Sola object to this diagnosis and mention a note in Copeia (1931) in which Grant records a specimen 275 mm. in length. We have a specimen collected by Major Grant which is 270 mm. long, and are inclined to agree with these writers in their criticism of Schmidt's diagnosis.

The following table shows the variation which we have found in the position of the axial in relation to the fifth marginal:

| Locality | Percentage in contact | Percentage separate | Percentage in contact on one side, separate on other |
|---|---|---|---|
| Haiti (*decorata*) | 100 | .. | .. |
| Hispaniola (*vicina*) | 50 | .. | 50 |
| Puerto Rico | 60 | 20 | 20 |
| Great Inagua | 91 | .. | 9 |
| Cat Island | 50 | 21 | 29 |
| Jamaica | 28 | 44 | 28 |
| Cuba, Rio Jobabo | 29 | 57 | 14 |
| Cuba, southern Pinar del Rio | 77 | 8 | 15 |
| Cuba, except in above localities | 77 | 14 | 9 |

### Pseudemys stejnegeri vicina new subspecies

*Emys decussata* Duméril and Bibron, 1835, Erpet. Gen., II, p. 279.—Duméril, 1851 (part), Cat. Méth. Rept. Mus. Paris, I, p. 11.—Reinhardt and Luetken, 1862, Vid. Meddel. Naturh. Foren., Copenhagen, 1863, p. 290; author's separate, p. 138.—*Clemmys decussata* Strauch, 1862 (part), Chelon. Studien, p. 127; 1890, Mem. Acad. Sci. St. Petersb., (7) XXXVIII, 2, p. 78.

*Chrysemys scripta*, var. *rugosa* Boulenger, 1889 (part), Cat. Chel. Brit. Mus., p. 79.

*Pseudemys palustris* Schmidt, 1921, Bull. Amer. Mus. Nat. Hist. XLIV, p. 20.

*Type.* Field Museum of Natural History 5977, mature female; length 238 mm., width 168 mm., height 98 mm.

*Paratypes.* Field Museum 5976, 5978; Mus. Comp. Zool. 43651–4.

*Type locality.* Sanchez, San Domingo.

*Distribution.* Hispaniola.

*Diagnosis.* Very closely related to *P. s. stejnegeri*, from which it is distinguished by the broad head (width of head at anterior edge of tympanum contained in body length 7.0–7.2 times in *vicina*, 7.8–8.0 times in *stejnegeri*) and deep snout (depth of snout, including mandible, at anterior edge of orbit contained in body length 10.3–10.6 times in *vicina*, 12.0–14.4 times in *stejnegeri*), and by the plastral pattern. Distinguished from *decorata* by the absence of markings on the carapace and by the nature of the plastral pattern.

*Description. Body proportions:* Length-width, males 1.27–1.32, av. 1.29, females 1.40–1.47, av. 1.43; length/height, males 2.58–2.68, av. 2.63, females 2.42–2.58, av. 2.46; width/length, males, 1.10–1.96, av. 1.53, females 1.69–1.81, av. 1.73. *Carapace:* Greatest width usually posterior to middle of long axis, the posterior marginals flaring in adult females. Costals usually profusely and irregularly wrinkled, the rugosities generally longitudinal, but broken and extensively confluent; radial wrinkles slight or lacking. Second vertebral usually flat and keel-less in adults; marginals not longitudinally rugose. Ground color tan to nearly black; pattern not evident, even in young individuals. *Plastron:* No boss at posterior ends of gulars; gulars usually constricted at antero-lateral corners, and produced anteriorly. Pattern similar to that of *decussata*, usually following the sutures, at least anteriorly; pattern obsolescent or lacking in adults. *Head and limbs:* Snout of mature female short and deep, head very large. Ground color slate-gray to olive, stripes cream-color to white; supratemporal brown in preserved specimens; orbital and mandibular not confluent in our specimens. Stripes to second and fourth toes usually broad and distinct—others on anterior surface of fore limb obsolescent or lacking.

Neither of the two adult males in our series is melanistic.

*Localities.* San Domingo: Puerto Plata, Mus. Comp. Zool. 43651–4; Sanchez, Field Museum 5976–8. Haiti: Torbec, U. S. N. M. 80932–3; Cayes, U. S. N. M. 82565; "Haiti", Mus. Comp. Zool. 1891–2a,b,c.

### Pseudemys decorata new species

*Type.* Museum of Comparative Zoology 36862; mature male, length 220 mm., width 148 mm., height 87 mm.

*Paratypes.* United States National Museum 59093–6, 81091; Museum of Comparative Zoology 36851–60, 36861–6.

*Type locality.* Fond Parisien, Haiti.

*Distribution.* Eastern Haiti; Fond Parisien, Thomazeau and Île à Vache.

*Diagnosis.* Readily distinguished by the plastral pattern, which consists of small, circular or elliptical markings scattered about over the plastron; snout of adult relatively sharp and nearly conical, that of mature male upturned and very long. Supratemporal stripe white in preserved specimens. Markings on carapace, at least on lower marginals, distinct in most specimens.

*Description. Body proportions:* Length/width, 1.27–1.48, av. 1.35, female 1.25–1.46, av. 1.34; length/height, male 2.52–2.82, av. 2.65, female 2.36–2.72, av. 2.53; width/length, male 1.70–2.15, av. 1.96, female 1.67–2.17, av. 1.88. *Carapace:* Elliptical and rather elongate; relatively smooth, with the radial rugosities predominating in most specimens; marginals scarcely wrinkled; first vertebral slightly domed, second flat or only slightly keeled, third, fourth and fifth keeled. Posterior marginals not strikingly serrate. Color light grayish brown to chestnut; concentric dusky figures usually evident on the intermarginal sutures. *Plastron:* Light yellow or cream in color with a variable number of irregular or circular spots which are often concentric; two or more of these spots on bridge nearly always concentric; blotches present at the sutures of the lower marginals. *Head and Limbs:* Jaws not serrate; maxillae meeting at a vertical angle, but not notched at symphisis; median ridge of alveolar surface very low; snout nearly conical in adult, in the male very long and sharp, sloping upward from a point between the eyes. Head stripes conspicuous except on top of head, and black-bordered; supratemporal white or greenish white in preserved specimens; orbital and mandibular confluent beneath the tympanum. Ground color brown or grayish-brown. Stripes on limbs conspicuous and black-bordered, usually four on anterior surface of fore foot. Distal part of tail white dorsally, the lateral caudal stripes converging.

*Melanism.* Schmidt (1928) believes that the phenomenon of melanism in old males does not occur in the Hispaniolan form. In the two large male specimens of *decorata* in our series melanism is not marked. One of these individuals (Mus. Comp. Zool. 36863) has heavy deposits of black pigment in the plastral and lower marginal spots and scattered black dots on the carapace, and both it and Mus. Comp. Zool. 36862 show some breaking up and scattering of pigment in the borders of the head stripes, but neither approaches the extreme condition exhibited by other West Indian forms.

*Specimens examined.* Haiti: Thomazeau, Mus. Comp. Zool. 36851–60, U. S. N. M. 59093–6; Fond Parisien, Mus. Comp. Zool. 36861–6, U. S. N. M. 63096; Île à Vache, U. S. N. M. 81091.

Schmidt, l. c., believed that adequate material might demonstrate the occurrence of two distinct terrapins in Hispaniola. In studying our material we were at first considerably confused by the peculiar distribution exhibited by the two forms that we have recognized on the island. At present, however, there seems little doubt that the taxonomic arrangement here proposed for them (trinominal designation for the widely distributed and incompletely differentiated *P. s. vicina*, and specific status for the distinct, markedly different, and locally distributed *P. decorata*) illustrates the actual situation as clearly as any.

### Pseudemys malonei Barbour and Carr

*Pseudemys malonei* Barbour and Carr, 1938, Proc. New England Zool. Club, XVII, p. 76.

*Type.* Museum of Comparative Zoology 44338, female; length 238 mm., height 103 mm., width 176 mm.

*Paratypes.* Museum of Comparative Zoology 44339–48.

*Type locality.* Small ponds near Northwest Point, Great Inagua Island, B. W. I.

*Distribution.* Known only from the type locality.

*Description. Carapace:* Very high in adults, its sides steeply sloping and only very slightly arched, broadly elliptical from dorsal aspect, its greatest width

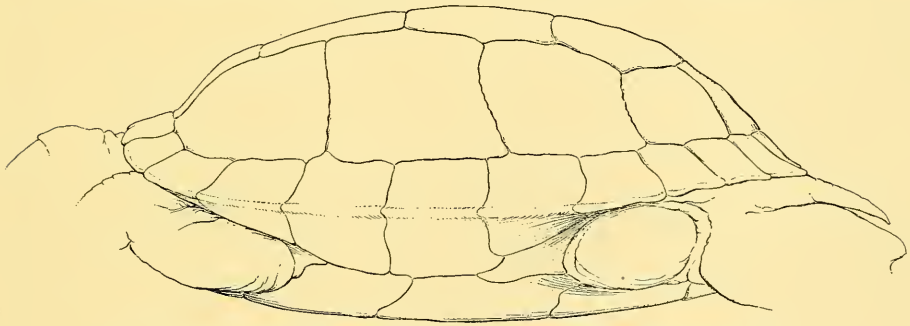

Fig. 5. Lateral aspect of *Pseudemys malonei*, adult, M.C.Z. no. 44388. About ½ nat. size.

near the middle (at about the sixth marginal suture); relatively smooth, lacking deep continuous rugosities; ground color very dark gray, in some specimens nearly black; markings lacking in mature specimens. *Plastron:* Pattern occasionally entirely lacking, but when present, similar to that of *stejnegeri;* gulars less constricted at their anterio-lateral corners than in *stejnegeri. Head and limbs:*

Upper jaw with a deep notch at the symphysis, from which there extends dorsally a conspicuous brownish groove. Stripes white or cream, supratemporal brown or not evident in preserved specimens; orbital and mandibular not confluent in any of our specimens; the two conspicuous stripes on anterior surface of fore leg nearly the same breadth; distal part of tail dark above, the lateral caudal stripes not converging. Ground color slate gray.

*Melanism.* "Mus. Comp. Zool. 44343 is an excellent example of the extreme melanistic or '*rugosa*' condition seen in most old males of the group. The lamellae of the posterior half of the carapace are opaque and heavily pigmented with black, while those covering the anterior portion are clear and translucent, with pigment only along the sutures. The plastron is yellow with black sutural borders, and the head and leg stripes have been replaced by gray and white mottling." [1]

*Habits.* We have not been able to secure any information concerning the habits of this terrapin.

*Specimens examined.* Great Inagua, B. W. I., Mus. Comp. Zool. 44343, holotype, Mus. Comp. Zool. 44339 male allotype, and Mus. Comp. Zool. 44340–2, 44344–8, paratypes.

[1] From Barbour and Carr (1938), p. 76.

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# EXPLANATION OF THE PLATES

PLATE 1

Plate 1

Upper and lower left. Type of *Emys decussata* Gray in British Museum.

Upper and lower right. Type of *Testudo rugosa* Shaw in the Royal College of Surgeons. No. 990.

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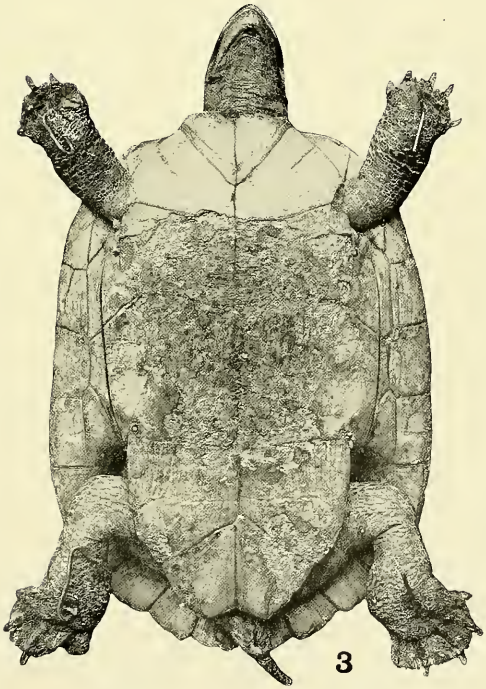

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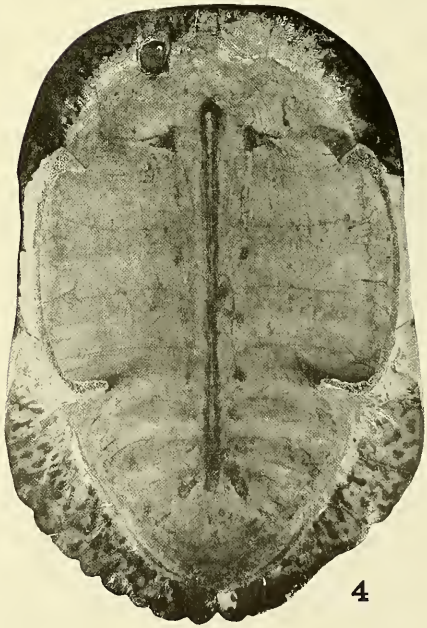

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PLATE 2

Plate 2 E. N. Fisher del.

Upper fig. 1. Plastron of *Pseudemys decorata* Barbour and Carr. Haiti. Mus. Comp. Zool. No. 35863. Ad. ♂.

Lower fig. 2, 3. *Pseudemys stejnegeri stejnegeri* Schmidt. Rio Piedras, Puerto Rico. Mus. Comp. Zool. No. 37295. Young ♂.

Plate 2, upper fig. 1. M. C. Z. no. to read 36853.

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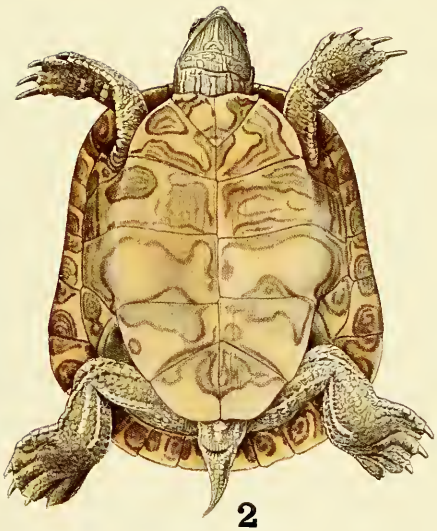

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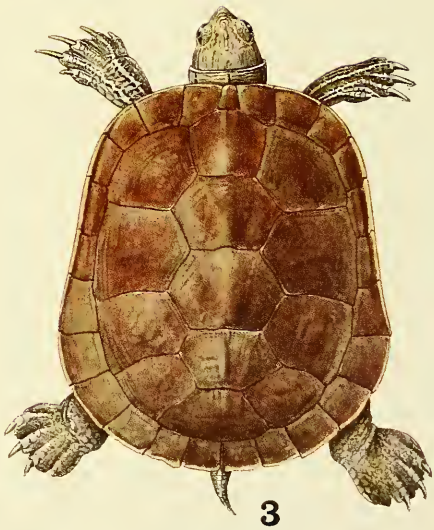

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PLATE 3

Plate 3 Miss J. Sawyer del.

Dorsal and ventral view of *Pseudemys felis*, Cat Isl., Bahamas. Mus. Comp. Zool. No. 38385. Ad. ♀.

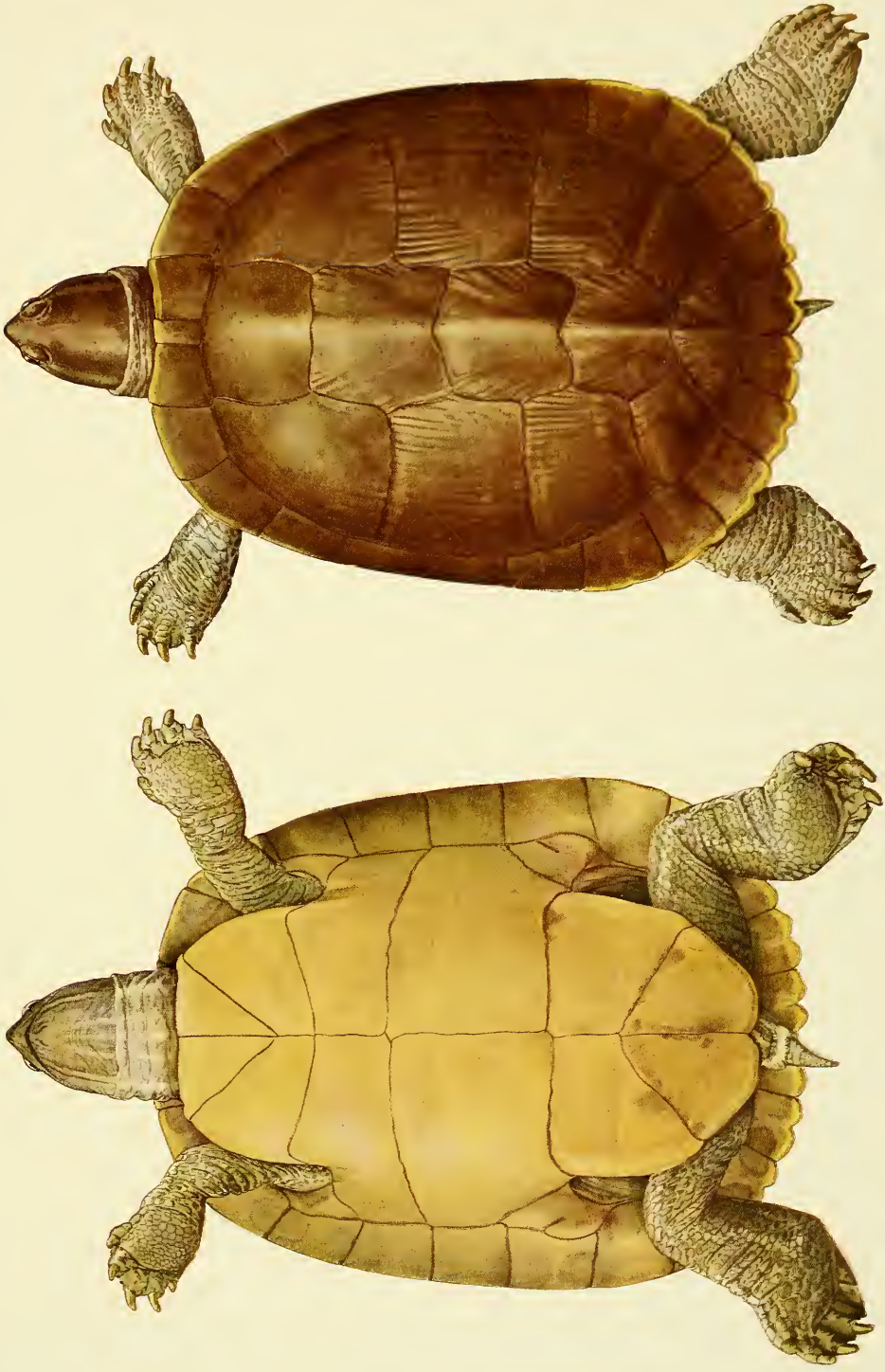


PLATE 4

Plate 4 Miss J. Sawyer del.

Dorsal and ventral view of *Pseudemys terrapen* (Lacépède), Jamaica, near Kingston. Mus. Comp. Zool. No. 39704. Young ♀.

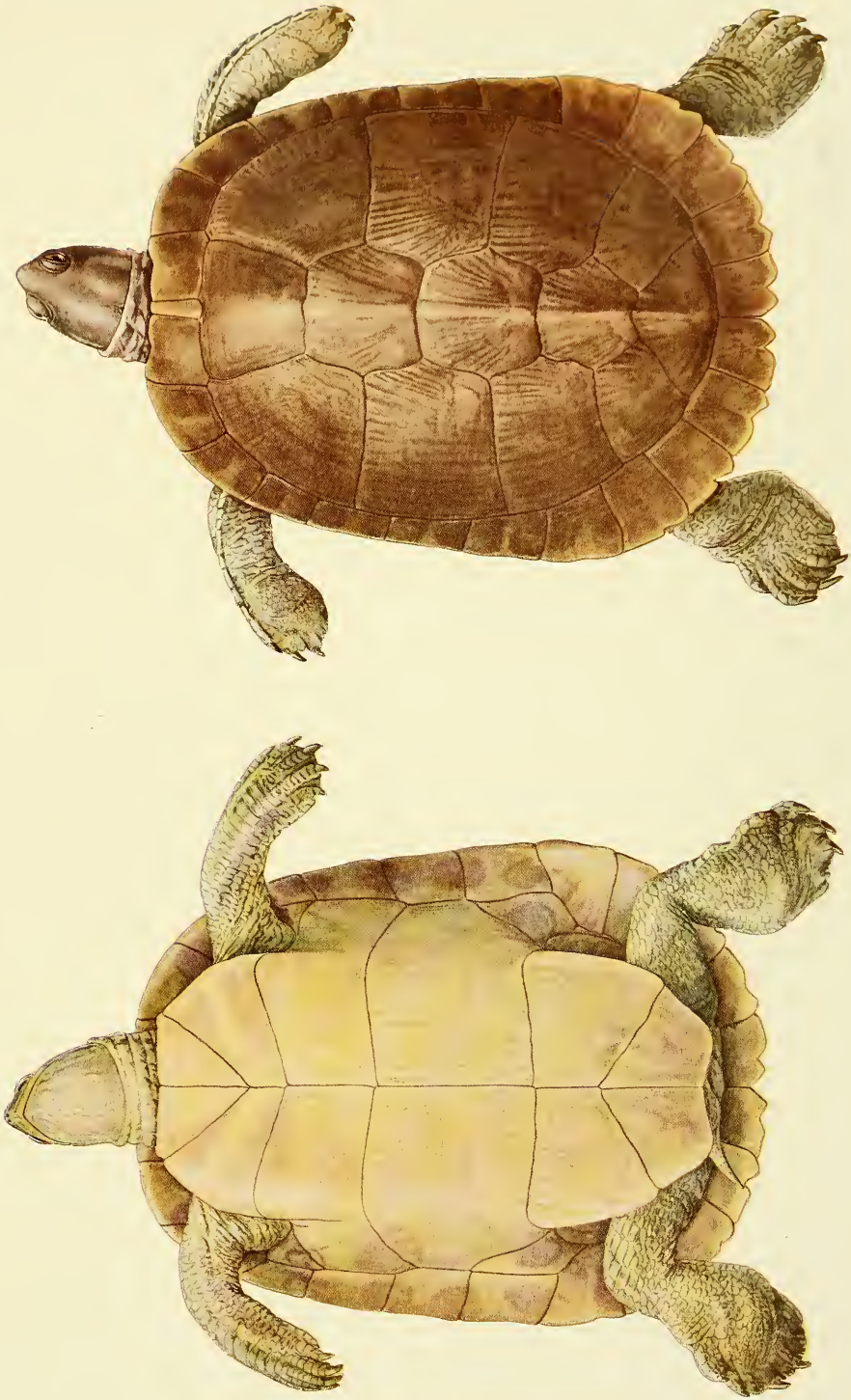


PLATE 5

Plate 5 Miss J. Sawyer del.

Dorsal and ventral view of *Pseudemys decussata plana*, Rio Jobabo, Cuba. Mus. Comp. Zool. No. 34128. Ad. ♂.

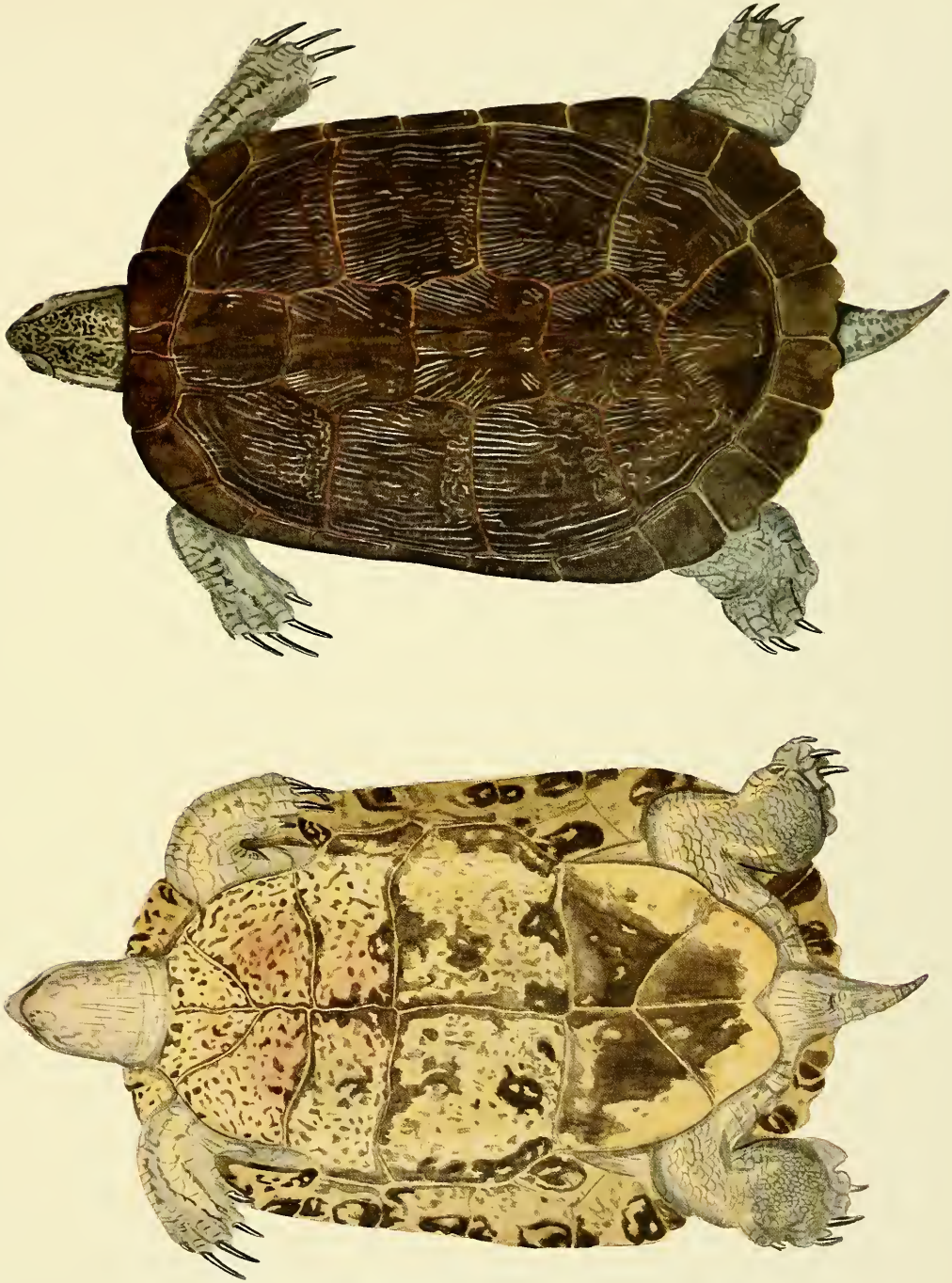


PLATE 6

Plate 6 Miss J. Sawyer del.

Dorsal and ventral view of *Pseudemys decussata decussata*, Rio Cauto, Cuba, Mus. Comp. Zool. No. 34136. Melanistic ♂.

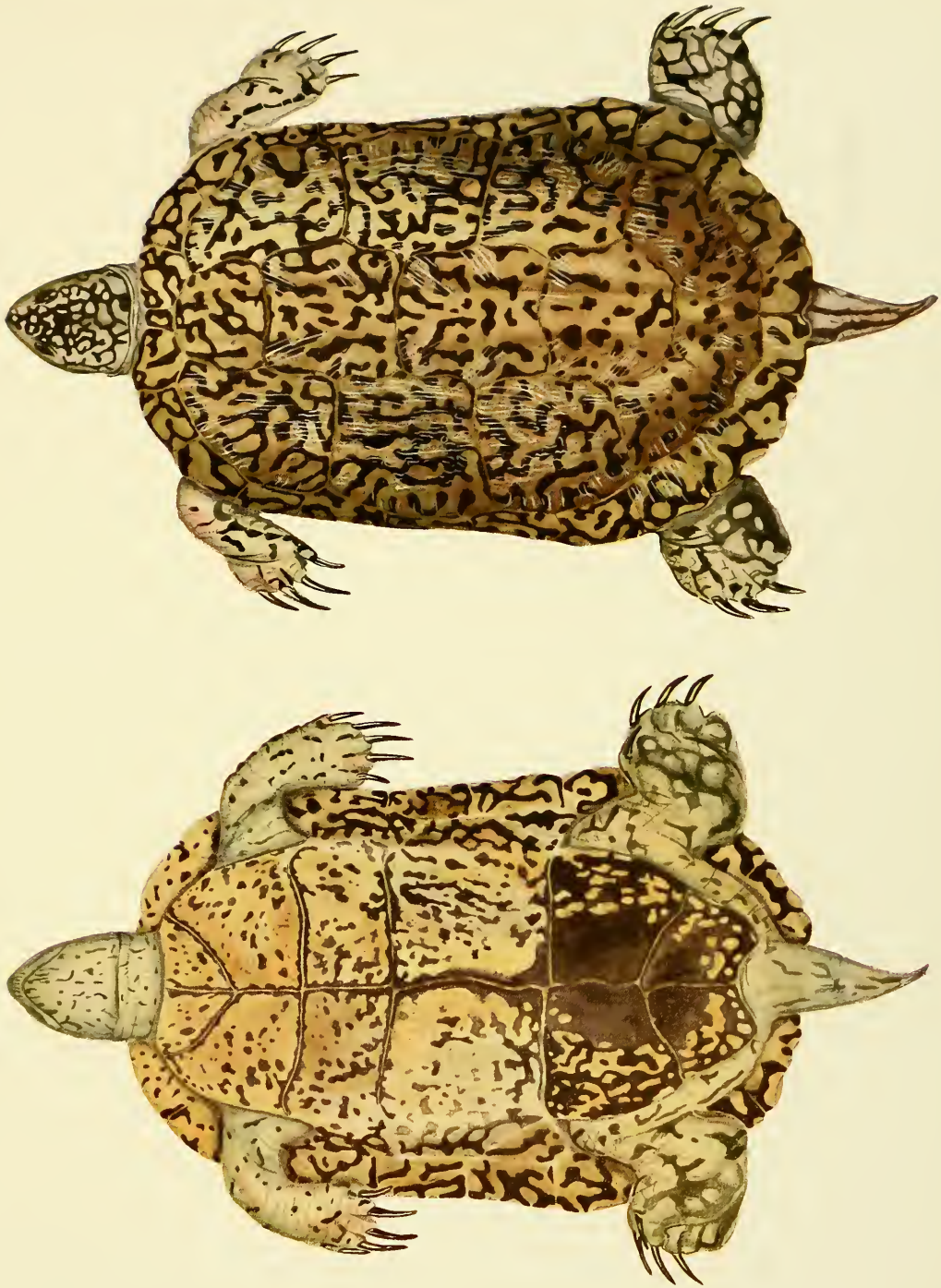
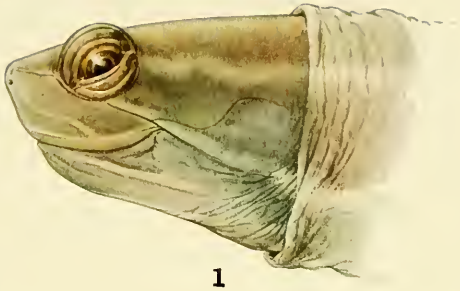


PLATE 7

Plate 7 E. N. Fisher del.

1. Head of *Pseudemys felis*, Cat Island. Mus. Comp. Zool. No. 38385. Ad. ♀.
2. Head of *Pseudemys terrapen*, near Kingston, Jamaica. Mus. Comp. Zool. No. 39704. Young ♀.
3. Head of *Pseudemys decorata*, Fond Parisien, Haiti. Mus. Comp. Zool. No. 36863. Ad. ♂.
4. Head of *Pseudemys stejnegeri stejnegeri*, Rio Piedras, Puerto Rico. Mus. Comp. Zool. No. 37295. Young ♂.
5. Head of *Pseudemys decussata decussata*, melanistic, old ♂, Rio Cauto, Cuba. Mus. Comp. Zool. No. 34136.



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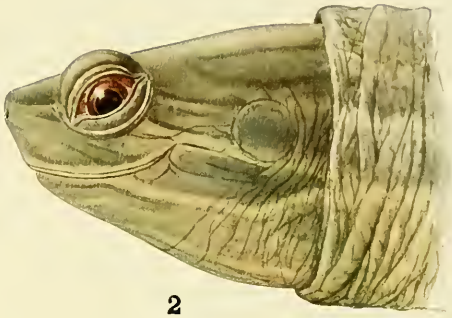

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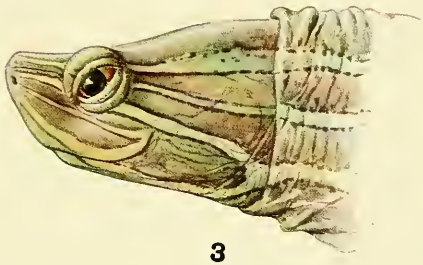

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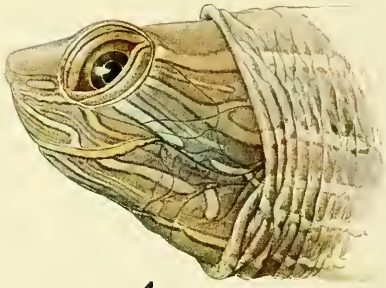

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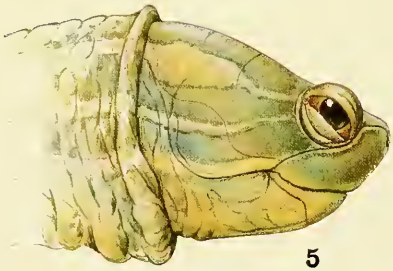

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PLATE 8

Plate 8 E. N. Fisher del.

1. Head of *Pseudemys decussata plana.* Rio Jobabo, Cuba. Mus. Comp. Zool. No. 34133.
2. Head of *Pseudemys decussata decussata.* Soledad, Cuba. Mus. Comp. Zool. No. 34147. Young ♀.
3. Head of *Pseudemys decussata plana.* Rio Jobabo, Cuba. Mus. Comp. Zool. No. 34128. Ad. ♂.
4. Foot of *Pseudemys decussata decussata,* Rio Cauto, Cuba. Mus. Comp. Zool. No. 34136. Melanistic ♂.
5. Head of *Pseudemys decussata decussata,* Rio Cauto, Cuba. Mus. Comp. Zool. No. 34136. Melanistic ♂.
6. Foot of *Pseudemys decussata decussata,* Soledad, Cuba. Mus. Comp. Zool. No. 34147. Young ♀.
7. Head of *Pseudemys decussata decussata,* Rio Cauto, Cuba. Mus. Comp. Zool. No. 34137. Melanistic ♂.
8. Foot of *Pseudemys decussata plana.* Rio Jobabo, Cuba. Mus. Comp. Zool. No. 34132. Young ♀.

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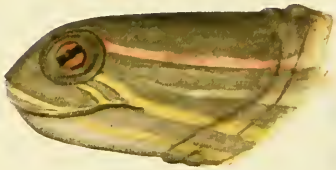

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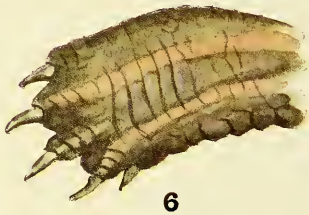

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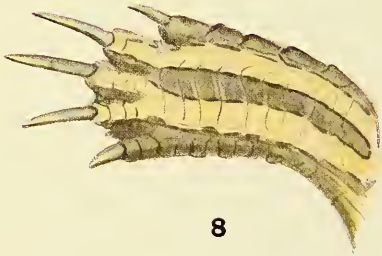

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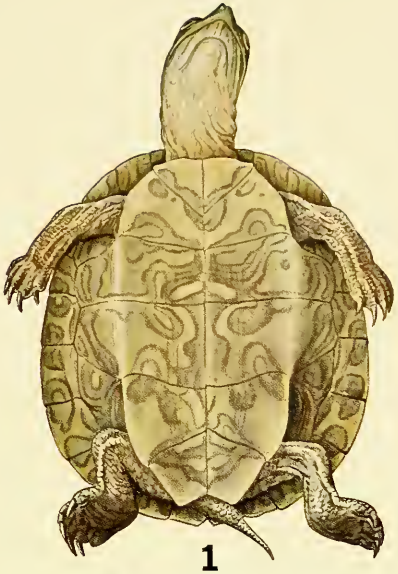
PLATE 9

Plate 9 E. N. Fisher del.

1. Under surface of *Pseudemys decussata decussata*. Soledad, Santa Clara, Cuba. Mus. Comp. Zool. No. 34177. Young.
2. Upper view of *Pseudemys decussata decussata*. Soledad, Santa Clara, Cuba. Mus. Comp. Zool. No. 34177. Young.
3. Under surface of *Pseudemys decorata*. Thomazeau, Haiti. Mus. Comp. Zool. No. 36855. Young.
4. Upper view of *Pseudemys decorata*. Thomazeau, Haiti. Mus. Comp. Zool. No. 36855. Young.



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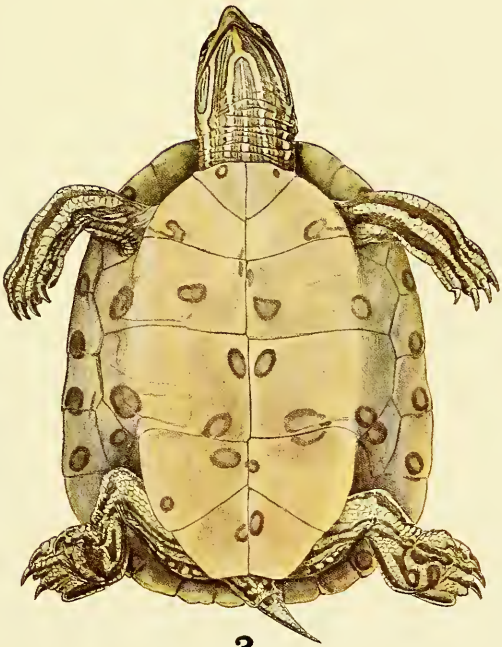

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