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Longevity of White Bass in Beaver Reservoir, Arkansas

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GENERAL NOTES

THE PRESENCE OF AN UNUSUAL EOSINOPHILIC STAINING SUBSTANCE IN THE BLOOD OF SNAKES

Telford (J. Florida Acad. Sci., 34:78-80, 1971) reported that certain Giemsa-stained blood smears from the lacertid, *Takydromos tachydromoides*, collected from Japan, had a peculiar staining reaction. Rather than the usual light bluish-gray background seen on such preparations, some smears had a reddish appearance. This reaction could be easily detected by macroscopic examination of the stained smear. Microscopically, this odd background material appeared to be precipitated between the blood cells and ranged in color from a light pink to a brick red. All blood smears with this reaction came from 41 female lizards that, with three exceptions, had developed yolk follicles to some degree. Telford concluded that the reddish precipitate resulted from lipid materials mobilized during vitellogenesis. Ayala and Spain (Copeia, 1975:138-141, 1975) confirmed and furthered these observations with *Anolis auratus* from South America. Complete correlation was seen between the appearance of the reddish-staining reaction on blood smears and oogenesis of autopsied female lizards. It was suggested that use of such a blood smear technique would allow the following of reproductive cycles in reptiles without permanent removal of animals from the environment. Ayala and Spain speculated that the precipitated material was probably lipoprotein that is found in reptile blood during yolk deposition. This conclusion was based on the data of Dessauer and Fox (Amer. J. Physiol., 197:360-366, 1959) from studies of plasma constituents of ribbon snakes undergoing oogenesis. The latter investigators were, however, unaware of the reddish-staining reaction of blood smears from oogenic reptiles with Romanowsky blood stains. To our knowledge, this highly eosinophilic material has not been isolated or chemically identified.

In a survey for blood parasites of 100 snakes collected from Lonoke County, Arkansas, in May and June of 1975, seven animals had this reddish staining reaction. Blood for smears was obtained either by decapitation or tailclipping and stained with Wright's using an Ames Hematek automatic staining machine. Positive blood specimens were found from three *Natrix erythrogaster* (yellow-bellied water snake), one *Natrix rhombifera* (diamond-back water snake), one *Natrix grahami* (Graham's water snake), one *Thamnophis proximus* (western ribbon snake), and one *Elaphe obsoleta* (black rat snake). As far as we can ascertain, this reaction has not been reported from any ophidians or other reptiles from North America. Unfortunately, the *E. obsoleta* (a female) was the only snake with positive blood smears that was sexed. It was kept in captivity and gender was determined at autopsy a year later. The reddish-staining reaction was discovered after the six other positive snakes had been discarded. Therefore, any relationship between the presence of the reddish substance and oogenesis in snakes is not yet established. In this regard, it should be noted that, with the exception of the black rat snake, all of the snakes in this report are live-bearers as opposed to the previous reports with egg-laying lizards.

The staining reaction on the blood smears of the seven snakes ranged from a light background to an intense, bright red. A comparison can be made between a smear with the normal very light, transparent stained plasma (Fig. 1A) and a smear with the most intense staining reaction of the precipitated material (Fig. 1B). Not previously noted is that the eosinophilic substance seems to accumulate more around the erythrocytes than the white cells. Since the nature of this reddish-staining material has been only conjecture, it would seem in order to isolate and chemically identify this unusual substance that has been previously associated with the plasma of oogenic lizards only. The finding of this material in such large and readily available ophidians such as water snakes would make obtaining reasonable quantities of this substance feasible for future studies.

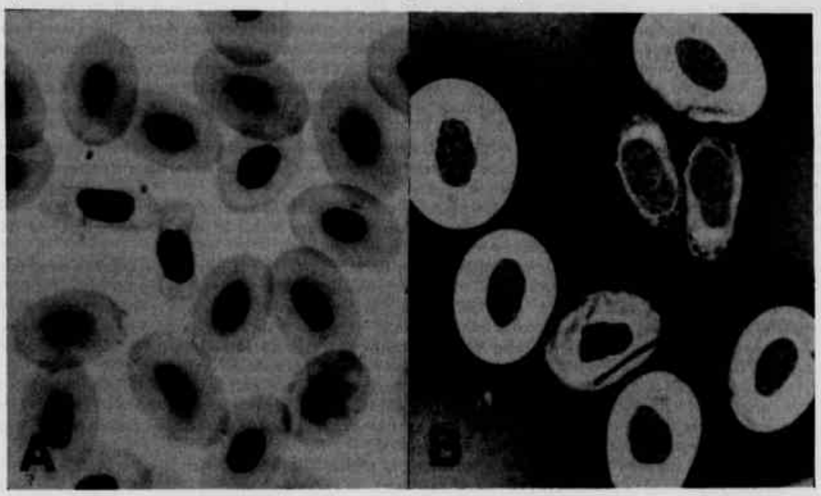

Figure 1. Blood smears stained with Wright's from *Natrix rhombifera* (A) with the usual transparent, lightly basophilic background and *Natrix grahami* (B) containing the eosinophilic-staining substance between the cells. Oil immersion (x1300).

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LONGEVITY OF WHITE BASS IN BEAVER RESERVOIR, ARKANSAS

A mark and recapture study to determine the movements of white bass, *Morone chrysops* (Rafinesque), in Beaver Reservoir, Arkansas, was conducted during the winters of 1967-68 and 1968-69. The recapture of four of these tagged white bass in 1974-76 produced new longevity records for this latitude. The oldest white bass previously recorded from southern United States waters (Center Hill Reservoir, Tennessee) was an 8-year-old (Webb and Moss, Proc. Annu. Conf. Southeast. Assoc. Game Fish. Comm. 21(1967):343-357, 1968). Beaver and Center Hill Reservoirs are at about the same latitude. Other localities where white bass 8 or more years old have been reported are: Oneida Lake, New York, 10 years (Forney and Taylor, N. Y. Fish Game J. 10:194-200, 1963); Spirit Lake, Iowa, 9 years (Sigler, Agric. Exp. Stn. Iowa State Coll. Res. Bull 366:236-244, 1949); and Shafer Lake, Indiana, 8 years (Riggs, Ph.D. Thesis, Univ. Michigan 224 p., 1953).

Three fish were 3-year-olds at the time of tagging; therefore one was an 8-year-old when recaptured in 1974, and two were 9 years old when recaptured in 1975. Total lengths at tagging were 315, 350, and 354 mm respectively. The last two fish listed establish a longevity record for white bass in the southern United States. One fish, 248 mm long was a 1-year-old when marked in November, 1968 and was over 8 years old when recaptured in 1976. Based on the angler's recapture report, the fish was 501 mm long and had gained about 900 g. Its weight at tagging was estimated from the average weight of several fish of the same length in a 1969 gillnet sample. This fish established a record for the length of time (7.6 years) a white bass has carried a tag.

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EFFECT OF LIMESTONE ON SPRING WEED POPULATIONS IN A FERTILIZED COASTAL BERMUDAGRASS SOD*

In 1968 a nitrogen-potassium fertilizer experiment was initiated at the Main Arkansas Agricultural Experiment Station to study the effects of these fertilizers on the yield and winter hardiness of Coastal Bermudagrass (*Cynadon dactylon* L.). Various research investigations have been conducted on this site dealing with the effect of fertilizer treatments on the yield and chemical composition of the forage, on the chemistry and acidity of the soil (Allured, 1976; Nagel, 1977), and on weed population and species. Allured et al. (1974) studied the effect of varying rates of N and K fertilizer on weed populations and species in 1973 and found that total week count was affected only by the highest rate of N (672 kg/ha) and that these treatments contained less than half as many weeds as did the N treatments of 0 and 336 kg/ha. They observed that the average number of weed species on treatments receiving the highest N rate was only about 60% as high as those with the two lower N rates. Also, as K rates increased to 168 kg/ha, weed species also increased but decreased as higher K rates (336 and 672 kg/ha) were applied.

Meijden (1974) reported that ragwort (*Senecio jacobaea* L.) populations increased as exchangeable calcium increased. Beard (1973), who recognized the influence of soil fertility on weed populations, stated that certain turf specialists have recommended allowing acidic conditions to exist in turfgrass soils to control weeds. Buchanan et al. (1975) reported that certain weeds such as common chickweed (*Stellaria media* [L.] Cyrillo) redroot pigweed (*Amaranthus retroflexus*), and common dandelion (*Taraxacum officinale*) were sensitive to low soil pH. The Geigy Weed Tables state that henbit (*Lamium amplexicaule* L.) thrives in fertile soils when pH is between 6 and 7 (1968).

Fifteen fertilizer treatments were applied to a Coastal Bermudagrass sod on a Pembroke silt loam at the Main Experiment Station, University of Arkansas, Fayetteville, for the years 1968-1976. Nitrogen rates of 0, 336, and 672 kg/ha and K rates of 0, 84, 168, 336, and 672 kg/ha were applied annually. The experimental design was 3 X 5 factorial arrangement in a randomized complete block. There were four replications. Nitrogen, as NH_4NO_3, was applied in three equal applications after the first three harvests; and K, as KC1, was applied in two equal applications each season. A broadcast application of superphosphate was applied uniformly as needed to supply the phosphorus needs of the plants. In May of 1974, the 2.45 by 6.10 meter plots were split, and finely ground calcitic limestone was applied randomly to one half of each plot at the rates of 2.5, 5.0 and 7.5 MT/ha to the no-N, 336N and 672N treatments, respectively. In May 1976, each of these three N treatments was relimed at the rate of 2.4 and 6 MT/ha, respectively.

The number of weeds and the species were counted 14-15 March 1977, before the bermudagrass emerged, within an area one meter square, randomly selected from the center of each plot. The data collected were subjected to an analysis of variance to determine the nature of the relationship between the soil amendments and total weed population.

The mid-March weed counts showed that henbit (*Lamium amplexicaule* L.) plants accounted for 80% of the total weed population. Other weed species, in decreasing order of abundance, were little barley (*Hordeum pusilium* Nutt.) at 10%, chickweed at 5%, dandelion at 4%, and wild garlic (*Allium vineale* L.), mint (*Labeate* spp) and other weeds at less than 0.5% each.

The average density of all weeds amounted to 8.7/m². Neither the N, the K, nor the N X K interaction affected weed counts. However, both the limestone and the limestone X nitrogen interaction affected the weed population at the 1% level of significance (Table 1). None of the other limestone X fertilizer interactions were significant. The limestone had no effect on the weed population in the no-N treatments, but as N rates increased, weed counts significantly declined in unlimed plots and significantly increased in the limed plots. Visual observation indicated that there was no amendment X weed species interaction; i.e., the ratio of the several weed species remained constant on the variously limed and fertilized treatments. The limed, high-N treatment had almost four times as many weeds as its unlimed counterpart.

Throughout this experiment the soil of the treatments receiving the highest N rate became progressively more acid. By the time these weed counts were made, this surface soil had a pH in the mid to high 3's. This extreme soil acidity may have been the factor that suppressed weed growth. When the weed counts were taken, the experimental site had a striking checkerboard appearance caused by the bright purple flowers of the henbit in the subplots of the N fertilized treatments which had been limed.

While the high N rates on the unlimed treatments affected the weed population in much the same manner as reported by Allured et al. (1974) the effect of N fertilization on weed populations of the limed treatments in 1977 was markedly different. There was no limestone variable in Allured's 1974 experiment.

*Published with the approval of the Director of the Arkansas Agricultural Experiment Station.

Table 1. Effect of long-term annual nitrogen applications, and 1974 and '76 limestone applications, on early spring weed populations in a Coastal Bermudagrass sod. Weeds/m².

	annual N rates, kg/ha			
	ON	336N	672N	ave
no limestone	7.9c*	5.5d	4.1d	5.8b
limed in 1974 & '76	7.7c	11.5b	15.3a	11.5a

*Values in the average column and in the interaction table not followed by the same letter are significantly different at the 5% level of probability.