BREVIORA

Museum of Comparative Zoology

CAMBRIDGE, MASS. 31 MARCH, 1969 NUMBER 312

ECOLOGICAL OBSERVATIONS ON *ANOLIS OCCULTUS* WILLIAMS AND RIVERO (SAURIA, IGUANIDAE)

T. Preston Webster

ABSTRACT. Recent observations indicate that the structural niche of *Anolis occultus* on Puerto Rico is the peripheral foliage of the montane forests from which it has been recorded; probably best considered a canopy species, it descends to ground level only at the few localities where trail-edge vegetation merges with the tree crowns. Structurally, behaviorally, and in coloration it is very well adapted for a life on twigs and leaves. As expected from other studies of *Anolis* ecology, the spatial preferences of *occultus* show little overlap with those of the other species recorded from the same locality.

In 1963 the first specimen of the very distinctive species *Anolis occultus* was captured by day at Cerro La Punta in Puerto Rico's Cordillera Central. Subsequent collecting produced about 40 additional specimens from all areas of higher montane forest on the island. All but two of these specimens were collected by Richard Thomas at night along forest trails where the trail-edge vegetation merged more or less intimately with the foliage of the canopy. Thomas suggested (Williams, Rivero, and Thomas, 1965) that *occultus* is a canopy species with a preference for exposed areas of bare twigs and vines, although after further collecting he suggested that "their habitat requirements may not be as narrow as my first experience with the species indicated" (Thomas, personal communication, March, 1968). As Thomas observed only a single specimen during the day, the diurnal ecology of this elusive lizard remained a mystery.

Recently 15 additional specimens were obtained 13.6 kilometers south of Palmer, Puerto Rico, in the Sierra de Luquillo. The species was first sought at night; nine specimens were easily located the night of April 7th. Four slept on long, exposed twigs, two slept on twigs near leaves, and one slept across the upper surface of a broad, stiff leaf. Twigs selected for sleeping perches were a quarter inch in diameter or less. Thomas's observations were

confirmed; *occultus* clings tightly to its perch while asleep, may squeak loudly when handled, and can grip the twig strongly with its prehensile tail. Sleeping specimens are a light grey and stand out clearly in the beam of a headlamp. The two remaining anoles, asleep in the same small clump of vegetation, one across a leaf, the other on a bare twig, were left for observation in the morning.

Both lizards were found asleep at 6:15 A.M. One became active at 6:30, moving sluggishly to a nearby perch that seemed to offer greater exposure to the sun. The second became active a half hour later, but neither moved far for at least an additional hour. While both were in view, a third specimen was discovered when it became backlighted; far more active, it seemed to drink from raindrops on two occasions and prowled with frequent long pauses over an area of largely bare and exposed twigs, eventually wandering upward and out of sight. The remaining two also disappeared in the vegetation, but with the appearance of new individuals or the reappearance of those previously seen a total of six were observed, at least one staying in sight at all times. Movements were slow, cautious, and generally along twigs of small diameter, although occasionally the anoles crossed leaves or used larger branches to ascend or descend through the vegetation; after seemingly great deliberation, quick and agile leaps from twig to twig and twig to leaf were undertaken. Movement for more than a few inches at a time was infrequent; during the intervening pauses the lizard generally lay flush with a twig or leaf. Much more rapid and extensive changes of perch occurred when the foliage was briefly disturbed by a gust of wind. At 10:15 the three specimens remaining in sight were captured without difficulty.

When the locality was revisited about noon, an *occultus* was soon located on a dead twig in a pile of cut branches. It showed the same alternation of pauses with slow movements over short distances observed earlier. After extensive wandering among the twigs it leaped to the upper surface of a fern frond, where it remained for perhaps a half hour; although this small brown lizard was difficult to distinguish on a substrate of bare twigs, on the frond it was always conspicuous, and the two pale orange spots at the base of the tail were displayed. Eventually, after a little maneuvering on its leaf, the lizard jumped to another tangle of dead twigs and disappeared.

That evening intensive searching yielded six additional specimens in an hour and a half; three were on living twigs near leaves, one was on a long dead twig, one was at the tip of a very long descending branch, and a juvenile was on a dead fern.

On Puerto Rico the genus *Anolis* is represented by 10 species. All share adaptations for an active, diurnal, arboreal life, are primarily insectivorous, and in many cases are of similar size. Rand (1964) used the concept of a structural niche, which for arboreal *Anolis* is a combination of perch height and diameter as determined by quantitative observation, to separate into three ecological groupings seven of the eight Puerto Rican *Anolis* recognized at the time. Temperature preference provided an additional niche dimension that permitted Rand to separate the species within each grouping. It is of interest to relate the structural niche of *occultus* to those of other Puerto Rican species, especially those recorded from the same locality.

Anolis occultus appears to be an inhabitant of the peripheral foliage. Branches and bushes along trails have characterized all the productive collecting localities discovered to date; these somewhat artificial conditions give the collector access to vegetation continuous with the more or less high canopy characteristic of Puerto Rico's montane forests. Thomas's (1965) hypothesis that *occultus* is normally an occupant of the canopy is probably statistically correct, as suitable conditions near the ground occur only infrequently. There is no indication, however, that areas of dead branches and climbing plants are preferred; the specimens observed in this study showed a preference for fairly dense vegetation by day and no well-defined selection of dead or living twigs for sleeping perches. The sleeping positions selected in thin foliage or on dead twigs are probably optimal for early morning sunning; one of the two specimens observed to awaken was asleep in moderately dense foliage, but moved early to a more exposed position where it remained motionless for a long time.

Rand (1964) has provided a detailed study of the structural niches for the three common Puerto Rican *Anolis* present at the La Mina area in the Sierra de Luquillo. Of the three species present at La Mina, *A. evermanni* uses almost exclusively perches of several inches or more diameter. *A. gundlachi,* which shows somewhat greater preference for shade than *evermanni,* perches lower but also on tree trunks and branches of large diameter. *A. krugi,* while primarily found on grasses and similar plants, occasionally perches low in bushes on branches of moderate diameter. Although *evermanni* and *krugi* were common, *gundlachi* uncommon, and *cristatellus* rare at the locality of the recent *occultus* collection, the only species showing any overlap of structural niche with *occultus* in early April was *evermanni.* Juvenile *evermanni* were occasionally seen on twigs and small branches, although in general they

seem to prefer perches of large diameter. This overlap is probably over-emphasized by an examination of trail-margin conditions; although, as Rand noted, studies of *Anolis* ecology are biased by the restriction of accurate observation to the lowest level of the forest, the available evidence indicates that *evermanni* lives below the canopy, while *occultus* is largely a species of the canopy. If the observations of as many as six *occultus* in a small clump of vegetation can be considered indicative of the population density at this locality, *occultus* is much commoner than juvenile *evermanni,* only one of which was noticed. Thomas recorded *gundlachi, cristatellus, krugi,* and *evermanni* from localities where he took *occultus.*

Anolis occultus seems well-adapted structurally, in coloration, and behaviorally for a cryptic existence in the peripheral foliage of trees and bushes. Long and slender, with a downward tapering snout, resting specimens merge easily with the outline of a twig and cast little or no shadow; from the distance of only a few feet a human observer finds the blending of outline of lizard and twig very deceptive. Although its use has only been observed at night, a prehensile tail is presumably of some diurnal advantage to *occultus,* if only to hold it firmly flush with a perch. Thomas (1965) described the coloration of live *occultus* in detail. Specimens observed in the present study by day were grey or brown, the degree of patterning variable; although individuals crossed leaves on several occasions, and one lingered for a considerable length of time on a fern frond, the green phase recorded by Thomas was not observed. The orange spots at the base of the tail are conspicuous in some postures; they may be eye spots to ward off predation or possibly function in intraspecific communication. Motion is slow and continuous over only short distances. The tendency for *occultus* to be most active when the vegetation is in general motion suggests that the species seeks to remain inconspicuous at all times. The selection of exposed surfaces for sleeping may, by warming the lizard as early as possible on cool mornings, maximize the number of daylight hours during which *occultus* is alert and active.

ACKNOWLEDGMENTS

Field work was in part supported by National Science Foundation Grant GB6944 to Ernest E. Williams. Thanks are due to Dr. Williams, who sponsored this collection of Puerto Rican reptiles and expressed particular interest in the *occultus* problem; to

Mr. Richard Thomas, who supplied information on collecting in Puerto Rico; and to Dr. Williams and Mr. Thomas Schoener, who read and provided valuable criticism of this paper.

LITERATURE CITED

RAND, A. STANLEY

1964. Ecological distribution of anoline lizards of Puerto Rico. Ecology **45**: 745-752.

THOMAS, RICHARD

1965. Field observations of *Anolis occultus* Williams and Rivero. Part II *in:* E. E. Williams, J. A. Rivero, and R. Thomas, A new anole (Sauria, Iguanidae) from Puerto Rico. Breviora, No. **231**: 10-18.

(Received 6 November 1968.)