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An Observation of a Wild Group of Masked Shrews, *Sorex cinereus*

— Thank you for letting me do the trapping and observations

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A group of Masked Shrews, *Sorex cinereus*, were active together in a mountain forest in Macon County, western North Carolina. A literature review of similar observations and the results of stomach analysis lead to the conclusion that a concentration of prey during a dry spring may have caused the aggregation reported here.

Key Words: Masked Shrew, *Sorex cinereus*, feeding behaviour, social behaviour, diet, North Carolina.

Shrews (Soricidae) are generally reported to be solitary outside the breeding season. Although some sociality has been reported for certain genera (e.g., *Cryptotis* and at least some Crocidurinae), shrews of the genus *Sorex* are considered to be among the least social (Nowak and Paradiso 1983; Michalak 1983; Vogel 1980). I was therefore surprised to encounter a group of *Sorex* active together on a hillside.

On 27 April 1986 an Indiana State University herpetology class walking down a mountain dirt road (elevation about 1400 m) on the property of the Coweeta Hydrological Laboratory, Macon County, North Carolina (35°04'N; 83°23'W), noticed shrews active among fallen leaves on an east-facing roadside bank. It was about an hour before sunset on a hot, clear day of an exceedingly dry spring. A steep bank with mossy rocks and exposed tree roots rose about 2.5 m above a roadside ditch. The bank leveled as it joined the gently sloping forest floor. Most deciduous vegetation had yet to leaf, and so rhododendron (*Rhododendron* sp.) and a few mountain laurel (*Kalmia latifolia*) were the main foliage. They occurred mostly along the road where they received morning sun. Despite the drought, the area of the shrew concentration contained a damp seep. The leaf litter was mainly oak leaves and, on the flatter ground, was often at least 10 cm deep.

Rustling drew our attention to shrews scurrying up and down the bank. We spread out along about 19 m of the road, and each of us could see at least a few active shrews. This would imply a minimum of perhaps 15 animals, although the common estimate was 30 to 40. The shrews appeared to be mostly small, brown *Sorex* although John Whitaker, Jr., thought he also saw the larger Smoky Shrew, *S. fumeus*. Despite the presence of more concealed trails, the shrews would frequently leap down the banks from higher levels, bounding over the leaves and across rocks or logs. Some darted along well-worn routes through the moss,

running back and forth, often seeming to retrace parts of their paths. Periodically, one would pause before hurrying on.

They sometimes seemed to move in "waves" of two or three animals. The paths of two shrews would occasionally cross, but they did not appear to notice each other; no chasing was seen. High-pitched, faint chirps were heard from at least some of the animals.

At this time, one animal was captured. It was a male Masked Shrew, *S. cinereus*. Its testes were enlarged (mean = 4.4 X 3.33 mm). A return trip to the site was made on 4, 5 and 6 May; no more shrew activity was seen despite over 18 hours of quiet watching prior to setting traps. The well-worn tunnels in the moss proved to be the regular paths of Southern Red-backed Voles, *Clethrionomys gapperi*, who were visible now and then through the day. Chipmunks, *Tamias striatus*, were frequently heard on the forest floor. Two nights of pit trapping (42 trap-nights) along the hillside yielded five *S. cinereus* (three male, two female), three *S. fumeus* (two male, one female) and one Short-tailed Shrew, *Blarina brevicauda* (a female).

All shrews harbored ectoparasites, most common on the *Sorex* (n = 9, including the shrew captured by hand) were pygmephorid mites (*Bakerdania* and *Pygmephorus*, 100% of shrews infested, mean 21.1 per host), ixodid ticks (100% infested, $\bar{x}$ = 5.8 per host) and trombiculid mites or chiggers (*Euscheongastia* and *Neotrombicula*, 89% infested, $\bar{x}$ = 19.2 per infested host; found mostly just above the tail). Nematodes were present in at least five *Sorex* stomachs.

The reproductive systems indicated that all shrews were breeding adults. One female Masked Shrew possessed six uterine swellings; the Smoky Shrew female had at least seven swellings and was parous. The pit traps also captured three juvenile *Clethrionomys*. Sherman traps (53 trap-nights) caught five adult *Clethrionomys* (three male, two female) and four Deer Mice, *Peromyscus maniculatus* (two male, two female).

There have been previous reports of similar observations of Masked Shrews. Tuttle (1964) reported catching five Masked Shrews on one day from among a vocal group of shrews; many more assumed shrew calls were heard nearby. He observed the shrews to fight upon meeting. Woolfenden (1959) caught three Masked Shrews from another vocal group which he estimated at 20 shrews. Buckner (1970) noted two adult and five juvenile Masked Shrews feeding together on butterflies. The adults pounced on butterflies, and returned to the waiting juveniles which shared in the meal. Hieshetter (1972) reported a group of Masked Shrews which were causing commotion in leaf litter. He was unsure of total number since no more than three were seen at one time. He also mentioned that a similar observation had been related to him. Along the banks of the Yukon, Cade (1953) commonly saw shrews feeding on insects in the light of the Arctic night, but he does not specifically mention groups. It is possible that some of these were Masked Shrews, however the two specimens identified were Dusky Shrews (*S. obscurus*). Pruitt (1953) snap trapped 26 Masked Shrews during six nights (= 600 trap-nights) in a bog habitat; 16 of these were taken on the third night. This could indicate a burst of shrew activity, but Pruitt believed a high shrew catch during the first two nights was prevented by squirrel and Raccoon disturbance to the traps.

In Eurasia, the general works of Ognev (1962) and Hainard (1961) mention groups of the Common Shrew, *S. araneus*. Crowcroft (1957) commented specifically on such observations and reported his own. He warned that it is very easy to over-estimate numbers, since the animals move so quickly and pass in and out of view. In a group that he watched, his first impression was of "dozens" of shrews but observation convinced him that only six to nine were actually present. Another similar revised estimate had been described to him. The shrews which Crowcroft watched were "squeaking and fighting", and after seeing the activity ebb, he concluded that a single shrew family had been attacking an intruder. Ognev's (1962) comments are also of fighting groups, although he associated this with breeding.

Baker (1983) believed such groups might be "attracted to a food source or perhaps involved in a courtship ritual". In the observations reported here, I feel the former to be likely. Many sciarid (Diptera) larvae were found in the shrew stomachs. The shrew captured by hand had a chironomid larva in its clenched jaws, but its stomach contained over 90 sciarid larvae which amounted to almost 100% of the food volume. Two of the *Sorex* had empty stomachs and in the six remaining, sciarid larvae composed about 65, 40, 30, 20, 10 and 0% of the food volume (mean = 28%). The stomach of the *Blarina* was full of these larvae and contained over 150 individuals.

For comparison, Whitaker et al. (1975) reported that identifiable dipteran larvae composed less than 1% of the food of Smoky and Masked shrews (n = 16) taken during April in an adjacent county over a three-year period; they noted no unusual shrew densities. Cole and Schlinger (1969) and Imms (1964) mention that the larvae of some sciarids may travel in long, snake-like masses over the forest floor. While such concentrations were not seen by us at the time, lesser concentratons could have gone unnoticed in the leaf litter.

None of us observed battling between the shrews, and the calling we heard seemed (although we were not unanimous) to fit better Blossom's (1932) description of the Masked Shrew's feeding call, "a succesSon of faint twittering notes", than his "rapid series of rather staccato squeaks" heard during aggression. Torn ears on a couple of the collected shrews could indicate past altercations. The fact that Smoky Shrews were apparently present as well makes a breeding aggregation seem less probable. Tuttle (1964) also reported seeing a Smoky Shrew during his observations.

Repeated reports of groups of Masked Shrews might indicate that such behaviour is regular if rare. In the case discussed here, it seems likely that a prey source may have brought together these predators. Perhaps the drought conditions concentrated available food in the area of the seep; Verme (1958) similarly suggested that a dry summer may have resulted in unusual shrew densities. Our results seem to show that, perhaps because of food distribution, adult Masked Shrews may be socially tolerant outside the mating bond. However, observations detailed by others indicate that gatherings are sometimes associated with aggression. If future witnesses of shrew groups could capture a few specimens and examine their stomach contents, some of the conclusions could be further tested. I would appreciate hearing from anyone who has had a similar experience.

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