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Source: *American Midland Naturalist*, Vol. 86, No. 2 (Oct., 1971), pp. 500-502

Published by: [The University of Notre Dame](#)

Stable URL: <http://www.jstor.org/stable/2423642>

Accessed: 27/08/2013 10:53

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Fig. 3.—Topographic map showing the proximity of Clark's Run (large arrow on right) and headwaters of Rolling Fork River (large arrow on left), Boyd Co., Ky. Both streams lie in the Blue Grass Region, although they are moving by headward erosion through the Muldraugh escarpment into the Mississippian Plateau. Small arrows indicate flow direction

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### The Distribution of the Fungus *Basidiobolus ranarum* Eidam in Fish, Amphibians and Reptiles

**ABSTRACT:** *Three hundred fifty-seven specimens of fish, amphibians, and reptiles representing 59 taxa and a variety of ecological relationships were surveyed for the fungus Basidiobolus ranarum. B. ranarum was isolated from species occupying a broad range of ecological situations varying from totally aquatic to semiarboreal and subterranean forms.*

#### INTRODUCTION

Information is sparse concerning relationships between fungi and amphibians and reptiles (Reichenbach-Klinke and Elkan, 1965). Eidam (1886) first isolated *B. ranarum* from the intestines of frogs and lizards. It has also been isolated from toads, salamanders, legless lizards (presuming *Blindschleiche* = *Anguis fragilis*) (Levisohn, 1927), decaying plant materials (Drechsler, 1964) and turtles and snakes (Hutchison and Nickerson, 1970). The exact sources from which isolates are obtained are often obscure in the literature, e.g., nature, small animals, frogs, etc.

#### MATERIALS AND METHODS

This study was initiated to determine the distribution of *B. ranarum* within various fishes, amphibians and reptiles. The method of isolation followed Hutchison and Nickerson (1970). Three hundred fifty-seven specimens were surveyed. Most were collected in Arkansas and Missouri, sampled, preserved and placed in the vertebrate collection at Arkansas State University (ArkSU). Precise locality data are available upon request. Following the name of each species is the number dissected as compared with the number of fungal isolates (No. of specimens/No. of isolates). In many cases the intestinal tract was void of any material. Attempts to isolate the fungus from the lining of visceral parts by the method described by Hutchison and Nickerson (1970) were unsuccessful.

**FISH:** *Cyprinus carpio* 5/0, *Dorosoma cepedianum* 2/0, *Lepisosteus oculatus* 4/0, *Pomoxis annularis* 5/0, *Micropterus salmoides* 1/0, *Scaphirhynchus platyrhynchus* 2/1.

**SALAMANDERS:** *Ambystoma maculatum* 4/4, *A. opacum* 12/10, *A. texanum* adult 8/1, *A. texanum* larvae 1/0, *Amphiuma tridactylum* 1/0, *Cryptobranchus alleganiensis* 1/0, *Desmognathus fuscus* 34/34, *Eurycea lucifuga* 3/1, *E. longicauda* 8/5, *E. multiplicata* 8/3, *Necturus maculosus* 5/1, *Notophthalmus viridescens* eft 2/1, *Plethodon glutinosus* 1/1, *P. cinereus* 7/4, *Siren intermedia* 7/0, *Typhlotriton spelaeus* 2/1.

**ANURANS:** *Acris crepitans* 43/13, *Bufo americanus* 2/2, *B. fowleri* 21/18, *Gastrophryne carolinensis* 6/4, *Hyla versicolor* (or *H. chrysoscelis*) 11/2, *H. cinerea* 14/6, *H. crucifer* 2/0, *Pseudacris triseriata* 5/0, *Rana catesbiana* 32/20, *R. clamitans* 1/0, *R. palustris* 1/0, *R. pipiens* 2/0, *Scaphiopus holbrooki* 11/2.

**TURTLES:** *Chrysemys picta* 3/0, *Graptemys kohni* 1/0, *Kinosternon subrubrum* 4/0, *Pseudemys concinna* 2/1, *Terrapene carolina* 4/1.

**LIZARDS:** *Cnemidophorus sexlineatus* 2/0, *Crotaphytus collaris* 5/4, *C. wislizeni* 1/0, *Eumeces fasciatus* 3/1, *Lygosoma laterale* 2/0, *Sceloporus undulatus* 5/4.

**SNAKES:** *Aghistrodon piscivorus* 2/0, *Carphophis vermis* 7/5, *Diadophis punctatus* 5/2, *Elaphe obsoleta* 6/1, *Virginia striatula* 2/0, *V. valeriae* 1/0, *Natrix erythrogaster* 1/0, *N. fasciatus* 3/0, *N. rhombifera* 2/0, *Opheodrys aestivus* 2/0, *Storeria dekayi* 2/1, *Tantilla gracilis* 11/4, *Thamnophis proximus* 5/1, *T. sirtalis* 2/0.

#### DISCUSSION

*Basidiobolus ranarum* has been characterized by globose conidia (25-48  $\mu$ ) and by spherical zygospores (23-43  $\mu$ ) which may display an undulate outer wall. A benzene hexachloride odor is typically produced when *B. ranarum* is grown on laboratory media (Drechsler, 1956) (Fig. 1, A B).

*Basidiobolus ranarum* is usually described as a saprobe, but has been suspected as a pathological agent in humans (Emmons *et al.*, 1957) and salamanders (Pelseeneer-Coremans, 1966). Its distribution within lower vertebrates encompasses species within a broad range of ecological situations varying from totally aquatic forms such as the sturgeon *S. platyrhynchus* and mud puppy *Necturus maculosus* to semiariboreal hylids and subterranean forms, e.g., *Typhlotriton spelaeus*.

We wish to thank Mark Wilson, Curtis Barnett and Ron Austin for their assistance in the laboratory. Ed Wortham, Patrick Cicala, Jim Grissom, Doug King, Haldor Wilkes, Dale Snow, Bruce Diesche and Rebecca Cooper donated specimens.

We acknowledge Arkansas State University and Max Allen's Zoological Gardens for financial support.

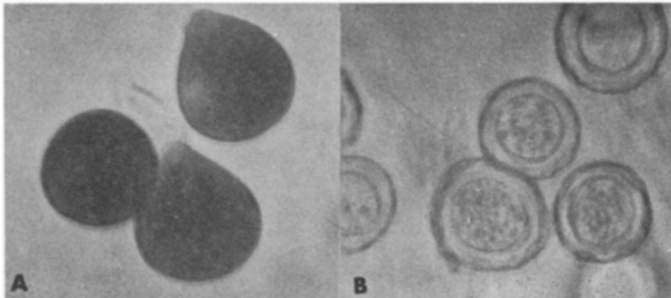


Fig. 1.—Lactophenol—cotton blue mounts of *Basidiobolus ranarum*. (A) Conidia (B) Zygospores displaying undulate outer wall. All X 530

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### Experimental Homing of Gray Bats to a Maternity Colony in a Missouri Barn

**ABSTRACT:** *A maternity colony of ca. 15,000 gray bats, Myotis grisescens, was found in an abandoned barn in central Missouri 14 July 1967. Previously, nursery colonies were known only from caverns. On 14 and 15 July, 437 bats were caught, banded and released, half at 38 miles S and half 75 miles NW of the barn. During the rest of the summer and autumn at least a fourth of the bats homed to the barn while it was being razed. The percentage of males homing from the more distant site, beyond the usual range of the species, greatly exceeded that from the nearer, familiar site.*

## INTRODUCTION

Since the pioneer work in North America by Griffin (1940) in establishing patterns of seasonal migrations of certain species in New England, many experimental movements or transplants of groups of bats have been made. These have been reviewed by Cockrum (1956), Davis (1966) and Barbour and Davis (1969).

It is clear from these and our review of the literature that nothing has been published on the homing ability of experimentally moved gray bats, nor has any previous account been published of the use of buildings for nursery colonies by this species. It is these two events we report in this paper.

Since *M. grisescens* has formerly been considered restricted to caverns and sinks (Hall and Wilson, 1966), we were surprised when we visited the Roth barn near Tipton, Moniteau Co., Mo., on 14 July 1967 and found it inhabited by a large nursery colony of gray bats. The owners informed us that the barn had been "full of bats" for at least 30 years.

The barn measured 50 x 70 ft and had been used for livestock until 1962. It was now to be razed. It had two sets of double, swinging doors which were kept closed, leaving the barn quite dark. Bats found access through breaks in the cupola and several small open windows. The hayloft floor was supported by double sills made of 2- x 12-inch lumber with 3-inch spaces between. These sills ran the length of the barn, and the 24 pairs totaled 700