

## A New Subspecies of the *Bufo woodhousii* Group of Toads (Salientia: Bufonidae)

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### INTRODUCTION

Specimens of *Bufo* collected in northeastern Texas and adjacent regions in Oklahoma, Louisiana, and Arkansas have long puzzled naturalists. Three names have been applied to various individuals or to small groups of such specimens: (1) *Bufo americanus* Holbrook, (2) *B. fowleri* Hinekley (or Garman), and (3) *B. woodhousii* Girard (or trinominals appropriate to subspecific designations of these forms, as accepted by various authors).

In southeastern Oklahoma, a dwarf variety of *B. americanus* is now well known (Bragg, 1940a, b, 1950; Bragg and Smith, 1943) but whether this crosses the Red River into Texas has long been uncertain. Actually, no specimens of this form have been found south of Idabel, Oklahoma, where the Austroriparian life zone of W. F. Blair (1950) extends to the north of the river. Because Bragg and Smith (1943) knew this toad to range westward in the oak-hickory savannah in southern Oklahoma more than half way through the state and to cross the Red River into Texas at Nocona (based on a single call heard), they inferred its presence in northeastern Texas. This view seemed reasonable to them because it conformed to many old records, especially of

Strecker (1908, 1915, etc.). But A. P. Blair (1941) and Wright and Wright (1938, 1948) did not believe this form to be in this region. In fact, the Wrights' latest map (1948) brings its range southward only to near the edge of W. F. Blair's (1950) Carolinian zone in Oklahoma.

With *Bufo fowleri* and *B. woodhousii* there has been similar question. Earlier reports of the latter in McCurtain County, Oklahoma, have proved to be in error and clear evidence of its replacement by a form identified by A. N. Bragg as *B. fowleri* has been found (Bragg, 1940; Bragg and Smith, 1943). Intergradation between these two was also reported in a narrow Oklahoma belt following closely the line separating the Carolinian and Texan biotic provinces as outlined recently by W. F. Blair (cf. map, W. F. Blair, 1950, p. 98, with Bragg and Smith, 1943, fig. 10, p. 302). In Texas, Strecker (1926) found "typical" specimens of *B. fowleri* in Liberty County but earlier (1915) did not mention this form as such in eastern Texas. In the same paper (1915) Strecker says that *Bufo lentiginosus* (= *americanus* as now understood) grades into *B. woodhousii* in many places in eastern Texas; and earlier (1908), under the listing of *B. l. woodhousei* (sic) B. & G., had spoken of "large overgrown specimens of a dark colored form of *americanus* [which are] exceedingly common in central Texas in districts below five hundred feet." To make matters still worse, Strecker and Williams (1928) found specimens near Texarkana, Arkansas, that they thought probably to be *B. fowleri* but which differed from this form as they knew it in Caddo Parish, Louisiana. Strecker (1926a) also had reported *B. fowleri* in Henderson County, Texas, without comment.

Black and Dillinger (1938) were sure that no specimens of *B. woodhousii* Girard occur in Arkansas, but they mention considerable confusion between *B. fowleri* and *B. americanus*.

The greatest difficulty in identification of a small series of specimens from this general region has seemed to be that, of the three forms commonly recognized as the only possibilities (i. e. *B. americanus*, *B. fowleri*, and *B. woodhousii*), only the first typically has a spotted venter. Some toads from eastern Texas have such spotting but others do not; and whether they do or not, most of them in dorsal characters (details of crests, type of parotoids, spotting and other portions of the dorsal color

patterns, etc.) are clearly more like *B. fowleri* or *B. woodhousii* than like *B. americanus*. Solution of the problem implied has awaited the study of a large series of specimens from this region.

In the meantime another phase of the puzzle developed in Oklahoma. Recently, Bragg (1950) reported that tadpoles of so-called *B. woodhousii fowleri* in eastern Oklahoma were consistently mottled in different shades of brown, coarsely mottled when young, more finely so when older. Elsewhere others have just as consistently found them to be very dark (black or nearly so dorsally) and closely resembling those of the American toad (see especially Walker, 1946, and Wright and Wright, 1948). Since Bragg's article went to press he has discovered that the tadpoles of Fowler's toad in the Illinois River of northeastern Oklahoma are black and so like those of the American toad as to be indistinguishable in the field. Actually the mottled tadpoles have all been found south of the Arkansas River in Oklahoma, which raises the question of the status of so-called *B. w. fowleri* in the southeastern part of this state near the Texas line. The possibility that they are not examples of Fowler's toad is also enhanced by the further fact that many (but by no means all) of the adults, taken from single breeding congresses, in southeastern Oklahoma, have mottled venters. Since all of these were calling with a short, low-pitched cry, very unlike that of the American toad, and since mixed breeding congresses of these two in southeastern Oklahoma have also been seen, it has been tacitly assumed that the ventral spotting came from hybridization, a distinct possibility physiologically according to A. P. Blair (1941) and others.

This was the essential status of our knowledge of the toads of this region when we started the present study. Since Bragg has some familiarity with the region north of the Red River in Oklahoma and adjacent Arkansas, and Sanders has had considerable experience in northeastern Texas, we have pooled our specimens and experiences in our attempt to bring some order out of the chaotic confusion concerning the toads of this region, principally those of the *B. woodhousii-fowleri* group. *Bufo valli-ceps* Wiegman occurs in the southern part of the region considered, but is purposely excluded from the present account.

## OBSERVATIONS

Many specimens in collections from northeastern Texas are small *B. fowleri*-like toads, some of which have spotting in some degree on the venter, others of which do not. Several, taken in the black-soil prairies about Commerce, Texas, are large, dark colored toads which superficially suggest *B. w. woodhousii* but differ in the extent and intensity of dark shading anteriorly on the venter. Still others, especially several about Dallas and near the Elm Fork of the Trinity River near Carrollton, Texas, northwest of Dallas, as well as some from Hunt and Walker counties, are large *B. woodhousii*-like toads but with markedly spotted venters which recall Strecker's (1915) "large overgrown specimens of a dark colored form of *americanus*," stated as common in central Texas at low elevations.

We have compared these toads in great detail with others from Oklahoma, Arkansas, Louisiana, Tennessee, Wisconsin, New York, North Dakota, and Massachusetts, as well as from several other parts of Texas and even California, Utah, and Arizona (in view of Shannon's, 1949, recent suggestion of the relegation of *B. californicus* Camp to subspecific status within *B. woodhousii*). We have also made use of what the sex calls might teach us and have compared tadpoles wherever possible. The result is a clear-cut conviction that eastern Texas has a hitherto unrecognized and undescribed form which we present as follows:

***Bufo woodhousii velatus*** Bragg and Sanders, new subspecies.

Name derived from Latin, meaning having a veil or velum, and referring to the pectoral velum, defined subsequently in this paper. As a common name for this new form, we propose "the dark-breasted toad."

TYPE LOCALITY: Elkhart, Anderson County, Texas. PARATYPES: 37 (35 males and 2 females). HOLOTYPE and paratypes collected by Ottys Sanders and Ruth Maxwell Sanders at Elkhart, March 8, 1951, from a breeding congress; killed in alcohol and preserved in formalin after color notes were made of some of the specimens. Numbers in Ottys Sanders collection: holotype no. 1891; paratypes nos. 1854-1890. Type and 6 paratypes being deposited in the United States National Museum. Other specimens examined:

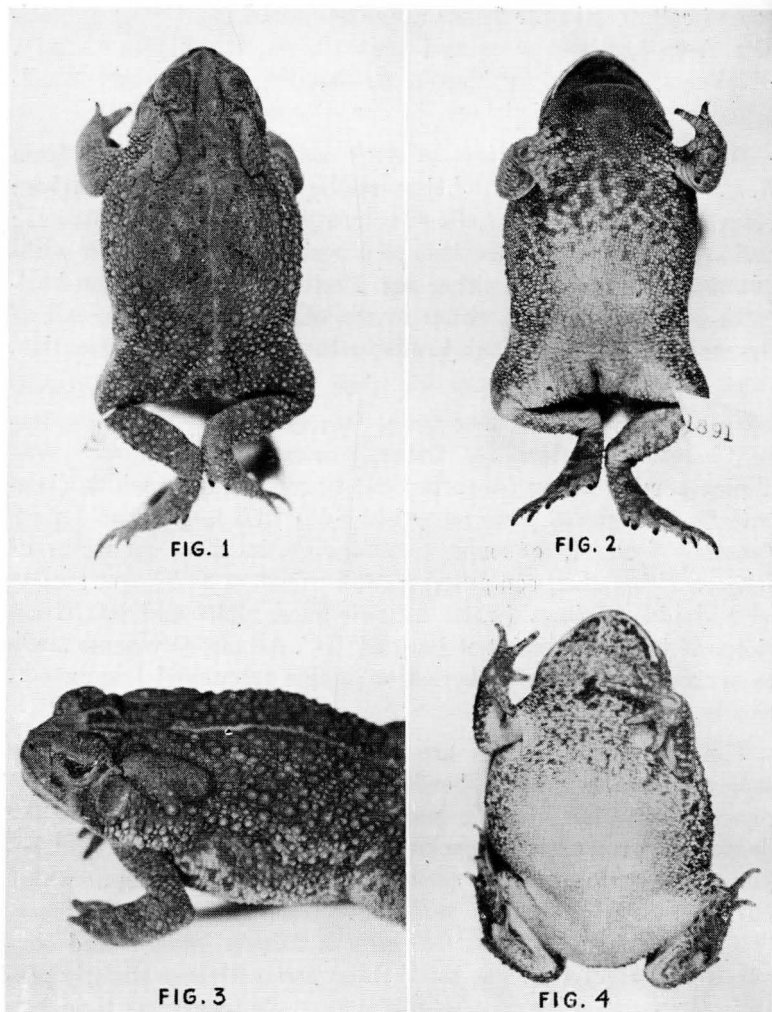


PLATE I.

Figure 1. Type specimen *Bufo woodhousii velatus*, male, No. 1891, dorsal view (after preservation).

Figure 2. Type specimen *B. woodhousii velatus*, ventral view (after preservation).

Figure 3. *Bufo woodhousii velatus*, specimen No. 1623. Side view of head and thorax (after preservation).

Figure 4. *Bufo woodhousii velatus*, female, specimen No. 1890, paratype. (From living specimen.)

(a) 44 collected in the Texas range delimited below, (b) 1 specimen from low, wet woodland near Harris, McCurtain County, Oklahoma, collected by Harold A. Dundee, (c) 1 specimen collected at Monroe, Louisiana, by Dr. Charles C. Smith.

*Diagnosis:* A small form of *Bufo woodhousii*, differing from *B. w. woodhousii* Girard in being smaller, less spotted and darker; from *B. w. fowleri* in details of coloration (especially spotting); and from both in its possession of a pectoral velum with or without ventral spotting in either sex. Preliminary observation indicates a difference from either of the other subspecies in call of the male also, although this needs further study for confirmation.

*Description of holotype:* No. 1891, Ottys Sanders; Elkhart, Texas; March 8, 1951. Sex male. Size medium, 60 mm. (snout-vent length taken dorsally). Other measurements as follows: tibiofibular portion of leg (knee to heel) 21.5 mm.; head width (ventral, from rictus of jaws on either side) 21.5 mm.; head length (ventral, from tip of snout to midpoint line between rictus of jaws on either side, computed mathematically) 11.87 mm.; angle at midpoint of jaws (made by two lines, right and left, from rictus of jaw to midpoint of jaw)  $84^{\circ} 26'$ . All measurements made to nearest mm., after preservation; angle calculated trigonometrically to nearest  $0.1^{\circ}$ .

The interorbital crests are sharp, prominent, fairly widely separated, each closely bordering an eye; lower anteriorly, progressively heightening posteriorly, the intercrestal valley deepening progressively backward accordingly; they extend beyond the meeting with the postorbital to form a short spur which curves inward toward the mid-dorsal line. There is a faint preorbital crest. The canthus rostralis is faintly swollen and converges between nares. The interorbital crests diverge slightly posteriorly and meet the postorbitals at an angle just larger than  $90^{\circ}$ . The postorbital crests are prominent and extend laterally to the borders of the tympana, neither directly touching the parotoid, but each sends a short spur to its corresponding parotoid.

The parotoids are prominent, oblong, set wide apart, a little more than twice as long as wide, and nearest together at their middle. (Interparotoid distance at this point equals length of parotoid.) They have some small spines on their surface and some

pits. The tympanum is broadly oval (5.5x4 mm.) and its greatest length is more than one-half diameter of eye (8 mm.). Its anterior lateral margin is elevated. The tympanic membrane is smooth, dark colored.

Two metatarsal tubercles are present: one, prominent, rounded and lacking a cutting edge, dark colored over half or more of its surface; the other, small, conical, rounded and dark colored. The toes are short with medium webbing, webs extending to tip of long toes. The subarticular tubercles on the fourth toe are weakly developed and the first and second tubercles are undivided. A single large palmar tubercle is present. The tubercles at the base of the thumb are no larger than other tubercles thereon and apparently a thenar tubercle is lacking.

The general appearance is like a typical member of *Bufo woodhousii* but of smaller size. Dorsum and legs are very spiny with numerous small spine tipped warts; prominent spine tipped warts being particularly evident on the tibia. The spininess of the limbs spreads over the whole foot on each side. Warts are of small and medium size. The dorsum is mostly unspotted except for some of the larger warts being margined at their base with black. The specimen (in formalin) is quite uniform in color dorsally, a dark brown. A median mid-dorsal stripe of narrow width extends from between the eyes to near the level of the insertion of the rear legs. There is a faint light area on either side of the mid-dorsal line, separated from it by about 5 mm. and beginning at a level near the posterior of the parotoid and running about half way the length of the body. A faint lateral stripe begins just back of the tympanum, midway ventro-lateral to the parotoid, and extends to near the thigh. This is margined below by a line of small spiny tubercles and posterior to this by a broad band of darker color. There is a light colored band from the mid-lateral border of parotoid to the arm insertion. This band is bordered anteriorly by a broad black stripe running from the anterior-lateral margin of the parotoid to the arm insertion. A cluster of large light colored tubercles is just back of the rictus of the jaws and on a line with it. The inside of the femur has a background of black, superimposed on which are small rounded yellowish tubercles. The snout is bluntly rounded but more pointed than in *Bufo w. woodhousii*. It is similar in color to the dorsum and has some minute tubercles

on it. The lower jaw is margined with white, and the border of the upper jaw is lighter in color than the remainder of snout.

The ventral coloration is distinctive. The throat is intensely black, shading to slightly lighter posterior to the angle of the jaws. Starting in the still darkly shaded area of the pectoral region, this darkness becomes broken into spotting posteriorly and extends over about the anterior third of the abdomen beyond the arms. We call this darkened area the *pectoral velum* whether with or without spots. The remainder of the abdomen is just off white except for a rusty colored "sitting" spot. The ventral surface is coarsely granular in the midpectoral region, more so to the sides than toward the median line, the coarser granulations extending over the whole abdomen laterally but becoming finer medially near the level of the groin. (Figs. 1, 2, and 3.)

*Variations and general considerations.* About one-third of the specimens examined lack the abdominal spotting, but invariably these have its place taken by an extension of the darkness of the throat to at least the mid-pectoral region and it may extend onto the abdomen for some distance. A basic character which distinguishes these toads from others of their species is the tendency for the pectoral velum to extend to or beyond the pectoral region. In doing so, it may or may not be partly intensified as spotting. A breast spot is characteristic but often this becomes obscured partially or completely by the pectoral velum.

Since adult males of American species of *Bufo* in general have dark throats as a secondary sex characteristic, one might think we are overemphasizing the pectoral velum, since most of our specimens are males. That this is not so is indicated by the five females in the collection (one shown in fig. 4). All of these have dark throats, with pigment extending on to the pectoral region and beyond. Three of them have the venter well spotted from the lower jaw to beyond the pectoral region. While the pigment on several of these is not as intense as in the males, one of them (which dissection showed to have ovaries crammed with eggs) had an intensively dark throat with the color fading out gradually well behind the pectoral region as in males. The breeding males may be distinguished from females by excrescences on the fingers.

Females are also larger and have broader heads. The few in our collection measure around 70 mm. The extremes of sizes of



males varies from 2 specimens 47 mm. in length to 1 specimen 67 mm. The larger number, comprising two-thirds of the group, vary between 56–61 mm.

As to voice, the call is like that of *Bufo w. woodhousii*, beginning with a whirr and then prolonged on a single droning note of medium to low pitch. The average call lasts three seconds. A rare individual may call for 5 seconds.

Field notes on live specimens taken at Elkhart, Texas, indicate there may be considerable variation in color, the dorsum varying from an almost clay red to a dull chocolate brown. Lighter colored specimens were often an olive brown or greenish brown. The mid-dorsal line is rarely a wide stripe, usually narrow, and in some specimens indistinct except toward the rear of the body. Spotting on the dorsum is variable, being practically absent in some specimens except for scattered dark margins around some of the larger warts. A few specimens have a peculiar fusion of elongated spots suggesting bands. Some have spots anteriorly but not posteriorly. In a few these spots are paired, in others they are scattered about over the back. The warts tend to be of small or medium size and are fairly numerous and spine tipped, but some specimens have a smaller than usual number of larger than usual warts. The warts are almost invariably conical.

The subarticular tubercles of the fourth toe are generally undivided but the first may be divided as is frequently the case in *Bufo w. woodhousii* of Texas and Oklahoma. Lack of a prominent thenar tubercle is characteristic of the group although some specimens may have it developed slightly. When such is the case, the development is usually more on one hand than on the other.

*Breeding sites, tadpoles, and size at metamorphosis.* The eggs are similar to those of *Bufo w. woodhousii* being placed in a single file about 1 mm. apart in a single tube which (in formalin) measures about 3.5 mm. in diameter.

When we first suspected that some of our specimens represented a new form, we recalled the mottled tadpoles in McCurtain County, Oklahoma, already mentioned. It was obvious that if the toads called *B. w. fowleri* in this region (Bragg and Smith, 1943; Bragg, 1950, etc.) were intergrades with a new form from the south, the mottling of tadpoles might be derived from this

and, if so, the new form should have markedly mottled tadpoles. We accordingly searched in known breeding sites of *Bufo w. velatus* for such larvae.

We found them in two places and they fulfilled our predictions exactly. We also secured metamorphosing stages, as well as a few just out of water and one juvenile obviously at least a month removed from metamorphosis. These specimens are described below.

The first of the tadpoles were found in a flat, shallow limestone creek bed, 2 miles west of Mt. Vernon, Franklin County, Texas, where they were present in pools and also in the very shallow, clear flowing water of the main stream. Small pools of shallow, clear water as well as shallow edges of creeks appear to be typical breeding sites of the new form.

*Description of tadpoles.* Body form ovoid with anterior end bluntly rounded. Color (in life) very dark dorsally (nearly black background) but heavily mottled and streaked in cream and various shades of brown. The most prominent of these markings is a pair of cream-colored lines starting from symmetrical positions just posterior to the eyes and running diagonally posterior-lateral to the sides of the abdomen. These color notes were made in the field and the specimens were then preserved in formalin where they remained for 16 days. They were then transferred to 65 per cent alcohol and studied. All mottling had disappeared from the preserved specimens which were now an indistinct grey, still quite dark, with very indistinct slightly lighter areas about the head dorsally. The remainder of the description is based upon these preserved specimens.

Tail short, its tip rounded; tail musculature heavily pigmented and becoming very attenuated posteriorly. Tail fins clear; tail not extended onto the body. Overall length = 18.37 mm., head-body (to posterior end of anal tube) = 10.0 mm.; tail, therefore, 8.37 mm. Anal tube sinistral, small in diameter (about .80 mm.). Posterior limb buds, 2.23 mm. in length with toe-buds present.

Spiracle sinistral and almost exactly at midpoint of lateral surface (i. e., equidistant dorso-ventrally and antero-posteriorly of head-body). Spiracular opening ovoid, directed slightly dorso-posteriorly. Practically no spiracular tube; opening appears merely as a hole in side of body. Spiracular opening measures 0.45-x0.33 mm. in longest and shortest diameters.

Internarial distance = 0.84 mm., the interorbital distance = 1.23 mm., snout to eye = 1.9 mm.

The mouth parts appear delicate, fine, and small. (Mouth disc from outer borders of right and left labia at jaw angles = 1.79-mm. in diameter.) Both mandible and maxilla small, the mandible making a very open V; both jaws finely serrate. Labial formula  $\frac{2}{3}$  with only the second dorsal row interrupted, this for about half the length of the maxilla across midline. The three ventral rows of denticles progressively shorter from inner to outer rows. Labial papillae mostly confined to the sides, but extending mesiad on the lower labium as a single row about half way to the midline. All labial papillae fine and small.

The details and measurements in the above description are based on a single tadpole (the largest collected) except for the color notes as explained earlier. Others in the collection (several dozen) and all those collected a few miles from this point, appeared essentially like it, though, being smaller, they would of course have different absolute measurements. This large a tadpole is believed to have reached full development because two recently metamorphosed toads collected on the bank of one pool measured 8.0 and 9.5 mm. overall length respectively. This is the expected size of a newly produced juvenile from such a tadpole.

*Juveniles.* Tiny toads just out of water, had merely a rounded lump representing the tail, the legs were already very spiny, the ventral surface quite "pebbly," and the throat spotted, all foreshadowing the conditions of the adult. The most distinctive thing about them, however, was that each had a markedly truncated snout, not at all like the adult. The whole body outline was quite juvenile with the two sides from head to posterior legs nearly parallel. Their color in life was quite dark with no distinctive dorsal markings.

The older juvenile, collected about four miles north of this site, hopping on a woodland floor, measured 39 mm. snout-vent just after preservation in 65 per cent alcohol. Its color (alive) was overall medium brown dorsally, with several small spots, unpaired except for one pair on eyelids and another to the sides of parotoids just posterior to the eyes. The venter was irregularly spotted from lower jaw to well beyond the pectoral region. Palms

and soles had orange colored tubercles, the whole under surface of the toes (except the fourth) also was orange; soles and under surface of the fourth toe dark. The cranial crests were just developing, clearly visible but very low. They were arranged basically as in the adults. The body form was not juvenile as the sides were rounded out the same as in adults and did not approach parallel.

*Range and interrelations.* When we plotted county distributions of our specimens on a map, there was a striking comparison with the expected distribution according to the biotic districts outlined (F. W. Blair, 1950). Every one of our specimens of *Bufo w. velatus* fell south or east of the northern or western limits of Blair's Austroriparian life zone in Texas and Oklahoma (Louisiana is not shown in Blair's map but the zone presumably extends for some distance into this state). Not only this, but all around the western and northern edge of Blair's line separating the Austroriparian from the Texan biotic district (to the west) and the Carolinian (to the north) we found clear evidence of intergradation. We, therefore, have an almost unique situation wherein we can present with considerable accuracy nearly the whole range of *Bufo w. velatus* with its original description. The only real doubt is to the south. Southward and southwestward along the Gulf, the status of the subspecies is still uncertain.

*Locality records:* LOUISIANA: *Ouachita Parish*. Monroe (No. ANB 601; Charles C. Smith; Sept. 22, 1940). OKLAHOMA: *McCurtain Co.*, 1.8 mi. E. Harris, in one of the two known places where palmetto occurs in Oklahoma (No. ANB 593; Nov. 8, 1947); tadpoles of subspecies from a ditch about 1 mi. from above. TEXAS: (Sanders collection numbers) *Anderson Co.*, Elkhart (Nos. 1854-91; March 8, 1951), 1 mi. N. Montalba (No. 1892; March 8, 1951); *Bowie Co.*, Maude (Nos. 1662-4; 1566; Apr. 21, 1950), 3 mi. S. Redwater (Nos. 1571, 1573-6, 1579-80, 1582-92; John Wotters and Frank Washman; Apr. 22, 1950); *Cherokee Co.*, 7 mi. E. Rusk (Nos. 1636-9; May 7, 1950); *Harrison Co.*, 20 mi. E. Jefferson (Nos. 1035-6; Apr. 1, 1934), *Henderson Co.*, 1 mi. E. La Rue (Nos. 1613-7; May 6, 1950); 2 mi. E. La Rue (No. 1618; May 6, 1950); 1 mi. E. Poyner (Nos. 1619-22; May 6, 1950); *Hokpins Co.*, 2 mi. W. Brashear (No. 1467; May 5, 1949); *Rusk Co.*, 5 mi. E. New Summerfield

(Nos. 1623-31; May 6, 1950), 7 mi. E. Reklaw (Nos. 1632-5; May 7, 1950).

*Intergrading material.* We have, or have examined, the following which seem to intergrade with *Bufo w. fowleri*. LOUISIANA: *Ouachita Parish*, Monroe. 46 specimens (20 under one number OUMZ (Okla. Univ. Museum Zoology), No. 25291; April 3, 1941), (OUMZ 25097-119; Apr. 3, 1941), (ANB 598-600; Sept. 22, 1940). All taken by Dr. C. C. Smith. OKLAHOMA: 42 specimens. *McCurtain Co.*, South edge of Idabel (OUMZ 23642-59; A. N. Bragg; May 19, 1946), near Idabel (OUMZ 17176, 17203, 17207-8, 17236, 17246, 17427; A. I. Ortenburger; 1932); *Adair Co.* (OUMZ 7189, 7204-8; A. I. Ortenburger; 1927); *Le Flore Co.* (OUMZ 15803, 15807-12, 15854, 15902-3, 15938; A. I. Ortenburger; June, 1934). Specimens from Le Flore County show some of the most clear-cut intergrades seen. Those from Adair Co. appear closer to *Bufo w. fowleri* than to *Bufo w. velatus* but have either a pectoral velum or a suggestion of one. This area appears to be on the border-line where the influence of *velatus* is waning. ARKANSAS: *Union So.*, Calion (Nos. 17S, 128S, H68; R. L. Hass, W. L. Burger, T. S. Miller; May 2-3, 1945; Maridian (USNM 83988; S. E. Burt; no date). Specimen is labeled *B. terrestris*. Light pectoral velum present, dorsal spots fused to bands. Clearly an intergrade.

We have specimens which seem to be intergrades between *Bufo w. woodhousii*, as it is currently known in Texas, and *Bufo w. velatus* as follows: TEXAS: *Dallas Co.* (Nos. 1040, 1280, 1525; May 27, 1936, May 12, 1948, May 17, 1949); *Denton Co.*, 5.3 mi. N. W. Carrollton (Nos. 1312, 1314, 1327, 1329; May 13, 1948); *Mason Co.*, 11 mi. N. Mason (No. 1438; Apr. 29, 1949); *Walker Co.*, Huntsville (No. 1038; May 4, 1935). A specimen from Mason Co., is very much like *Bufo w. velatus* but if so is the largest of this form seen. Because of its size, we think it likely an intergrade. Intergrades in the black-soil prairies around Greenville and Commerce (Hunt Co.), Texas, are dark toads which strongly suggest *B. w. woodhousii* in dorsal structure and size, but they have the pectoral velum of *B. w. velatus*, usually in its unspotted form. Those about Dallas and in northern Dallas County are in general lighter in color but with markedly spotted venters.

We have examined in addition twenty-one specimens of *Bufo w. woodhousii* from the following states: Illinois, Massachusetts, New York, Rhode Island, Indiana, and Tennessee. We have examined a large number of *Bufo w. woodhousii* from Oklahoma, Texas, two from Kansas, one from New Mexico, and two from Utah.

#### SUMMARY

*Bufo w. woodhousii velatus*, new subspecies, is described from Person County, Texas, and a description of its tadpoles is given. The new subspecies is apparently confined to and characteristic of the Austroriparian life zone of Blair (1950) and intergrades to the west, northwest, and southwest with *Bufo w. woodhousii* Girard at the border of the Texan life zone, and to the north, northeast and east in Oklahoma, Arkansas, and Louisiana with *Bufo w. fowleri* Hinckley.

*Bufo terrestris americanus* has not been found in the Austroriparian of northeastern Texas and southern Oklahoma and probably does not occur, and is at least doubtful in adjacent Arkansas and Louisiana. It does occur (in its dwarf form) in the Carolinian of both Oklahoma and Arkansas. *Bufo woodhousii fowleri* occurs in Oklahoma north of the Arkansas River and in adjacent Arkansas, but to the south all known in the Carolinian zone of Oklahoma and many seen in Arkansas are intergrades. In Louisiana, over 50 specimens taken from a single breeding congress at Monroe, are also intergrades of *Bufo w. fowleri* and *Bufo w. velatus*, but a single specimen from here apparently is pure *Bufo w. velatus*. Toads from Harrogate, Tennessee, are "good" *Bufo w. fowleri*. This probably indicates that Monroe, Louisiana, is near the eastern limits of intergradation and if so, *Bufo w. velatus* could be expected to be the characteristic toad of northeastern Louisiana, south of the Carolinian life zone. (We have no specimens from here, however, to prove this.) The relations of the toads along the Gulf Coast of Texas are still uncertain although we are accumulating material for a study (Cf. Gunter, 1941, and Brown, 1950).

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