A PLEISTOCENE HERPETOFAUNA FROM LADDS, GEORGIA

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Published accounts of Florida Pleistocene amphibians and reptiles are numerous (Gehlbach, 1965, Table 2), but herpetofaunal reports dealing with Pleistocene fossils from other southeastern states are almost entirely lacking. In fact, heretofore no such reports have appeared concerning Georgia. Recently, a moderately large Pleistocene herpetofauna from fissure fillings in northwestern Georgia was submitted to me for identification by Dr. G. Arthur Cooper and Dr. Clayton E. Ray of the United States National Museum. Hundreds of the fossils were too fragmentary for identification. But some bones were identifiable and these represent at least 23 species of amphibians and reptiles that are detailed in the following paragraphs.

The Georgia fossils were collected in 1963 and 1964 by the students, staff, and friends of Shorter College, Rome, Georgia. Professor Lewis Lipps of Shorter College was particularly instrumental in securing the bones. The fossils occur in small fissures exposed in limestone representing the southern end of Quarry Mountain (locally known as Ladds Mountain). This site is presently isolated from the major portion of the mountain by extensive quarrying operations. The fossiliferous matrix is a red cave earth that is in part firmly cemented as a cave breccia. The site is 2.3 miles WSW of Cartersville, Bartow County, Georgia at 84° 50′ W, 34° 9′ N.

I wish to thank Dr. G. A. Cooper and Dr. C. E. Ray for the privilege of studying fossils in their care. I also wish to thank Dr. Paul Parmalee of the Illinois State Museum, Springfield, Illinois for the gift of a turtle skeleton used in this study. Numbers are those of the United States National Museum (USNM). This work was supported in part by NSF Grant B60900R.

Following is a check list of the amphibians and reptiles of the Ladds, Georgia Pleistocene faunal assemblage.

CHECK LIST

Order Urodela

Ambystoma tigrinum (Green)
Desmognathus or *Leurognathus*
Plethodon cf. *Plethodon glutinosus* (Green)
Gyrinophilus sp. indet.
Pseudotriton ruber (Sonnini)

Order Anura

Bufo americanus Holbrook
Hyla crucifer Wied
Rana pipiens Schreber

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Rana sp. indet.
Order Chelonia
Clemmys insculpta (Le Conte)
Terrapene carolina (Linnaeus)
Pseudemys cf. *Pseudemys concinna* (Le Conte)
Order Squamata
Anolis carolinensis Voigt
Sceloporus undulatus (Latreille)
Natrix sipedon (Linnaeus)
Thamnophis sirtalis (Linnaeus)
Heterodon platyrhinos Latreille
Diadophis punctatus (Linnaeus)
Carphophis amoenus (Say)
Coluber or *Masticophis*
Elaphe sp. indet.
Lampropeltis getulus (Linnaeus)
Lampropeltis triangulum (Lacépède)
Crotalus horridus Linnaeus

Annotated List

Ambystoma tigrinum (Green)

Geologic range.—Aftonian-Recent.
Material.—Three vertebrae, USNM 23287.
Remarks.—Tihen (1958) gave vertebral characters for distinguishing the various species groups of the genus *Ambystoma*. These characters are mainly substantiated by the study of additional ambystomatid skeletal material at hand. The three fossils represent the *tigrinum* group (Tihen, *op. cit.*) and are assigned to the species *Ambystoma tigrinum* on the basis of their large size. According to Conant (1958, p. 340, Map 169) *A. tigrinum* does not occur in northwestern Georgia today, although it is found in nearby southeastern Tennessee.

Desmognathus or *Leurognathus*

Geologic range.—Wisconsonian-Recent.
Material.—Four presacral vertebrae, USNM 23288.
Remarks.—These vertebrae are opisthocoelous and have pointed processes arising from the dorsal surfaces of the postzygapophyses as in *Desmognathus* and *Leurognathus* as pointed out by Soler (1950). I am unable to carry the identification of these fossils any farther.

Plethodon cf. *Plethodon glutinosus* (Green)

Geologic range.—Illinoian-Recent.
Material.—Two right and two left femora, 35 vertebrae, USNM 23289.
Remarks.—Long bones of fossil plethodontid salamanders have very seldom been identified. Nevertheless, there seem to be some diagnostic characters on plethodontid femora. The femur of the several large species of *Plethodon* available is stouter and

has more robust processes than that of *Eurycea*. The femur of *Pseudotriton* and *Gyrinophilus* is as large or larger than that of the large species of *Plethodon*, but it has a much more flattened head and a wider trochanter than in *Plethodon*.

Distinguishing species of *Plethodon* on the basis of the femur is difficult. The femur of *Plethodon glutinosus* is much larger than *P. cinereus* (Green), *P. dorsalis* (Cope), *P. richmondi* Netting and Mittleman, and *P. welleri* Walker. The other *Plethodon* species have the femur similar in size to *P. glutinosus*, but the head of *P. jordani* Blatchley is flatter than in *P. glutinosus*, and in a single specimen of *P. yonahlossee* Dunn the bone is less stout and the processes less massive than in *P. glutinosus*. On the basis of the above characters the fossil femora are tentatively assigned to the species *P. glutinosus*. The vertebrae represent a large *Plethodon*, and I cannot distinguish them from those of Recent *P. glutinosus*.

Gyrinophilus sp. indet.

Geologic range.—Wisconsonian-Recent.

Material.—Presacral vertebra, USNM 23290.

Remarks.—Based on characters discussed in the following section the vertebra is assigned to the genus *Gyrinophilus*. Specific identification was not attempted because of the lack of comparative material. This is the first record of the genus as a fossil.

Pseudotriton ruber (Sonnini)

Geologic range.—Wisconsonian-Recent.

Material.—Presacral vertebra, USNM 23291.

Remarks.—The presacral vertebrae of *Pseudotriton* and *Gyrinophilus* may be distinguished from those of *Desmognathus* and *Leurognathus* in that they are amphicoelous (more precisely falsely opisthocoelous, Soler, *op. cit.)* rather than truly opisthocoelous as in the latter two genera. Presacral vertebrae of *Pseudotriton* and *Gyrinophilus* may be distinguished from those of *Plethodon* in that they are larger and have more constricted notochordal canals. *Pseudotriton* vertebrae may be separated from those of the two available specimens of *Gyrinophilus porphyriticus* (Green) in that the neural spines are well developed in the former and obsolete in the latter form. On the basis of three skeletons of *P. ruber* and two of *P. montanus* Baird the neural spines are higher in the former than in the latter species. The fossil agrees with *P. ruber* in this character. This is the first record of the genus and species as a fossil.

Bufo americanus Holbrook

Geologic range.—Wisconsonian-Recent.

Material.—One cranial crest, three body vertebrae, one ilium, one humerus, one scapula, one femur, two tibiofibulae, one calcaneus-astragulus, all representing one extremely large toad;

two ilia representing two much smaller individuals USNM 23292.

Remarks.—The fossils differ from *Bufo quercicus* Holbrook in that they are much larger and in that they lack the produced dorsal ilial protuberance of *B. quercicus*. The fossils differ from *B. terrestris* (Bonnaterre) in lacking the pronounced knob on the cranial crest. Moreover, both *B. quercicus* and *B. terrestris* inhabit the Southeastern Coastal Plain today, much to the southeast of Ladds, Georgia.

The fossils are similar to *Bufo woodhousei* Girard and *B. americanus*, species that are very difficult to distinguish osteologically. Nevertheless, the fossils are assigned to the latter species. In 10 Recent *B. woodhousei fowleri* (Hinckley) and in 11 *B. americanus* there appears to be a tendency for the dorsal protuberance of the ilium to be narrower at the base in the former species than in the latter. There is some overlap in this character, but this appears to occur between the smaller *B. woodhousei* and the larger *B. americanus*, with the largest *B. woodhousei* having the protuberance narrower at the base than the largest *B. americanus*. Although the fossil ilium from the very large specimen is of much greater size than the largest *B. woodhousei* examined, the protuberance of the fossil is quite broad at the base. The two smaller fossil ilia also are similar to *B. americanus* in this character.

TABLE 1

MEASUREMENTS OF FOSSIL AND RECENT *BUFO* (IN MM.).

Structure Measured	Fossil *B. americanus* Georgia Pleistocene	Adult *B. marinus* Mexico Recent	Adult *B. americanus* Illinois Recent	Adult *B. woodhousei* Alabama Recent
Cranial crest length	12.8	none	9.0	7.6
Humerus shaft width	8.7	8.0	4.7	4.4
Calcaneus-astragulus length	25.8	27.8	15.8	16.0
Calcaneus-astragulus width	13.7	11.8	8.5	7.3
Ilial acetabular height	16.5	15.5	10.8	9.4
Ilial shaft height	4.5	4.7	2.6	2.5
Femur distal width	11.6	10.8	7.5	6.7
Femur shaft width	5.3	5.7	3.1	3.0
Tibiofibular distal width	11.8	10.0	7.2	5.8
Scapula distal width	10.1	11.8	6.0	5.8

Of considerable interest is the very large size of the individual represented by most of the toad bones. A skeleton of an adult *Bufo marinus* (Linnaeus) from Veracruz, Mexico, with a snout-vent length of 132.0 mm. is similar in size to the fossil (Table 1). According to Conant (1958) the size record for Recent *Bufo americanus* is four and one-fourth inches, whereas the size record for *B. woodhousei fowleri* is three and one-fourth inches. Thus, the fossil represents a bigger toad than the largest recorded specimen of either of these species. The two smaller fossil ilia represent toads of adult size based on the ilia of Recent toads studied. The measurements of these two fossils are: ilial acetabular height 7.2-11.0 mm., ilial shaft height 2.0-3.4 mm.

Hyla crucifer Wied

Geologic range.—Wisconsonian-Recent.

Material.—Right ilium, USNM 23293.

Remarks.—The ilium of *Hyla crucifer* is rather distinctive. Although it has an ilial shaft ridge as in *Acris gryllus* (Le Conte) and *Acris crepitans* Baird (Lynch, 1965), it may be separated from those species in that its dorsal protuberance is usually more posterior on the shaft (Holman, 1964) and in that its ventral acetabular expansion (see Chantell, 1964 for terminology applied to hylid ilia) is much more extensive. The ilium of *H. crucifer* is smaller with a less well developed dorsal protuberance and a more extensive ventral acetabular expansion than in a specimen of *Pseudacris ornata* (Holbrook). *Hyla crucifer* may be distinguished from *Pseudacris triseriata* (Wied) in that its dorsal ilial protuberance is less elongate and more anterior on the shaft, and in that the anterior part of its ventral acetabular is narrower. The ilium of *H. crucifer* may be separated from those of *H. avivoca* Viosca, *H. cinerea* (Schneider) and *H. versicolor* Le Conte in that it is smaller, has its dorsal protuberance less well developed, somewhat rounder, and more anterior on the shaft. *Hyla crucifer* is somewhat similar in ilial size to *H. squirella* Sonnini and Latreille, but its ilium may be distinguished from this species in that its dorsal protuberance is smaller, less elongate, and more anterior on the shaft. This is the first record of the species as a fossil.

Rana pipiens Schreber

Geologic range.—Hemphillian-Recent.

Material.—Six left and five right ilia, USNM 23294.

Remarks.—Based on available comparative material *Rana palustris* Le Conte, *R. pipiens*, and *R. sylvatica* Le Conte may be distinguished from *R. catesbeiana* Shaw and *R. clamitans* Latreille in that the posterodorsal border of the ilial shaft slopes more gently into the dorsal acetabular expansion in the former group than in the latter two species. The Georgia *Rana* fossils represent small frogs of the former group. *Rana pipiens* and *R. palustris* (only one skeleton available) may be separated from

R. sylvatica in that the prominence for the origin of the vastus externus head of the triceps femoris muscle (terminology of Holman, 1965c) is larger, less produced, and less roughened than in *R. sylvatica*. *Rana pipiens* has a somewhat steeper slope of the posterodorsal border of the ilial shaft into the dorsal acetabular expansion than in the specimen of *R. palustris*. Based on the above characters the fossils represent the species *R. pipiens*.

Rana sp. indet.

Geologic range.—Arikareean-Recent.

Material.—Forty-five left and 47 right ilia, four sacral vertebrae, USNM 23295.

Remarks.—These small fragmentary ilia and sacral vertebrae are not assigned to species, but probably they represent *Rana pipiens*.

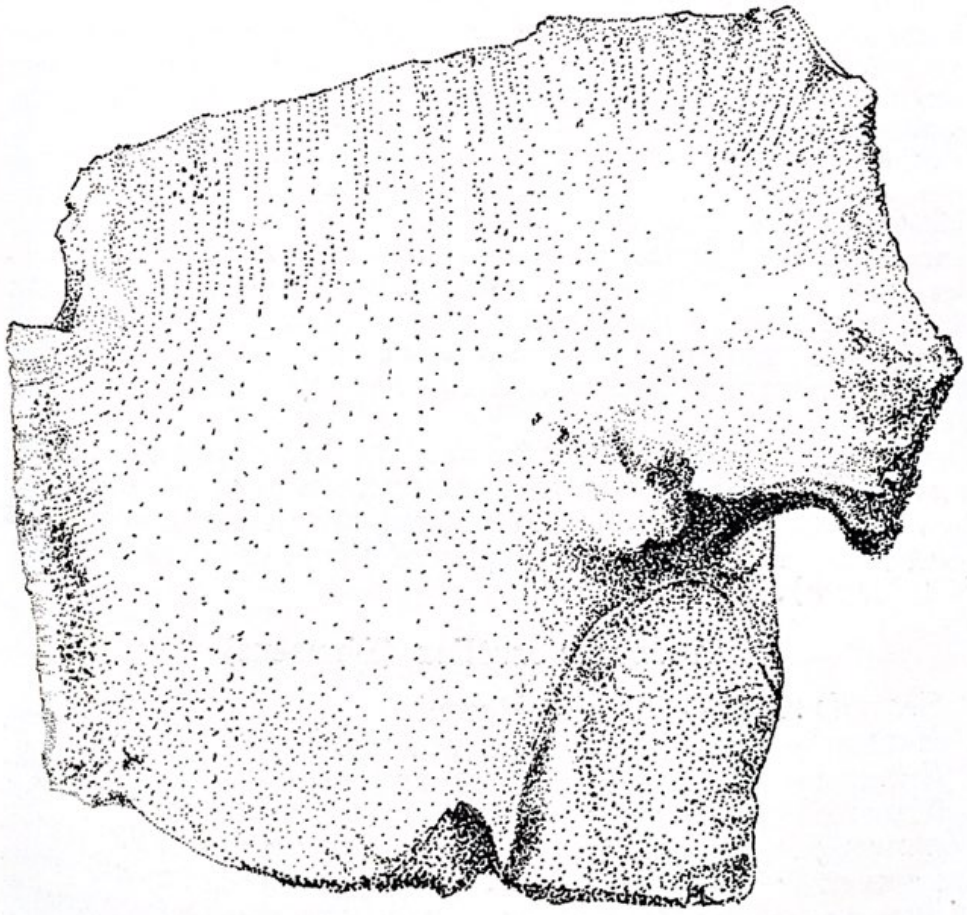

FIGURE 1

Right hypoplastron of *Clemmys insculpta*, USNM 23296, from the Pleistocene of Quarry Mountain, Ladds, Bartow County, Georgia.

Clemmys insculpta (Le Conte)

Geologic range.—Yarmouth-Recent.

Material.—Right hypoplastron (Figure 1), left hyoplastron, left epiplastron fused to partial entoplastron, partial pleural, USNM 23296.

Remarks.—These bones are quite distinctly separable from those of other North American emydid turtles. In the hypoplastron of *Clemmys insculpta* the dorsal part of the femoral epidermal lamina (terminology of Carr, 1952) is very large and its seam is quite convex medially. In *Clemmys guttata* (Schneider), *Chrysemys picta* (Schneider), *Dierochelys reticularia* (Latreille), *Graptemys pseudogeographica* (Gray), *Malaclemmys terrapin* (Schoepff), *Pseudemys concinna* (Le Conte), *P. nelsoni* Carr, and *P. scripta* (Schoepff) the dorsal part of the femoral lamina is smaller and its seam is concave, straight, or only slightly convex medially. In *Clemmys insculpta* and *C. guttata* the inguinal lamina is absent. An inguinal lamina is present in all of the above turtles with the exception of *Dierochelys* and *Malaclemmys*. The hypoplastron of *C. insculpta* may further be distinguished from that of *C. guttata* in that in the former species the bone is larger and the abdominal lamina does not encroach the dorsal part of the plastron. In *C. guttata* the abdominal lamina curves dorsally and thus is visible in dorsal view.

The hyoplastron of *Clemmys insculpta* differs from other species studied in the appearance of the posterior surface of the plastral bridge. In *C. insculpta* the flattened part of the posterior surface of the hyoplastral bridge is directed almost directly posteriad, whereas in the other species it is directed posterolaterally. The large fossil epiplastron is also assigned to the species *C. insculpta* as the bone has the characteristic deep gutter next to the first marginal lamina and the flat anterior border of this same area.

The wood turtle is absent from the herpetofauna of northwestern Georgia today. In fact, the southernmost localities where *C. insculpta* may be found at present are in northeastern West Virginia and the northernmost tip of Virginia (Conant, 1958, p. 313, Map 5).

Terrapene carolina (Linnaeus)

Geologic range.—Illinoian-Recent.

Material.—One left humerus, one right femur, USNM 23297.

Remarks.—The humeri and femora of *Terrapene* are stouter and more bowed than most North American emydid turtles. *Clemmys guttata* and *C. insculpta* have humeri and femora that are almost as bowed as in *Terrapene*, but the humeri and femora of *Terrapene* are much stouter than in *C. guttata*. Moreover, there is a broad shelf behind the head of the humerus in *Terrapene*. This shelf is lacking in *C. guttata* and *C. insculpta*. The intertrochanteric width is only slightly greater than the width of the head of the femur in *Terrapene*, but is much greater than the width of the head in the two species of *Clemmys*. I am unable to distinguish the fossils from bones of living *T. carolina*. The

lack of identifiable *Terrapene* shell remains from the Ladds site is surprising.

Pseudemys cf. *Pseudemys concinna* (Le Conte)

Geologic range.—Wisconsonian-Recent.
Material.—Proneural, USNM 2398.
Remarks.—This large fossil proneural is similar to *P. concinna* and differs from most *P. scripta* in its lack of sculpturing, and in that the area bordered by the seams of the first central lamina is not raised. Moreover, the size of the fossil indicates a form at least 14 inches (355.6 mm.) in carapace length, and the record length for Recent *P. scripta* is 11 inches (Conant, 1958, p. 57). Unfortunately, specimens of *P. rubriventris* (Le Conte) were not available for study, but the present day coastal range of this species (Conant, 1958, p. 317, Map 25) would make it appear that *P. rubriventris* is not the species represented by the Georgia fossils.

To indicate the very large size of the turtle represented by the fossil, its measurements are compared with those of a *P. concinna* with a shell length of 10 and ⅜ inches (364.0 mm.) Measurements of the Recent *P. concinna* are in parentheses. Greatest length 70.5 mm. (51.5 mm.), greatest width 80.7 mm. (57.3 mm.). The species *P. concinna* has not previously been reported as a fossil.

Anolis carolinensis Voigt

Geologic range.—Illinoian-Recent.
Material.—One left and one right dentary, USNM 23299.
Remarks.—The dentary of *Anolis carolinensis* may be distinguished from other lizards that occur in eastern United States today by the following combination of characters: dentary long and slender; teeth relatively short and stout; tricuspid teeth beginning at level of posterior series of lateral foramina. The two fossil dentaries are indistinguishable from those of Recent *A. carolinensis* at hand.

Sceloporus undulatus (Latreille)

Geologic range.—Wisconsonian-Recent.
Material.—Left dentary, USNM 23300.
Remarks.—I cannot distinguish the dentary from that of Recent *Sceloporus undulatus hyacinthinus* (Green) on any salient characters. The fossil is slightly smaller than a *S. undulatus hyacinthinus* with a snout-vent length of 69.0 mm. from Macoupin County, Illinois.

Natrix sipedon (Linnaeus)

Geologic range.—Wisconsonian-Recent.
Material.—One basioccipital, one quadrate, one squamosal, one pterygoid, two ectopterygoids (transpalatines), three an-

gulars, one right dentary, twenty precaudal vertebrae, all from a single individual, USNM 23301.

Remarks.—The quadrate of North American *Natrix* appears to be distinguishable from that of North American *Thamnophis* (Holman, 1965b). The fossil resembles four specimens of *Natrix sipedon sipedon* (Linnaeus) in that it has a deeply excavated posterior surface and a much inflected, very thin lateral border. None of the other *Natrix* quadrates examined (*N. cyclopion floridana* Goff 6, *N. erythrogaster erythrogaster* Forster 1, *N. fasciata pictiventris* Cope 10, *N. rhombifera rhombifera* (Hallowell) 1, and *N. taxispilota* (Holbrook) 3) have this condition as well developed.

The fossil ectopterygoids resemble *Natrix* and are thicker than those of *Thamnophis* species available to me, especially in the constricted region just posterior to the maxillary end. The fossils are indistinguishable from a Recent *N. sipedon sipedon* ectopterygoid of the same size.

The fossil vertebrae resemble those of four Recent skeletons of *N. s. sipedon* in having their neural spines lower than long, whereas the precaudal vertebrae of *N. cyclopion floridana, N. fasciata pictiventris, N. erythrogaster erythrogaster, N. rhombifera rhombifera,* and *N. taxispilota* have their neural spines higher than long.

Thamnophis sirtalis (Linnaeus)

Geologic range.—Wisconsonian-Recent.

Material.—Two basisphenoids, three precaudal vertebrae, USNM 23302.

Remarks.—Vertebral characters of *Thamnophis sirtalis* have been previously discussed (Holman, 1962). The fossil basisphenoids have more pointed, better developed posterior processes than those of available specimens of *Natrix sipedon sipedon* and *Thamnophis sauritus* (Linnaeus) and are similar to *T. sirtalis* in this character.

Heterodon platyrhinos Latreille

Geologic range.—Illinoian-Recent.

Material.—Three precaudal vertebrae, USNM 23303.

Remarks.—Based on characters discussed in Holman (1963) the fossils represent *H. platyrhinos.*

Coluber or *Masticophis*

Geologic range.—Aftonian-Recent *(Coluber),* Illinoian-Recent *(Masticophis).*

Material.—Seven precaudal vertebrae, one right articular, USNM 23304.

Remarks.—I am unable to assign these elements to either *Coluber constrictor* Linnaeus or to *Masticophis flagellum* (Shaw).

Elaphe sp. indet.

Geologic range.—Illinoian-Recent.
Material.—A single precaudal vertebra, USNM 23305.
Remarks.—The vertebra represents *E. obsoleta* (Say) or *E. guttata* (Linnaeus) rather than *E. vulpina* (Baird and Girard) based on characters given in Holman (1965a), but I am unable to separate isolated vertebrae of the former two species.

Diadophis punctatus (Linnaeus)

Geologic range.—Illinoian-Recent.
Material.—Ten precaudal vertebrae, USNM 23306.
Remarks.—The vertebrae of *Diadophis punctatus* and *Carphophis amoenus* (Say) are quite similar. Based on 10 Recent skeletons of *Diadophis punctatus* and eight skeletons of *Carphophis amoenus* the most consistent way to tell the two forms apart is that the neural spine is higher, thicker, and usually with more of a posterior overhang in the former than in the latter species. The above fossils resemble *D. punctatus* in these characters.

Carphophis amoenus (Say)

Geologic range.—Illinoian-Recent.
Material.—Two precaudal vertebrae, USNM 23368.

Lampropeltis getulus (Linnaeus)

Geologic range.—Illinoian-Recent.
Material.—Two articulated precaudal vertebrae, USNM 23669.
Remarks.—Auffenberg (1963) and Holman *(op. cit.)* have discussed vertebral characters for the identification of *L. getulus* and *L. triangulum* (Lacépède).

Lampropeltis triangulum (Lacépède)

Geologic range.—Illinoian-Recent.
Material.—Two precaudal vertebrae, USNM 23670.
Remarks.—The fossils resemble the large northern subspecies *L. triangulum triangulum* (Lacépède) in size.

Crotalus horridus Linnaeus

Geologic range.—Yarmouth-Recent.
Material.—One left and one right maxilla, one left dentary, one left and three right articulars, 29 precaudal vertebrae, USNM 23671.
Remarks.—Crotalid species are quite difficult to identify on the basis of disarticulated skeletal material. Nevertheless, *C. horridus* may be distinguished from all of the eastern crotalid species on the basis of the above fossil bones.
Holman (1959) has given characters and has figured differences between the maxillary bones of *Crotalus* and *Agkistrodon*. The fossil maxillary bones resemble *Crotalus* in these characters. The maxilla of *C. horridus* may be separated from that of *C.*

adamanteus Beauvois in that the loreal fossa is well excavated in the former species and flattened in the latter. The two fossil maxillae resemble *C. horridus* in this character.

The fossil left dentary represents a juvenile snake and has two distinct fossae on its anterior lingual surface as in a Recent juvenile *C. horridus*. Single specimens of juvenile *Agkistrodon contortrix* (Linnaeus), *A. piscivorus* (Lacépède), and *Sistrurus catenatus* (Rafinesque) differ in that they lack fossae on the lingual side of the dentary. In a single juvenile *C. adamanteus* there are two fossae in this area, but one is small and the other is obsolete.

The articular bone of *Crotalus horridus* may be distinguished from that of *Agkistrodon contortrix* and *A. piscivorus* in that posterior to the notch for the quadrate the bone is more slender and less internally curved. Moreover, the area below the notch for the quadrate is less deeply excavated. The articular bone of *C. horridus* may be distinguished from that of *Sistrurus catenatus* in that the area below the notch for the quadrate is more deeply excavated in *C. horridus*.

In the crotalid skeletons available to me the neural spines of the vertebrae are highest and shortest in the anterior part of the column and become progressively lower and longer toward the posterior part of the column. *Crotalus horridus* has lower neural spines than either *C. adamanteus* or *Agkistrodon piscivorus*. Thus, the large fossil vertebrae with very long, low neural spines are easily separated from all of the vertebrae in the columns of *C. adamanteus* and *A. piscivorus*. Moreover, *A. piscivorus* has deep pits on either side of the cotyla. These pits are much shallower in *C. horridus*. *Agkistrodon contortrix* has low neural spines in the posterior part of the column, but even medium-sized copperhead vertebrae are much smaller than the fossils.

Discussion

The fact that the anole *(Anolis carolinensis)* and the wood turtle *(Clemmys insculpta)* occur together in the same fossil fauna strongly suggests that the Ladds, Georgia Pleistocene herpetofauna is at least in part a heterochronic assemblage. Today, the anole ranges north only to the extreme southeastern tip of Virginia (Conant, 1958, p. 313, Map 37), whereas the wood turtle ranges south only to northeastern West Virginia and the northernmost tip of Virginia (Conant, *op. cit.*, p. 313, Map 5). Ray (1965) has previously suggested that the Ladds fossil fauna is mixed and states: "The disturbed (by dynamiting) and open nature of the deposit, together with the presence of certain apparently ecologically incompatible species, suggest the possibility of a heterochronic assemblage rather than a unit fauna." Nevertheless, with the exception of the wood turtle, all of the species represented by the Ladds fossil herpetofauna could be found living in or near the area today. Thus, based on the fossil herpetofauna, there is no evidence that the Pleistocene

climate of northwestern Georgia was any warmer than at present or any cooler than the climate of the northern tip of Virginia today.

Based on preferences of living amphibians and reptiles represented by the fossils the following ecological situations obtained in the Pleistocene of northwestern Georgia: (1) moist deciduous woodland, *Ambystoma tigrinum, Plethodon glutinosus, Bufo americanus, Hyla crucifer, Clemmys insculpta, Terrapene carolina, Thamnophis sirtalis, Diadophis punctatus, Carphophis amoenus, Lampropeltis getulus, L. triangulum,* and *Crotalus horridus;* (2) open woodland or brushy edge, *Anolis carolinensis, Sceloporus undulatus, Heterodon platyrhinos,* and *Coluber* or *Masticophis;* (3) swift, clear stream, *Desmognathus* or *Leurognathus, Gyrinophilus,* and *Pseudotriton ruber;* and (4) larger woodland pool, *Clemmys insculpta* (hibernates under water), and *Pseudemys concinna. Natrix sipedon* and *Rana pipiens* could have inhabited either one or both of the aquatic situations.

The huge fossil *Bufo americanus* is indeed noteworthy. Pleistocene amphibians that appear to reach a much larger size than their living representatives occur in Florida, and I plan to discuss this in a future publication. But based on current knowledge, there are as yet no satisfactory hypotheses to explain this apparent gigantism in Pleistocene amphibians.

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