ON THE NORTH AMERICAN LAND TORTOISES OF THE GENUS XEROBATES.

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The land tortoises, to which this paper is intended to direct attention, are those which are found living within the borders of the United States at the present time. The species, three in number, I shall recognize under the names *Xerobates polyphemus* (Daudin) Cooper, the Gopher; *Xerobates Agassizii* Cooper, Agassiz's Tortoise, and *Xerobates Berlandieri* Agassiz, Berlandier's Tortoise.

The Gopher, to speak in general terms, inhabits the southeastern and southern parts of the United States, *Xerobates Agassizii* the southwestern portion, and *X. berlandieri* the extreme southwest and northeastern Mexico.

I. TAXONOMY AND DESCRIPTION OF SPECIES.

History of Xerobates polyphemus.—In tracing the history of the first of these animals, *X. polyphemus*, we become involved at once in a whirlpool of conflicting opinion and uncertainty. The first allusion to it in zoological literature appears to be in Seba's work upon the curiosities of his museum,* where an imperfect figure is given under the name "Testudo terrestris major americana." No mention of it occurs in the tenth edition of Linnæus' Systema Naturæ, but in the interval between the publication of this edition and the twelfth the great naturalist seems to have had his attention called to Seba's figure, for in the latter edition he cites it as the last synonym under his *Testudo carolina*.† From this fact and the additional one that in the thirteenth edition of the Systema Naturæ, Gmelin, thinking to improve Linné's somewhat incomplete description of *T. carolina*, added certain remarks on the characteristics of the plastron drawn from a study of the animal portrayed in Seba's work,‡ some naturalists have thought themselves justified in regarding *T.* (or *X.*) *carolina* as the proper name for our gopher. That this is not a correct view of the case is made evident by the consideration of the first of Linné's references, the only one which occurs in the tenth edition. The citation is from George Edwards' Natural History, published between 1743 and 1751.

* Seba, Albert. Locupletissimi rerum naturalium thesauri accurata descriptio et iconibus artificiosissimis expressio, per universam physices historiam. Amsterdam, 1734–1765, i, pl. 80, fig. 1.

† Linné, Syst. Nat., 12th ed., 1766, vol. i, p. 353.

‡ Gmelin, Linn. Syst. Nat., xiii ed., i, pt. 3, 1788, p. 1041.

The phrase quoted is as follows: "Testudo tessellata minor caroliniana, Edw. An. 205, t. 205."* On the same page in Edwards' work on which this phrase occurs, the following description (if we may trust the accuracy of Holbrook†) is given: "The lower shell is divided across the middle of the belly and joined to the upper shell on the sides by a tough flexible skin, by means of which it can, when it draws in its head and legs, close up its shell, as firmly as that of an oyster.‡ It is evident that this description was taken from a specimen of the box tortoise, denominated *Cistudo clausa* in Cope's check-list,§ but which should undoubtedly receive the name *Cistudo carolina*.

It does not seem probable that Linné would have confounded two species so distinct as the box tortoise and the gopher, if he had had definite information regarding the latter. He was undoubtedly misled by the imperfection of Seba's figure, and made to believe that it portrayed the same animal which Edwards had described.

That it may appear still more clearly that Linné's *T. carolina* is the box tortoise, I will quote the pertinent paragraph from Müller's Linné's Systema Naturæ, a translation of the 12th edition, in which extended descriptions of many animals are given. The author states in his preface that he has had access to much of the material which Linné had elaborated. The description of *Testudo carolina* is as follows:

"11. The Carolina Tortoise. *Testudo Carolina*.—This animal is named from its native country, but is also called Turapin by the English, and Terrapen by the Spaniards. It is smaller than the preceding species [*T. graeca*], and is as much tessellated, but in six-cornered pieces, and is still further distinct in that it has no tail. The color of the plates is dark brown, abundantly sprinkled with yellow patches of different sizes. The plastron is likewise different from that of the former animal, for it is cleft in the middle, and is attached to the upper shield on the sides only by skin so that it can be closed when the animal would hide himself entirely. The head is yellow and provided with scales, similar ones also being on the fore feet; the long neck and the hind feet are of bluish flesh-color. As regards the claws, there are five on the fore feet and four on the hind feet, as in the preceding species."‖ This description, taken apparently from a very well preserved specimen, and coming as it does before Gmelin's unfortunate additions, leaves little doubt but that the box tortoise should bear the name *Testudo* (or *Cistudo*) *carolina*. In this opinion I am supported by Holbrook, Duméril, Strauch, Say, Harlan, and Gray, while Le Conte, Louis Agassiz, and Cope, at least in his check-list, entertain

* Linn. Syst. Nat., 10th ed., 1758, p. 198.

† Holbrook, N. A. Herpetology, 1st ed., i, 1836, p. 45.

‡ Edwards, G. A natural history of uncommon birds, and of some other rare and nondescribed animals (= Linné's "Edw. An."). London, 1743–'51, p. 205.

§ Cope, Bull. U. S. Nat. Museum, No. 1, 1875, p. 53.

‖ Müller, P. L. S. Des Linné Vollständiges Natursystem, Third Part, 1774, pp. 44–45.

a contrary view. Gray proposed the name *T. gopher*, but many years after Daudin had given the tortoise a name.

The next mention of the gopher in literature, succeeding that occurring in Seba's unfortunate plate, is the full and tolerably accurate description given in William Bartram's account of his travels in the Southern States, published in 1791.* It is described in this work under the name "gopher." This appelation was undoubtedly first given to the animal by the Spanish settlers of Florida, the Spanish word "golfa," meaning pit or burrow, being very appropriate, as pointing to one of the most noticeable proclivities of the gopher, namely, the digging of pits or holes in the ground. The derivation of the first syllable of the word "*mun*göfa," a name given by Holbrook in later years as one in popular use, I have been unable to determine. It may be a corruption of "muñon," brawn or musele, and refer to the great strength of the animal, or may be of African origin.

Daudin, in his Natural History of Reptiles, published in 1803,† appears not to have noticed the remarks of Gmelin upon Linné's *T. Carolina*, accepts Bartram's statement as to its being an entirely new species, gives it the name *Testudo polyphemus*, and adds a latin diagnosis. He also paraphrases Bartram's description and notes.

In later times the gopher has been described among European writers by Bosc, in 1803, under the name "La Tortue Gopher"; by Gray, in 1831, 1844, and 1855, under the names "*Testudo polyphemus*," and "*Testudo gopher*."‡ Holbrook places *T. depressa* of Cuvier,§ among his synonyms of *T. polyphemus*,‖ but apparently without reason, for nothing relative to the tortoise except the words "*T. depressa*, Cuv." appears in that work on that page or elsewhere.

Among the earlier American zoologists who have written regarding the gopher I may mention Say, who wrote in 1825, using the name *T. polyphemus*;¶ Le Conte, who wrote in 1829 (?), employing the name *T. carolina*;** Harlan, who wrote in 1829, applying the name *T. polyphemus*;†† and Holbrook, who wrote in 1836 and 1842, using the name *T. polyphemus*.‡‡

A list of all the writings in which reference to this and the remaining species of North American *Testudinidæ* indisputably occurs, such as I

* Bartram, W. Travels through North and South Carolina, &c. Philadelphia, 1791, pp. 182–183.

† Daudin. Histoire Naturelle des Reptiles, Paris, ii, 1803 (X), pp. 256–259.

‡ Bosc. Nouv. Dict. d'Hist. Nat., xxii, 1803, p. 269.—Gray, Synopsis Reptilum, Pt. I, p. 11 (*T. polyphemus*); Gray, Tort. British Museum, 1844, p. 4 (*T. gopher*); Gray, Shield Reptiles, Pt. I, 1855, p. 5 (*T. gopher*).

§ Règne Animal, ii, p. 10.

‖ Holbrook, N. A. Herpetology, 1st ed., i, 1836, p. 41.

¶ Say, Jour. Acad. Nat. Sci. iv, pl. ii, 1825, pp. 207–208.

** Le Conte, Annals Lyc. Nat. Hist., New York, iii, 1828–1836, pp. 97–100.

†† Harlan, Jour. Acad. Nat. Sci. Phila., vi, pt. i, 1829, pp. 21, 22.

‡‡ Holbrook, N. A. Herpetology, 1st ed., i, 1836, pp. 41–46; 2d ed., 1842, pp. 25–30.

have been able to make up from the literature at command, will be found at the close of this article.

ESTABLISHMENT OF THE GENUS XEROBATES.—In 1857, Louis Agassiz placed the American gophers in the new genus *Xerobates*, a distinction which has been accepted by Cope,* Gray, and other herpetologists. The characters of the genus are based on the form of the alveolar surfaces of the jaws and on the form of the fore feet and claws. The latter characters, however, in my opinion, are of less generic value than the former, since *X. Berlandieri*, which agrees with *X. polyphemus* and *X. Agassizii* in form of alveolar surface, has fore feet but little compressed; and even in the two last-named species the amount of compression varies considerably. The bluntness of the claws is due largely to the nature of the soil in which the animals live and to their habit of burrowing. The claws of the young, in all the species, are sharp, and but little compressed, although almost perfectly straight.

HISTORY OF XEROBATES AGASSIZII.—The history of the scientific discovery of the western gopher, unlike that of its eastern relative, is a very simple one. The tortoise was first made known to science by Dr. J. G. Cooper in a paper on "New Californian Animals," read before the California Academy of Sciences, July 7, 1861, and published in the second volume of the proceedings of that society, issued in 1863. The description is as follows:

"Professor Baird thinks with me that the following will undoubtedly prove a new species, after a comparison of specimens:

"XEROBATES AGASSIZII.—Agassiz's Land-Tortoise.

"*Spec. char.*—*Young*, with the carapax higher and more arching than in *X. carolinus*; the margin serrate all round, the primary disks of the scales projecting from a tenth to an eighth of an inch. Color of primary disks entirely pale yellow, the annual rings of growth only being dark brown. (Young just hatched, probably all yellow.)

"*Remarks.*—Closely resembles *X. carolinus*, the 'Gopher' of Florida and the other Cotton States, of which no descriptions accessible are full enough to enable me to point out all the differences. But as another species intervenes between the range of that and this one, namely, *X. berlandieri* of Agassiz, found in Southern Texas and Mexico, I feel confident that comparison of specimens will show constant distinctions between them. From *X. berlandieri* it differs even more than from *carolinus*. Besides the serrate margin, which is most distinct in my youngest specimens (four years), while Agassiz's figure of the young has no serrations, and different coloration, it has but twenty-four instead of twenty-six marginal scales (abnormal in his figured specimen?), and the primary disk of the vertebral scales is more than half as long (antero-posteriorly) as it is broad, instead of about twice as broad as long. The other scales also differ in details of form.

* Cope, Bull. U. S. G. & G. Survey, iv, 1878, p. 393.

"Three young specimens, a male of seven years of age, two females of six and four years, obtained from the mountains of California, near Fort Mojave."*

The next account published is the very meager one contained in Cronise's "Natural Wealth of California," issued in 1868. The herpetology of this work was outlined or written, in part or entirely, by Dr. J. G. Cooper. The paragraph relating to Agassiz's Tortoise is as follows: "Agassiz's Tortoise (1. *Xerobates Agassizii*) is found only in the southeast quarter of California, which is both the driest and warmest. They grow a foot in length, and live wholly on vegetable food, closely resembling the tortoise called Gopher (*i. e.*, burrower), in the Gulf States. They are like that and most other species, eatable, but not very well flavored."†

The name *Xerobates Agassizii* alone appears again in Dr. Cooper's paper on "The Fauna of California and its Geographical Distribution," read before the California Academy, September 6, 1869,‡ and also in Cope's Check-list of Reptiles, published in 1875.§

These descriptions and allusions, together with one other to which I shall presently refer, complete, so far as I am aware, the literature of the subject. As they do not furnish sufficient data for the identification of the mature animal, I have judged it not unimportant to add a description of the species, drawn from a careful study of specimens of adults and young in the National Museum, and to point out the characters which separate it from *Xerobates polyphemus*.

Description of Xerobates Agassizii Cooper.—The shell is considerably depressed, and nearly flat above. Its margin is serrate all around, except in specimens worn by attrition with the soil, but most strongly behind and in front, and is quite strongly revolute over the thighs and shoulders. The center of each plate of the carapace (with the exception of the marginals) is raised, forming a sort of boss; the bosses of the anterior and penultimate vertebral plates are not prominent. The vertebral plates are five in number; the anterior hexagonal, the shortest side abutting against the nuchal plate; the second hexagonal, the posterior side longest; the third hexagonal, the anterior and posterior sides of equal length; the penultimate hexagonal, the anterior side a little the longest; the posterior hexagonal, the posterior side longest, the posterior angles very obtuse, making the plate appear almost quadrilateral. The first lateral plate is irregularly heptagonal, but the anterior angles arevery obtuse, so that the plate often appears to be quadrilateral or rudely triangular, with a rounded inferior side. The second and third laterals are heptagonal, the lower angles as before; the fourth is quadrilateral, the anterior side a little the longest. The marginal

* Proc. Cal. Acad. Sci., ii, 1863, pp. 120, 121.

† Cronise, The Natural Wealth of California, San Francisco, 1868, p. 480.

‡ Proc. Acad. Cal. Sci., iv, 1873, p. 67.

§ Cope, Check-list N. A. Bat. & Rept., Washington, 1875, p. 54.

plates are twenty-four in number. The nuchal is irregularly quadrilateral, broadest behind. The supra-caudal is single, large, twice as long as high, and but slightly bulging. It stands in an almost vertical position. The first marginal plate is irregularly pentagonal; the second and third quadrilateral or pentagonal; the fourth pentagonal; the fifth quadrilateral; the sixth pentagonal; the seventh to the eleventh, inclusive, quadrilateral. All the plates are about equally striated with concentric lines.

The sternum is very thick, and in adults extends about an inch beyond the anterior edge of the carapace. The gular plates together form an elongated pentagon, but there is sometimes a deep notch between them anteriorly. The brachial plates are quadrilateral, the free border longest; the anterior borders, which receive the posterior sides of the gular plates, together crescentic in outline. The surface of these plates, unlike that of those of *X. polyphemus*, is level in the antero-posterior direction. The thoracic plates are rudely quadrilateral, narrow, and but little expanded at their outer extremities. The abdominal plates are nearly quadrilateral, but less nearly square than in *X. polyphemus*. The femoral plates are also rudely quadrilateral, but much narrower than in *X. polyphemus*, the interior lateral border being scarcely more than half the length of the anterior side. The subcaudal plates, which do not differ from those of the eastern species, are rudely quadrilateral, the interior lateral border being a little shorter than the exterior.

These characters, as in all tortoises, are quite variable and unsatisfactory.

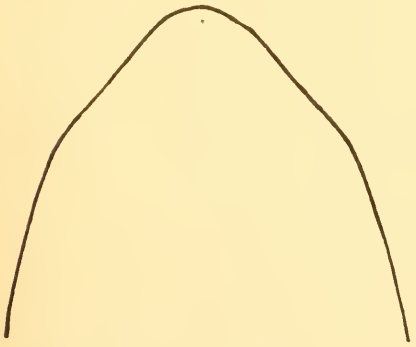

FIG. I.—X. POLYPHEMUS.

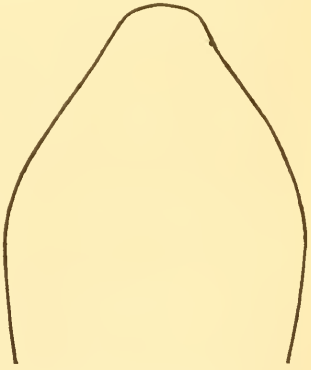

FIG. II.—X. AGASSIZII.

Contour of the head shown by passing a plane through the lowest point of the orbit parallel to the upper surface of the head.

The head is considerably compressed at the sides and elongated. Its superior surface is covered with flat scales, which decrease in size backward, and are usually divided into pairs between the eyes, and very large. The nostrils are quite small and near together, and are raised a little above the upper edge of the sheath of the upper jaw. The eyes are large and

look a little forward; they are situated high in the head. The jaws are irregularly but quite finely serrated, the margins being almost in a straight line. The sheath of the upper jaw is very high, between the snout and the eye, but becomes narrowed abruptly under the eye. The neck is of moderate length, with granulated skin.

The anterior extremities are large, stout, and more or less compressed in the antero-posterior direction. The claws, five in number, are short, stout, and not curved. The scales on the anterior aspect of the arm are all approximately equal in size. Those on the exterior edge are a little larger. On the posterior surface the scales decrease in size gradually from the exterior to the interior edge.

The posterior extremities are terete, the feet elephantoid, the soles being large and round in contour. The scales surrounding the edge of the sole are large, the two posterior ones being very thick and broad. The four nails or claws resemble those of the fore feet, but show a slight tendency to curve. There are two or three prominent scales on the posterior part of the thigh.

The tail, although very short, is considerably longer than that of *X. polyphemus*.

The general color of the whole animal is brown. The centers of the plates of the carapace in the young, and in some adult specimens, is light tawny yellow. The color of the plastron is usually a little lighter than the general color of the carapace.

In this description I have followed as closely as possible that given by Dr. Holbrook, for *X. polyphemus*, in order that the two may be contrasted.

Specific distinctions.—The leading difference in structure between *X. polyphemus* and *X. Agassizii*, one which is constant in all ages, is in the size of the fore feet as compared with the size of the hind feet. This distinction may be formulated as follows: The distance from the base of the first claw of the hind foot to the base of the fourth claw equals the distance from the base of the first claw of the fore foot to the base of the third claw in *X. polyphemus;* the fourth claw in *X. Agassizii*.

Again *X. polyphemus*, at all ages, has the anterior end of the plastron bent upward quite sharply toward the carapace, a character which does not occur in *X. Agassizii*. The inguinal plates of the former species do not usually exceed four in number—one large one and two or three small ones internal to it—and are set obliquely. Those of *X. Agassizii* are usually five or six in number—two large ones and three or four small ones between them—and are set vertically. *X. polyphemus* has one scale on the inner aspect of the knee-joint of the fore leg very much larger than the others covering that member, while in Agassiz's Tortoise all are approximately equal. This character is most noticeable in the young. The horny sheath of the upper jaw extends further back of the eye in *X. polyphemus* than in *X. Agassizii*. Other characters of less importance

might be added, but these will suffice, I think, to render the two species readily distinguishable. The relative proportions of the fore and hind feet is a matter of especial importance.

HISTORY OF XEROBATES BERLANDIERI.—The third species to be considered is *Xerobates Berlandieri* Agassiz, the only published description of which is contained in Agassiz's Contributions to the Natural History of the United States, volume i, page 447. The notice is so short that I will quote it in full. It is as follows: "XEROBATES BERLANDIERI, *Ag.* The young is represented Pl. 3, fig. 17–19. It has a small yellow dot in the centre of the median and costal scales; the marginal scales are only edged with yellow. The sternum is narrower and more projecting in front than that of *X. carolinus;* in the adult it is even forked. Behind it is broader and more turned downward. The centre of the scales remains granular for a longer time. The gland of the lower jaw is larger and more prominent. This species is smaller than the preceding, and limited to southern Texas and Mexico. All the specimens that I have seen were forwarded to me for examination by the Smithsonian Institution. They were collected by the late Mr. Berlandier, a zealous French naturalist, to whom we are indebted for much of what we know of the natural history of northern Mexico."*

The use of Berlandier's name in the denomination of this species is very appropriate, since that unfortunate naturalist was not only the first to collect specimens of the tortoise, but was the first to describe it. His manuscripts, deposited in the Smithsonian Institution, contain an extended description of the animal, under the name *Testudo tuberculata*, together with a carefully-drawn figure, and some notes on its distribution.

Mention of this animal occurs in later times in the writings of Strauch,† Gray,‡ Baird,§ and Cope,‖ but, with the exception of the last two naturalists, all regard it merely as a synonym of *X. polyphemus.* Professor Baird enumerates it among others as a separate species, giving the scientific name which Agassiz has applied and the common name, "Texas Gopher." Cope also employs Agassiz's name, and adds, "I obtained a specimen of this land tortoise, collected by Mr. Marnock in the southwestern part of the State [Texas], where, according to that gentleman, it is common. He has also found it near San Antonio. I did not meet with it on the first plateau." That it is a separate species I think no one who has compared the heads of the two can doubt. The following description is intended to show that Berlandier's Tortoise is a species entirely distinct from the gopher, and not merely a variety of the latter as Strauch and some other writers have supposed.

DESCRIPTION OF XEROBATES BERLANDIERI.—Shell short and high, slightly emarginate and revolute in front, strongly incurvated behind.

*Agassiz, Cont. Nat. Hist. U. S., i, 1857, p. 447.

†Strauch, Mem. Acad. Imp. Sci. St. Peterbourg, vii series, viii, 1865, article 13, p. 28.

‡Gray, J. E., Proc. Zool. Soc. London, 1873, p. 723.

§Baird, Herpetology Mex. Bound. Survey, 1859, p. 4.

‖Cope, Bull. U. S. N. Museum, No. 17, 1880, pp. 13 and 47.

Of the five vertebral plates, the anterior is pentagonal, the two posterior angles right angles; the second and third are hexagonal, the anterior and posterior lateral margins approximately equal; the fourth is hexagonal, the posterior lateral border longer than the anterior lateral and curved inward; the fifth is hexagonal, the anterior lateral borders longest. The first lateral plate is quadrilateral (or resembles a triangle with a rounded apex), the lower border presenting rounded angles, and joined to the first four marginal plates; the second and third are hexagonal, the lower angle very obtuse; the posterior is quadrilateral and in adults nearly square. There are twenty-four marginal plates. The nuchal is small, quadrilateral, largest in front, or square; the supra-caudal is quadrilateral, but considerably less than twice as broad as high. The marginal plates differ much in different specimens. The first is rudely pentagonal, usually with an acute angle directed toward the nuchal; the remainder are irregularly quadrilateral; the sixth, however, is sometimes plainly pentagonal. In adults, the center of the eighth, ninth, tenth, and eleventh plates is usually strongly depressed, the free border being revolute.

The sternum is broad and convex at the sides, and extends an inch or less beyond the carapace in front. Each gular plate is quadrilateral. They are united, the anterior border of the resulting pentagon being invariably emarginate, often very strongly notched. The nuchal plates change shape to a remarkable degree from youth to maturity. In the newly-born animal they are broad and short, but in the adult they are narrow and elongated. The brachial are quadrangular; in the adult, both free and posterior borders convex. The thoracic are rudely quadrilateral, and very narrow at their juncture in the median line. The femoral are quadrilateral, very long and broad, covering more than a third of the sternum; the anterior and posterior borders parallel. The abdominal are rhomboidal, the exterior side longer than the interior, and convex. The sub-caudal are quadrilateral, with a notch of medium depth between them posteriorly. The axillary are usually three in number—one large one between two small ones. The inguinal are also three in number, arranged as are the axillary plates.

FIG. III.—X. BERLANDIERI.
Contour of head obtained as before.

The head is slightly elongated, deep, and from the eyes forward wedge-shaped; it is covered with flat scales of moderate size which in adults are approximately equal. In the young the scales on the fore part of the head are clearly larger than elsewhere and are divided into pairs, but these distinctions become unappreciable in the adult. There is usually also one very large scale over the tympanum. Nostrils moderate. Eyes large, set obliquely, and looking slightly for-

ward; lower lid about three times as broad as the upper. Jaws short and thick; sheaths short and deep, that of the upper jaw ending under the middle of the eye; a depression beneath the eye. The two tooth-like processes at the symphysis of the lower jaw large and high, giving the cutting margin a concave outline.

Anterior extremities not greatly larger than the posterior, frequently compressed in the antero-posterior direction, but sometimes nearly terete. Five claws with stout nails. The whole anterior surface of the leg covered with very large rounded scales, approximately equal in size. Scales on the sole of the foot large.

The posterior extremities are terete and clavate, and bear four flattened, pointed nails. Scales on the heel large, two especially so.

Color of the carapace yellowish-brown, the surface within the smaller stria of each plate yellow. Sternum light dirty yellow. Head and legs yellowish gray. Jaws yellowish.

SPECIFIC DISTINCTIONS.—The main differences which separate *X. Berlandieri* from *X. polyphemus* and *X. Agassizii* relate to the size and shape of the head and jaws, the size and shape of the legs, and to the height of the shell. In *X. polyphemus* the length of the carapace is more than twice the height of the shell, while in *X. Berlandieri* the length of the former is considerably less than twice the height of the latter. In the former species the fore legs are largest at the extremity, while in the latter they are largest at the knees. In *X. polyphemus* again the cutting edge of the lower jaw is nearly straight, while in *X. Berlandieri* it is very considerably arched, giving the mouth a *hawk's bill* appearance. Many other minor differences exist in the arrangement of scales on the legs, and the like.

SIZE.—Of the three species, *X. Berlandieri* is the smallest. The adults of *X. polyphemus* and *X. Agassizii* are of about equal size. The following table gives the actual measurements of greatest length and breadth of six adult specimens:

Species.	Locality.	Length of carapace.	Depth of shell.
X. polyphemus:		*Inches.*	*Inches.*
No. ——		8½	3½
No. 9627	Florida	8¼	4
No. (33)	Nashville, Ga	11	4¼
X. Agassizii:			
No. 10412	Fort Yuma, Cal	10	4½
No. ——	——, Cal	8¾	3¾
X. Berlandieri:			
No. 8926*a*	Brownsville, Tex	7	3¾
No. 8926*b*	Brownsville, Tex	6¾	3½

ALLIED GENERA.—The Brazilian Tortoise, *Chelonoidis tabulata*, inhabiting the northern parts of the neotropical region, although resembling, when half grown, the species of *Xerobates*, differs from them all in characters of generic value, such as the absence of a nuchal plate,

and the presence of a pit in place of a ridge in the horizontal alveolar surface of the upper jaw, at the symphysis.

FOSSIL SPECIES.—In 1878, Professor Cope placed two fossil tortoises from Kansas in the genus *Xerobates*, under the names *X. orthopygius* and *X. cyclopygius*. The skull of the latter species, however, was not found, and, the author states, "it is not certain that it belongs to the genus *Xerobates*."* *X. orthopygius*, if I understand the description correctly, is an aberrant form as far as regards its shell, and may belong to a subgenus. As I have no fragments of these animals at command I cannot speak with confidence regarding either of them.

II. HABITS AND CAPTURE.

HABITS OF THE GOPHER.—Regarding the habits of the gopher considerable has been written by Holbrook, Bartram, Louis Agassiz, Say, and other observers and writers of less note. These all agree that it is an animal of docile nature, preferring situations of the utmost dryness and reveling in an abundance of sunshine and warmth. It has an innate repugnance to rain and all moisture, and at the approach of winter retreats to the depths of its burrow and becomes dormant. Its native home is in the sandy pine barrens of the South; far from them it is never found.

The habit of digging pits or dens in the earth seems to be peculiar to this genus of tortoises; I have been unable to find proof of any similar proclivity existing among tortoises of allied genera inhabiting other countries. "The domicile of the Gopher," observes Dr. Savage, "consists of an excavation of a size at the mouth just sufficient to admit the animal, and runs in an oblique direction to the depth of about four feet. From the entrance it enlarges and expands to a considerable extent, resembling in its interior outline a vessel of globular shape. Being concealed, it is sometimes a dangerous cavity to horsemen at full speed. It is inhabited by but one pair."†

The remarks of Rev. C. F. Knight, on the habits of this species, made before the Boston Society of Natural History, June 15, 1870, disagree somewhat with this account. He states that the gallery leading to the burrow is often sixteen feet long, sinking to a depth of twelve feet, and that the latter consists of several chambers. At the mouth of the burrow there is always a mound or hillock of considerable size, formed by the earth which the animal casts behind him in excavating.

Forbes states that gophers are sometimes forced to share their quarters with a brood of rattlesnakes, these welcome lodgers intruding themselves here as they do into the homes of the prairie dog. Rev. Mr. Knight, in the communication just referred to, affirms that, "on one

*Cope, Bull. U. S. G. & G. Survey, iv, 1878, pp. 393–395.

†Dr. Th. Savage in Louis Agassiz's Cont. Nat. Hist. U. S., i, 1857, p. 447.

occasion, a pair of opossums, a raccoon, a rattlesnake more than six feet long, and two other snakes, besides several of the native black rats of the district (Florida) were taken from one of these holes."*

The gopher is entirely graminivorous, feeding upon various succulent vegetables and grass. It does not distinguish between wild and cultivated plants, and often causes much annoyance to planters in the South by devouring great quantities of the sweet-potato vine and other garden vegetables. It is also fond of the gum which exudes from the pine tree. It has been generally supposed that the gopher wanders from its den in search of food only at night, but the animals which Holbrook kept in confinement partook of food at all hours of the day indifferently.

There is need of more extended information regarding the breeding habits of gopher. The account of Dr. Savage, which, so far as I am aware, contains all that has been published on the subject, is not derived from personal observation, and is incomplete in some details. From him we learn, however, that the eggs are not deposited in the burrow itself, but at some point near the mouth. "The habit of the animal in oviposition, it is said, is to draw a circle on the ground about four inches in diameter, and to excavate within this to a depth of about the same number of inches, expanding as it proceeds, in a manner similar to that adopted in making its domicile. In this are deposited five white eggs, of a round form. The number being complete, the cavity is filled with earth and pressed down smoothly, and to a level with the surface, by the weight of the animal. The time in hatching is said to be between three and four weeks. The month in which they lay is June."†

The age attained by *Xerobates polyphemus* is a matter of some dispute. Some herpetologists hold that the number of concentric striæ on the dorsal scales of a tortoise form a reliable index to the number of years of its life, one ring being formed annually. But for the species under consideration, at least, I am convinced that little is to be learned from an examination of these striæ. Specimens, apparently of advanced age, are frequent in which long attrition with a sandy soil has effaced all traces of striation from the shell. Furthermore, I conceive that if the growth of the layers of the scales is connected with the phenomenon of hibernation, owing to the varying mildness of southern winters, two or more layers might be formed in a single year.

As the alligator snapper (*M. lacertina*) is the strongest of American tortoises, as regards its jaws, so the gopher, as regards its legs. That it will walk about with a man standing upon its back is a fact too commonly observed to admit of doubt. Le Conte writes that it can support a maximum weight of 600 pounds; but this statement is not derived from his own observation.

The ordinary mode of capturing the gopher is to dig a pit at the en-

*Proc. Boston Soc. Nat. Hist., xiv, 1872, p. 16.

†Th. Savage, loc. cit.

trance of the burrow, into which the animal will fall when emerging from the latter in search of food. Wailes, however, in his report on the resources of Mississippi, gives an account of another method, which was related to him, but which it would seem must be taken *cum grano salo*. He writes: "A common box terrapin is used for the purpose, being driven into the gopher's hole, from which he is speedily driven out; but, in the eagerness of pursuit, the gopher frequently follows him so far above ground as to be cut off from his retreat and captured by the waiting hunter."*

HABITS OF AGASSIZ'S AND BERLANDIER'S TORTOISES.—Regarding the habits of Agassiz's and Berlandier's tortoises, but little has been recorded. The following notes by Mr. E. T. Cox are of recent date and point to a similarity of habits, except in the last particulars, between the eastern and western gophers. Speaking of *Xerobates Agassizii*, he says: "He is a vegetarian, feeding, as I am told, on cacti. His flesh is highly esteemed as food by the Indians and Mexicans. You will perceive that his mandibles are notched or toothed. His legs are covered with bony scales, and his front toe nails are made long and strong for digging amongst the rocks, while the hind feet are round like an elephant's. * * *

"In preparing the specimen, I found on each side, between the flesh and carapax, a large membranous sack filled with clear water; I judged that about a pint run out, though the animal had been some days in captivity and without water before coming into my possession.† Here then is the secret of his living in such a dry region; he carries his supply of water in two tanks. The thirsty traveler, falling in with one of these tortoises and aware of this fact, need have no fear of dying of immediate want of water."‡

I consider it doubtful whether Berlandier's tortoise digs burrows. The form of the legs is such that excavation by their aid would be a very tedious process. I have been unable to find any notes relating to its habits, save the single sentence in Berlandier's manuscript: "Elle est herbivore."

Its eggs, unlike those of the other species, are elliptical.

III. GEOGRAPHICAL DISTRIBUTION.

It is somewhat difficult at the present time to work out with exactitude the geographical distribution of the three North American *Xerobates*, owing to a "plentiful lack" of citations of the exact localities in which specimens have been found. In a general way, however, little difficulty is encountered.

DISTRIBUTION OF THE GOPHER.—The National Museum has specimens of *X. polyphemus* from Saint Simon's Island, Ga. (7551); Nashville,

* Wailes, Geology of Mississippi.

† Regarding this matter I may have somewhat to say at a later date.—F. W. T.

‡ Amer. Nat., xv, 1881, p. 1003.

Ga.; Clear Water, Fla. (16057); Homossasa, Fla. (10069–70); Gainesville, Fla. (10471), and Brownsville, Tex. (8926), together with others labeled East Florida (7554–55–57). I have a memorandum in my possession stating that Mr. G. Brown Goode shipped 19 specimens of this animal, collected in the vicinity of Arlington, Fla., to the zoological gardens in Philadelphia. Bartram found traces of them south of the Savannah River, in Georgia and Florida. Holbrook states that they are numerous in Edgefield and Barnwell districts (S. C.), whence they extend through Georgia, Alabama, and the Floridas, and that, "According to Le Sueur, they are brought to the New Orleans market, though probably not from the immediate neighborhood."* Wailes knew of their existence in the southern part of Mississippi.

From these data it would appear that *Xerobates polyphemus* inhabits all the drier portions of the Austroriparian region, from Southern South Carolina to the Rio Grande del Norte, with the exception, perhaps, of Southern Florida. Furthermore, Gray was informed of its introduction into Cuba, where, according to Mr. W. S. MacLean, it "lives in domestication."†

Distribution of Agassiz's Tortoise.—Of the species *Xerobates Agassizii* the U. S. National Museum has specimens from Fort Mohave, Ariz. (6718); Dr. Cooper's types from the Solado Valley, Cal. (7888), and from Fort Yuma, Cal. (10398–99, 10412).

The distribution of this tortoise, therefore, must be limited for the present to the southern, sandy desert portions of California and Arizona.

Distribution of Berlandier's Tortoise.—*Testudo Berlandieri* was described by Agassiz from specimens from Northern Mexico. Berlandier writes: "It inhabits the plains of Tamaulipas between Matamoras and San Fernando de las Presas. At Laredo, on the banks of the Rio Bravo, this tortoise forms an important article of diet for the soldiers of the presidios when crossing the deserts." Cope, as we have seen, knew of specimens from San Antonio, Tex., and of the occurrence of the animal in the southwestern part of that State generally.

Its distribution, therefore, would seem to be limited to the lower regions of Texas and northeastern Mexico, between the twenty-fifth and thirtieth parallels.

IV. SYNOPSIS OF THE SPECIES.

Terrestrial; horizontal alveolar surface of the upper jaw with two ridges; an interval at the symphysis, occupied by a transverse ridge; a notch in the lower jaw fitting over the transverse ridge. Anterior extremities more or less compressed in the antero-posterior direction; posterior extremities clavate; nails 5:4 ....*Xerobates.*

* Holbrook, N. A. Herp., 1st ed., i, 1836, p. 44.

† Ann. and Mag. Nat. History, 1st series, v, 1840, p. 115.

* Shell more than twice as long as high; head rounded in front; margin of jaws straight; fore-legs broadest at the extremity.

Anterior part of the plastron bent upward. Distance from base of 1st claw to base of 4th claw, hind foot, equal to distance from base of 1st claw to base of 3d claw, fore foot.....*X. polyphemus.*

Plastron level in the antero-posterior direction. Distance from base of 1st claw to base of 4th claw, hind foot, equal to distance from base of 1st claw to base of 4th claw, fore foot..*X. Agassizii.*

** Shell less than twice as long as high; head wedge-shaped in front; margin of jaws curved; fore-legs broadest at the knee..*X. Berlandieri.*

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U. S. NATIONAL MUSEUM, *Washington, January* 27, 1882.

CATALOGUE OF A COLLECTION OF JAPANESE COTTON FIBER PRESENTED TO THE UNITED STATES NATIONAL MUSEUM BY THE GOVERNMENT OF JAPAN, TOGETHER WITH THE AMOUNT OF THE ANNUAL CROP OF JAPAN AND THE PRICE OF COTTON.*

[Prepared by the Japanese Legation.]

No. 1. Cotton produced by—
Konishi Shojiro,
Awadono mura, Soyekami-gori,
Yamato, Osaka-Fu.
Annual crop, about 225 kin = 298.14075 pounds.
Market price, 7.1 sen per 1 kin = 1.32507 pounds.

*NOTE TO THE CATALOGUE OF THE COLLECTION OF COTTON.—Of the suffixes to the words signifying the localities of producers, "mura" means village and "gori" township, and in the catalogue is mentioned next to the township the name of a geographical division or province, and then follows a political division.

NOTE TO THE ACCOUNT OF COTTON HUSBANDRY.—The district of Kinai, strictly speaking, comprises the provinces of Yamashiro, Yamato, Kawachi, Idsumi, and Settsu, but in the sense used in the account that district may also comprise some other neighboring provinces. The district of Kanto comprises the province of Musashi and other seven adjacent provinces. The district of Chiugoku consists of all the provinces lying south of those of Harima and Tamba and north of Nagato and Suwo. The district of Kinshiu is the whole of the island of that name. The district of Tô-oku comprises the northeastern part of the province of Ô-shiu, which is now divided into five provinces. And the district of Hokuroku includes seven provinces—Wakasa, Techizen, Kaga, Noto, Tetchiu, Techigo, and Sado.