

OBSERVATIONS ON THE HABITS OF THE SALAMANDER, *DESMOGNATHUS OCOEE* NICHOLLS

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We have observed this species many times each spring and each fall for the four years since it was first collected in April, 1946. We have of course collected for it in both summer dry weather and winter freezing weather, without ever finding any specimens, even by tearing out loose sections of rock from the cliff front. While we have collected for it at many stations in North Carolina to the east of the type station locality, we have never found any exactly similar type of terrain and results have always been negative. Lack of time has so far prevented collecting for it westward.

In similar types of terrain, which exists westward, northward, and southward of the type station, it will probably be found. Doubtless it exists in those states neighboring Tennessee which have suitable habitats. Because of its peculiar habits of emerging from its crevices only at night and only for a small portion of the year during the spring and fall months, it is not surprising that it should remain unknown in most of its habitat and range.

The first collection of this species was in April, 1946, and consisted of twenty-seven specimens, six of them juveniles approximately half the length of the adults. A week later a check was made to determine the approximate residual population of that station, and ten specimens were counted in a half hour. This, though a quick survey of the accessible habitable area of the station, was a fairly thorough survey. These ten specimens could possibly have come from the inaccessible upper reaches of the cliff, assuming that the entire adult population resorted to the surface each night, which is possible.

Varying numbers of specimens have been both taken or observed—usually the latter—on numerous occasions in the spring and fall of many years since that first collection. The population has usually been approximately the same number as when the first collection was made. That first collection was of twenty-seven specimens. The collection which constitutes the type series numbered twenty-eight specimens. Each of these collections represented the greatest number we could possibly collect at that time at that station. The collecting of this species is most difficult both because the specimens are hard to see and because they are often almost inaccessible high on the cliff. In addition, they are exceedingly agile and adept at eluding capture.

Only once have we collected this species during the summer months, although frequent checks have been made. In the summer of 1949 excessive rainfall prevailed during almost the entire season. This caused seepage somewhat similar to that found in the fall, but only about 20 percent to 40 percent as much in volume and area.

Between 8:00 p.m. and 10:00 p.m. on the night of July 3, 1949, after a heavy rain the previous night, we took thirteen specimens, of which seven were adults, and six were juveniles one-half to three-quarters grown.

When the temporary seepage of spring and fall, resulting from the heavy seasonal rains of those periods, drips and splatters the rock surfaces of the cliff, or sheets large areas with a thin film of water, *Desmognathus ocoee* Nicholls emerges from deep crevices and moves freely about on any and all wet surfaces of the cliff, presumably in search of food, but probably also as recreation.

We have never, in several dozen checks, observed any specimens on any ground surface or plant material, other than the algae and mosses that mask the crevices and occur in the rock niches. Nor have we ever observed any specimens on dry surfaces when first found. However, specimens have left the wet surface to go out on a dry surface when pursued, but they try to avoid doing so. Also, when roughly or persistently disturbed, they will fearlessly leap into space to escape, falling ten feet or more without apparent injury. Or they will ricochet in a series of apparently voluntary leaps down a slanting rock surface. This is done so rapidly and the salamander is so small that the eye cannot follow it and it seems to simply disappear from sight under the relatively poor illumination of a flashlight or carbide miner's lamp. It would seem that these fast leaps are voluntary, for when they wish, they seem able to make almost instant, sure footed recovery on either a wet or dry surface.

We have found specimens stationary or moving slowly about on wet surfaces from the first full darkness (as early as 6:00 p.m.) until the light of dawn (as late as 6:00 a.m.). Most specimens have only the head projecting from a crevice or through the algae or moss for about an hour after darkness sets in. Specimens have been found in every conceivable position on the wet surfaces, except in completely inverted positions. However, they easily and often assume this inverted position when pursued, apparently being enabled to do so by the viscosity of the water aiding them to cling to the rock surface.

Apparently this water viscosity is stronger than the gravitational effect on their body mass. Thus their method is very different from that used by *Aneides aeneus* (Cope) and *Plethodon cinereus dorsalis* (Cope) in traversing rock ceilings in a completely inverted position. Both of the latter actually cling to the rock surfaces by the muscular effort of their legs and toes and by the use of their tails where possible. Although *Plethodon cinereus dorsalis* (Cope) is usually found in an inverted position only in a moist area on the ceiling of caves, where again, the viscosity of the water undoubtedly enables it to rest secure against the pull of gravity. Whereas *Aneides aeneus* (Cope) always avoids water or wet areas (and dust dry areas also), staying only in humid areas. Possibly this is because water dissolves a mucous secretion of their expanded toes, destroying the adhesiveness so useful in climbing over rock surfaces.

Desmognathus ocoee Nicholls uses the following method of

locomotion on wet surfaces: it slowly slides its body forward, or sideways, in the film of water, the viscosity of which holds all parts of its body close to the rock surface, no matter how irregular, in the manner somewhat of an alligator sliding forward on wet mud. They can, as noted above, leap forth, breaking this water viscosity instantly by their leg power, but it would be tiring to fight this viscosity continuously and unnecessarily, hence this adaptive method of locomotion.

Unlike most other species of *Desmognathus*, the pygmy species seeming to be the only other exceptions, *Desmognathus ocoee* Nicholls is apparently not inclined to be cannibalistic. Although some collections were held alive for several months, the individuals in the many collections we have made did not resort to eating the tails or entire bodies of each other, as do all the other *Desmognathus* species.

Females with large ovarian eggs have been collected in the spring, but not in the fall. Therefore, it is assumed that mating takes place in the spring, and that the eggs are deposited in early summer and hatch during the summer. The young remain in crevices and do not resort to the surface until the following spring. The smallest individuals (30 to 35 mm.) have been found in the spring, but none that small have been found in the fall. It is possible that the smallest individuals may resort to the moist soil and leaves of the woods immediately adjacent to the top of the cliffs from whence the seepage emerges.

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luminescence in the study of energy transfer mechanisms. I. Substrate and enzyme determination. *Arch. Biochem. and Biophys.*, 40:28.
Zuber, K. (ORNL). 1952. Intensification of the latent photographic image produced by beta-rays. *Nature*, 170:699.