Food and External Parasites of the Eastern Mole, *Scalopus aquaticus*, from Indiana

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Abstract

Major foods of moles, *Scalopus aquaticus*, from Indiana were earthworms, scarabaeid larvae, miscellaneous vegetation, Formicidae and carabid beetles.

The most abundant parasites and other associates found in the fur were the flea, *Ctenopthalmus pseudagyrtes*, and the mites, *Pygmephorus* sp., two new species and a new genus of *labidophorine mites*, *Xenoryctes latiporus* and *Scalopacarus obesus; Haemogamasus harperi*, *Androlaelaps fahrenholzi*, and *Haemogamasus liponyssoides*. Several other forms were found in low numbers.

Introduction

There are several previous studies on the food of Eastern Moles (1, 3, 5, 6). The first two studies dealt with captive individuals. The general conclusion one can reach from these papers is that *Scalopus* feeds primarily on earthworms, insects and insect larvae, and little on vegetation.

There are few reports on external parasites of *Scalopus* in Indiana. The flea, *Ctenophalmus pseudagyrtes*, is common (8, 11, 12). One specimen each of two other fleas, *Stenoponia americana* and *Opisocrostis bruneri*, have also been reported (12). Wilson (12) also reported the tick, *Dermacentor variabilis*; and (11), the mite, *Androlaelaps fahrenholzi*; and beetle, *Leptinus americanus* (= *testaveus*).

The purpose of this paper is to present information on the food and external parasites of *Scalopus aquaticus* (Linnaeus) in Indiana.

We express our appreciation to Dr. R. B. Loomis (Long Beach State College, Long Beach, Cal.) and Dr. C. S. Herrin (Brigham Young University, Provo, Utah) who confirmed identifications of *Euschoengastia* and *Hirstionyssus*, respectively.

Methods

A total of 113 Eastern moles was examined, 70 from Vigo County, the remainder from Gibson, Lawrence, Marion, Marshall, Newton, Owen, Parke, Pulaski, Putnam, St. Joseph, Sullivan, Tippecanoe, Vermillion and White Counties. Most were taken in Nash mole traps. Stomach contents were placed in petri dishes of water, and the material teased apart and gently washed with one or two changes of water. Identifications were made by comparison with reference material. Visual estimates were made of the volume of each food in each stomach. These values for each food were later summed, and divided by the total number of stomachs containing food x 100, giving the per cent volume for each food (Table 1).

TABLE 1. *Food of 90 moles,* Scalopus aquaticus, *from Indiana.*

Item	% Volume	% Frequency
Earthworms	26.8	87.8
Scarabaeid larvae	13.9	32.2
Miscellaneous Plant foods	9.0	40.0
Formicidae	7.2	48.9
Carabidae	5.6	28.9
Ant pupae	3.3	17.8
Unidentified insect	3.1	16.7
Chilopoda	3.1	21.1
Coleopterous larvae	3.0	18.9
Scarabaeidae, adults	2.6	7.8
Lepidopterous pupae	1.9	8.9
Digitaria seeds	1.9	2.2
Lepidopterous larvae	1.9	7.8
Oats or wheat seeds	1.5	2.2
Unidentified material	1.4	6.7
Carabid larvae	1.2	6.7
Sorghum seeds	1.1	1.1
Endogone	1.1	2.2
Spider	1.0	5.6
Other foods[1]	---	---

[1] Other foods having less than 1% volume were (in order of decreasing volume) as follows: Unidentified Coleoptera, *Elymus* seeds, cantherid larvae *(Chauliognathus),* Lepidoptera, corn, unidentified insect larvae, elaterid larvae, grass stems, *Cicindela repanda, Prunus* seeds, *Physalis* fruit, unidentified fungi, insect eggs (Orthoptera?) unidentified Hymenoptera, flesh, Lygaeidae, grass seeds, slug (*Deroceras*), sowbug, tipulid larvae, unidentified dipterous pupae, unidentified seeds, Curculionidae, *Cerastium* seeds, *Cyclorrapha* pupae, Gryllidae, dipterous larvae, moss, hymenopterous larvae.

Each mole was examined for external parasites by brushing the fur with dissecting needles while using a 10 to 70x zoom dissecting microscope. Parasites were counted, or their numbers estimated when they were abundant. They were placed in Nesbitt's solution containing acid fucsin to relax, clear and stain them, and then mounted in Hoyer's solution.

Results

Food Habits

Food was present in 90 stomachs (Table 1). The single most important food was earthworms, at 26.8% of the volume. Other important foods were scarabaeid larvae, vegetation, ants (Formicidae), and ground beetles (Carabidae). Animal material totaled 80.8% of the volume of food, and included 23.3% various kinds of larvae, 10.5% ant pupae and adults (and some larvae) and 9.6% various kinds of adult beetles. Plant foods comprised 18.2% volume, including 7.3% seeds. Miscellaneous plant foods consisted of parts of root, stems and leaves, much of which may have been taken incidentally or may have been in the intestinal tract of earthworms or other animals. Some foods eaten at relatively high rates by other Indiana insectivores (9), but at relatively low rates by *Scalopus* were lepidopterous larvae, slugs and snails, crickets, and spiders, probably because these items tend to

remain mostly above ground. The fungus, *Endogone*, often found in small mammal stomachs (7), including shrews (9), was found in only two moles although it made up 80% of the volume in one. Other items found in trace amounts but not included in the table are adult Staphylinidae, Cynipoidea, stratiomyid larvae, and *Chenopodium* seeds.

External Parasites and other Associates

A total of 104 moles was examined for external parasites, of which 80 (76.9%) were infested with at least one individual. Three species of flea, one beetle, one biting louse and at least 13 mites were found, in addition to 78 miscellaneous mites, apparently free-living forms (not included in Table 2).

TABLE 2. *External parasites and some other associates of 104 Eastern Moles,* Scalopus aquaticus, *from Indiana.*

Parasites	Total Number	Avg. No. per Mole	No. Moles Infested	% Infested
Siphonaptera (fleas)[1]				
Ctenopthalmus pseudagyrtes Baker	139	1.34	46	44.2
Coleoptera (beetles)				
Leptinus americanus	9	0.09	4	3.8
Anoplura (sucking lice)				
Haematopinoides squamosus (Osborn)	32	0.31	4	3.8
Acarina (mites)[1]				
Pygmephorus sp.	925±	8.89	42	40.4
Scalopacarus obesus Fain & Whitaker	823±	7.91	12	11.5
Haemogamasus harperi Keegan	282	2.71	13	12.5
Androlaelaps fahrenholzi (Berlese)	146	1.40	21	20.2
Haemogamasus liponyssoides Ewing	97	0.97	30	28.8
Eulaelaps stabularis (Koch)	13	0.13	6	5.8
Xenoryctes latiporus Fain & Whitaker	7	0.07	2	1.9

[1] Less than five individuals of each of the following forms (number in parenthesis), were also taken. Siphonaptera: *Nearctopsylla genalis* Baker (2), *Stenoponia americana* (Baker) (1), *Cediopsylla simplex* (Baker) (1); Acarina: *Euschoengastia trigenuala* Farrell (3), *Ornithonyssus bacoti* (Hirst) (2), *Haemogamasus ambulans* (Thorell) (1), *Hirstionyssus blarinae* Herrin (1), and *Macrocheles* sp. (1).

The only common flea of the mole in Indiana is *Ctenopthalmus pseudagyrtes*, of which 134 individuals were seen. Two specimens of *Nearctopsylla genalis* were taken on one mole from St. Joseph County, constituting the first record of this flea from Indiana. There are relatively few records of this species, but it is referred to as a flea of shrews and moles (4). *Stenoponia americana* has been reported from shrews and other species from Indiana (9, 10, 12). *Cediopsylla simplex* is a flea primarily of cottontail rabbits (*Sylvilagus*). The one specimen found on the mole can be considered accidental.

A few beetles, *Leptinus americanus*, were found on *Scalopus* and were previously reported from Indiana (9, 11).

Sucking lice, *Haematoponoides squamosus*, were found on only two moles. This species had not previously been reported from Indiana.

The most abundant mite on the moles was listed as *Pygmephorus* sp., but two species of this genus are included, and are currently being described as new by Dr. S. Mahunka of the Hungarian Natural History Museum in Budapest, Hungary. These tiny mites were sometimes in large numbers and have also been found on *Blarina* from Indiana (9). The relationship between these mites and the moles is not understood. One specimen of *Macrocheles* was also taken.

Two labidophorids, both new species were taken and have recently been described (2), one being placed in a new genus *Scalopacarus*. The species are *Scalopacarus obesus* and *Xenoryctes latiporus*. Both consist of hypopi or transport forms; the adults of neither have been found.

The remainder of the mites are normally thought of as parasitic forms. *Haemogamasus harperi, H. liponyssoides* and *Androlaelaps fahrenholzi* are the forms that could be referred to as the regular parasitic mites of *Scalopus aquaticus* in Indiana, with *Eulaelaps stabularis* being infrequent. Species of mites reported here for the first time from Indiana are *Haemogamasus harperi* and *Hirstionyssus blarinae*. The following species have not been previously reported from *Scalopus*: *Euschoengastia trigenuala, Ornithonyssus bacoti* and *Hirstionyssus blarinae*.

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