OBSERVATIONS ON THE FEEDING BEHAVIOUR AND MOVEMENTS OF THE SNAKES OXYBELIS AENEUS AND O. FULGIDUS

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Snakes of the colubrid genus Oxybelis are common in some neotropical lowland habitats, and their arboreal habits and relatively large size make them especially suitable for behavioural and ecological studies. Oxybelis aeneus is one of the few species of neotropical snakes whose ecology has been studied under natural conditions (Henderson, 1974). This report includes the results of observations of the behaviour of O. aeneus and O. fulgidus in captivity and new information on free-living O. aeneus; it permits comparisons between certain aspects of the ethology of captive and free-living O. aeneus which bear on the validity of studies utilising captive animals.

MATERIALS AND METHODS

We spent about 66 hr observing captive O. aeneus and about 41 hr observing captive O. fulgidus in a greenhouse on the roof of the Milwaukee Public Museum (see Henderson and Nickerson, 1976). Observations were made at all hours of the day and night, but primarily from about 1500 hr to 1900 hr (local time).

The snakes (13 O. aeneus, 4 O. fulgidus) were purchased from commercial dealers and were reportedly collected in Guatemala, Honduras, and Costa Rica. Additional observations on free-living Oxybelis in Mexico, Belize, Panama and Peru are also included.

RESULTS AND DISCUSSION

FEEDING BEHAVIOUR

Prey items recorded from O. aeneus in the wild have been summarized by Keiser (1967) and O. fulgidus probably feeds primarily upon frogs, lizards, birds and, less frequently, small mammals. Both species are cryptic in colour and behaviour and we have observed Anolis carolinensis use O. aeneus as a perch on several occasions. These snakes typically do not actively forage for prey, but tend to remain more or less motionless waiting for prey movement. Oxybelis is visually oriented and olfactory stimuli are apparently of minor importance if indeed they function at all in the detection and location of prey. The characteristic tongue movements of Oxybelis were described and discussed by Keiser (1975), among others, and he called attention to the similar behaviour of the African vine snake T. kiridalii, and he surmised that the trait 'may be associated with the snakes' arboreal habits.' This tongue thrusting trait, though perhaps restricted to arboreal snakes, is not widespread among them; seemingly it is associated with those that are visually oriented and, probably, have acute binocular vision. Whether similar behaviour occurs in the Asian vine snake Ahaetulla and the Hispaniolan Uromacer has not been recorded. We have made
extensive observations of the feeding behaviour of members of the neotropical arboreal snake genera *Imantodes* and *Leptophis* and have never observed *Oxybelis*-like tongue movements. However, *Imantodes* is nocturnal and the snakes can seemingly locate motionless prey through olfactory stimuli (Henderson and Nickerson, 1976). *Leptophis* is primarily diurnal but feeds almost exclusively on nocturnal prey (hyliid frogs). Although some of our observations suggest it is oriented to prey motion, its preference for hyliids, which ordinarily are inactive by day, must necessitate active foraging, and, perhaps olfactory cues are important. Leo G. Hoovers (personal communication) has observed fee-living *Belzeus l. mexicanus* feed on motionless prey.

After seeing the movement of a potential prey animal (usually an *Anolis* lizard), *O. aeneus* and *O. fulgidus* would begin a slow, deliberate stalk as the animal remained in motion. If the lizard stopped moving, so did the snake, and stalking behaviour resumed when the lizard again became mobile. Hunting snakes seemed unable to visually locate prey that remained immobile and perhaps the tongue movements function to monitor by olfaction prey that is unseen because it is motionless. This hunting technique was occasionally accompanied by side-to-side swaying motions of the head in a 5–10 mm plane and by forward and backward motions of the head. Both of these motions may serve to enhance binocular vision. When the snake had approached to within 150–375 mm of the anole it grabbed the lizard, whether the latter was in motion or not, with a smooth, rushing lunge that appeared almost gentle.

*O. aeneus* and *O. fulgidus* took prey that was above and below them on vegetation and they were also aware of prey movement on the ground. One large *O. aeneus* became aware of an alligator lizard (*Gerrhonotus*) on the ground 1.3 m below the bush into which the snake had climbed. The snake gradually descended with tongue extended straight out, until its head was 0.5 m above the lizard. The snake then dropped to the ground, catching the lizard’s neck at the instant of contact. Anoles captured in bushes likewise were usually seized just behind the head, shifted to the back of the mouth, immobilised, and invariably swallowed head first. Although *Oxybelis* does descend to the ground, it might not deliberately do so to hunt, and terrestrial lizards recorded from stomachs of *Oxybelis* might have been taken while the snakes maintained their arboreal perches or which were initially observed while the snake was in a bush.

*Oxybelis aeneus* was observed drinking water from large plastic pools on the floor of the greenhouse while hanging in a bush, and also from water heads on the leaves of bushes and trees.

Field observations in Belize (Henderson, 1974) and in the vicinity of Acapulco, Mexico (Henderson, unpublished) of *O. aeneus* in alert postures by day for 24–48 hr also suggest that it hunts by ambush.

Movements

From mark and recapture of free-living *O. aeneus*, Henderson (1974) showed that the horizontal activity range is small compared to that of most other snakes for which data are available, but that if vertical movements of this scansionial snake had been included, activity range size would have increased considerably. For example, if an arboreal snake moved in an area of 3 m × 5 m its horizontal activity range, calculated as an area, would be 15 m². But if that same animal also moved in a 3 m vertical range its activity range involved a volume of up to 45 m³ (this is, of course, an oversimplification). The confines of the greenhouse prevented the snakes from moving more than about 7 m in one direction. Most of the snakes were not left free in the greenhouse for more than a few hours at a time, but on two occasions we left individuals there for extended periods.

An *O. fulgidus* was released in the greenhouse at 0945 hr on 6 December and left until 1320 hr on 8 December. During the 21 hr:35 min that the snake was free it never descended to the ground and moved in a straight-line, horizontal distance of 1–2 m. It captured and ingested at least three *Anolis carolinensis*. Its vertical movements were greater than its horizontal movements (Fig. 1). After sunset it ascended to a higher perch and descended again some time after sunrise. Henderson (1974) noted similar behaviour in the population of *O. aeneus* studied in Belize.

![Fig. 1. The vertical position of one *Oxybelis fulgidus* at various hours of the day. See text for details.](image)

On 29 November at 1515 hr an *O. aeneus* was released in the greenhouse. From 1525 hr to 1555 hr it remained in a bush with only slight changes in body position, but apparently it was watching several active anoles. From 1556 hr to 1608 hr it moved about at a height of 1–2 m on five different bushes, all in contact with each other or nearly so. At 1615 hr, at a light intensity of about 10 ft-c it was perched at 2.3 m. At 1630 hr, with 5 ft-c of light, it moved to an adjacent bush. At 1643 hr, with light levels down to less than 1 ft-c, the snake assumed a loose-coiled, head down position at the distal end of a branch at the top of a bush (2.3 m) which Henderson (1974) described as a typical sleeping posture for the species. The snake remained in this position until 0628 hr on 30 November when the head was raised slightly. It remained
motionless except for slight movements of the head until 0810 hr (200 ft-c) when it began to slowly descend through the branches. At 0835 hr it had descended to 0.65 m and was in a typical ambush position; shortly thereafter it was removed from the greenhouse.

We have numerous additional observations of *Oxybelis aeneus* ascending to the distal portions of branches at twilight or dark, and assuming a loose-coiled head down posture as described by Henderson (1974) in free-living *O. aeneus* (Fig. 2).

![Graph showing perch height vs. time](image)

**Fig. 2.** The vertical position of *Oxybelis aeneus* at various times of the day. Small dots = 1 record, medium dots = 2 records, large dots = 3 records. See text for details.

The horizontal movements of *O. aeneus* are extremely limited. A mean daily movement of 0.72 m was recorded by Henderson for free-living marked individuals in Belize. The snakes probably shift to new locations in search of sites more favourable for ambush when a site occupied has failed to yield prey. Perhaps *Oxybelis* descends to the ground mainly during such shifts to new hunting sites.

Henderson (1974) speculated on the range of vertical movement in *O. aeneus* in a tropical rainforest where opportunity for such movement is great. However, extensive vertical movements are rendered unlikely by the fact that *O. aeneus* does not ordinarily occur in rainforest. Rather, it is associated with the forest periphery. For example, Harry W. Greene (personal communication) has taken a number of *O. aeneus* on Barro Colorado Island, Canal Zone, but found none in the forest which covers most of the island. Pekka Soini (personal communication), who has collected in the vicinity of Iquitos, Peru for 10 years, has never observed *O. aeneus* in the rainforest although *O. argenteus* and *O. fulgidus* were common. Thus, the range of vertical movements exhibited by the Belizean *O. aeneus* might be typical for the species regardless of habitat.

Conclusions from studies of captive animals even under simulated natural conditions have always been looked at with suspicion because it is difficult to determine how much behaviour is modified by captivity. By studying a species both in the wild and in captivity it is possible to judge the validity of data obtained from captive animals. Our observations on horizontal and vertical movements, on sleeping perches and postures of *O. aeneus* suggest that these aspects of behaviour were not significantly altered in the unnatural environment. The snakes fed readily while in the greenhouse, including individuals that would not take food in the confines of 61 x 32 x 42 cm glass enclosures. Thus captives kept in an artificial environment providing ample space and a simulation of natural conditions, such as those in the greenhouse of the present study, can yield valid data on some aspects of behaviour.

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**REFERENCES**


