MYIASIS OF NESTLING COTTONTAIL RABBITS *

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MYIASIS OF NESTLING COTTONTAIL RABBITS*

A series of experiments on young cottontail rabbits *(Sylvilagus floridanus mearnsii)* were conducted at the Rose Lake Wildlife Research Center, East Lansing, Michigan (Lopushinsky, 1969, Ph.D. Thesis, Michigan State University, East Lansing, 212 pp.). Outdoor breeding pens were maintained from 1965 through 1967. During this period, nestling cottontails were parasitized by the grey flesh fly *Wohlfahrtia vigil.* Since the first report of *W. vigil* myiasis in cottontails (Johannsen, 1926. Parasit. 13: 156), other investigators have reported similar infestations of the cottontail (Beule, 1940, Trans. N. A. Wildl. Conf. 5: 320-328; Yuill and Eschle, 1963, J. Wildl. Mgmt. 27: 477-480; Rongstad, 1966, J. Wildl. Mgmt. 30: 312-319). The present paper reports on the lesions and subsequent mortality observed in pen-reared nestling cottontails parasitized by *W. vigil.* Grateful acknowledgements are given to Dr. R. Fischer, Department of Entomology, Michigan State University, who identified the parasite.

The geographic range of the fly includes northern United States and southern Canada (Faust, Beaver and Jung, 1968, Animal agents and vectors of human disease. Lea and Febiger, Philad. 461 pp.). Larviparous females deposit tiny white larvae on exposed body surfaces of living vertebrates, primarily on the younger host age-classes (Ford, 1936, J. Parasit. 22: 309-328). After penetrating the skin, the larvae complete their development in the subcutaneous tissues of the host in 7-9 days. Mature larvae drop to the ground and form a pupal case from which an adult emerges in 10-12 days. Adult flies live 30-40 days, females beginning larvae deposition 13-17 days after emergence. The life cycle is completed in 30-36 days.

Incidence of Infestation.

In each of the 3 years that litters were produced in the breeding pens, at least one cottontail litter was parasitized by *W. vigil* (Table 1-a). Aside from the subcutaneous lesions produced by the larvae, no other lesions or pathogenic organisms were found at necropsy, and bacteriological examinations of dead nestlings were negative. The earliest dates of these parasitisms, 1965 through 1967, were July 1, June 13 and June 24, respectively. Following the suggestion of Rongstad (op. cit.), the total number of litters included only those born after the initial myiasis. May is the earliest reported date of *W. vigil* myiasis in cottontails (Rongstad, op. cit.).

Twelve of 60 (20 percent) nestlings were parasitized by *W. vigil.* Ten of the twelve nestlings died. Two were saved by larval removal. Removal of larvae too deep to reach with forceps relied on closing the exit holes with water. Lack of air resulted in the larvae crawling out. Vaseline was placed over the perforations of treated nestlings to hinder bacterial infections.

For ease of comparison, data on *W. vigil* myiasis of cottontails from other reports are listed (Table 1-b). The data in both Wisconsin reports are for 2 consecutive years. This study's high percentages of litters parasitized in 1965 and 1967 were probably due to small sample size and closeness of the pens. None of the litters was separated by over 50 feet. Rongstad's (op. cit.) data, also obtained in outdoor pens, was the only other report that included just those litters produced after the initial *Wohlfahrtia* myiasis. Both penned studies had higher rates of myiasis than reported in wild populations of cottontails (Beule, op. cit.; Yuill and Eschle, op. cit.). Greater infestations by *Wohlfahrtia* are expected under penned conditions because of increased nest density.

Data on numbers of young parasitized indicated that *W. vigil* concentrated within certain litters. Six of the 10 young parasitized in 1965 (Table 1-a) were littermates. Beule (op. cit.) likewise

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reported the destruction of two complete litters, while Yuill and Echle (op. cit.) found at least three entire litters destroyed.

In this study, the youngest animal found to be infested had larvae present on day 2, while the oldest was 14 days. Most nestlings became infested during the first week. Rongstad (op. cit.) also reported infestations in cottontails from birth to 14 days of age.

Significant size differences between parasitized and non-parasitized littermates were visible within 2-3 days post-infestation. The 1965 litter with six of seven littermates infested had three die within 3 days due to heavy infestations. Two others were killed because of their imminent death. Seven large larvae were removed from the back and head of the sixth rabbit which was returned to the nest with the uninfested littermate. Three days later (age: 5 days), the previously parasitized animal was half the weight of the other. When it died (age: 11 days), it weighed only 57 g compared to the 100 g weight of the sibling. Similar weight differences between infested and non-infested littermates were noted in two other litters, but the data are not available.

The minimal larval load necessary for death is unknown for cottontails, but James and Kraft (1964, Proc. First Internat. Conf. Parasit. (2): 949-951) stated that as few as four maggots can kill fox pups. Kingscote (1935, Report of the Ontario Vet. Coll., 1930, pp. 51-69) considered 5-20 *W. vigil* larvae sufficient to kill the young of a variety of wildlife species.

In the present study, a rapid loss of weight was noted in cottontails with as few as five larvae even though nursing continued after infestation. Nestlings dead from the myiasis had fresh or day-old milk curds in the stomach. Nestlings with at least 10 large larvae, if they were to die, did so within 3-5 days post-infestation. The largest number of larvae removed from a living animal was 35. Yuill and Eschle (op. cit.) reported 40 larvae in one animal.

Along with larval load, host mortality may relate to larval location. One nestling (135 g) had 25 larvae removed from

TABLE 1: Wohlfahrtia vigil *myiasis of cottontail rabbits* (Sylvilagus floridanus). *Percent infestations are in parentheses.*

	No. Litters Parasitized / Total No. Litters		No. Young Parasitized / Total No. Young	
a. Present Study: Michigan				
1965	3/3	(100)	10/19	(53)
1966	1/4	(25)	2/18	(11)
1967	1/2	(50)	3/8	(38)
b. Other Reports:				
Pennsylvania [1]	3/26	(12)	No data	
Wisconsin [2]	4/18	(22)*	13/81	(16)
	6/46	(13)*	17/173	(10)
Wisconsin [3]	14/41	(34)	No data	
	10/40	(25)		

*Does not include suspect litters

[1] Beule (1940, Trans. N. A. Wildl. Conf. 5: 320-328).

[2] Yuill and Eschle (1963, J. Wildl. Mgmt. 27: 477-480).

[3] Rongstad (1966, J. Wildl. Mgmt. 30: 312-319).

its back and legs with other smaller larvae unable to be removed. Three days later it weighed 262 g. Another nestling (97 g) had 12 small larvae removed from its head but was dead 2 days later.

Early September was the latest report of *W. vigil* myiasis in cottontails (Rongstad, op. cit.). But, a letter received at the Rose Lake Wildlife Pathology Laboratory (1967, on file) suggested that such parasitism may occur in early October in Michigan. The writer described "white worms" eating live nestling cottontails. Based on the writer's general description of the larvae and of the lesions produced in the nestlings, a diagnosis of *Wohlfahrtia* myiasis was made. Whether *W. vigil* was involved could not be determined because no larvae were submitted for identification.

Gross and Microscopic Pathological Findings.

Most infestations were found because of a characteristic matting of fur from the tissue exudates accompanying larval penetrations. This was most noticeable on the back and flank regions where the hairs surrounding the entry site were matted along their entire length and were quite glossy. Larval penetrations of the paws produced a serosanguinous exudate, the shorter hairs allowing exposure of both the entrance holes and larvae.

Lesions produced by migrating larvae were confined to the subcutaneous tissues of the cottontails. These ranged from a raised abscess that developed at the site of penetration to cases in which large areas of the skin were separated from the underlying muscle. The finding of different sized larvae within the same animal indicated multiple infestations separated in time. This feature prevented any determination of distance traveled by migrating larvae during their maturation.

Routine histologic examinations of tissues stained with hematoxylin and eosin (H and E) demonstrated necrotic areas containing cellular debris, red blood cells, eosinophils and macrophages adjacent to the paths of the larvae. Hemorrhagic and eosinophilic infiltrations between muscle fibers were common. When stained with H and E, both heterophils and eosinophils of cottontails contain eosinophilic granules; however, granules of the latter are larger, oblong rather than round, and more numerous (Lopushinsky, op. cit.). Proliferating fibroblasts were present beneath the necrotic areas.

Although the significance of *W. vigil* to wild cottontail populations is unknown, in the letter referred to previously, 15 of 19 nestling cottontails from five different litters were reported killed by the "white worms" within 5 days post-infestation. Assuming our diagnosis of *Wohlfahrtia* myiasis to be correct, and that *W. vigil* was the species involved, at least local importance should be ascribed to *W. vigil* myiasis of wild cottontail populations. Yuill and Eschle (op. cit.), furthermore, correlated the incidence of *Wohlfahrtia* myiasis in ranch mink and wild cottontails. Increased mink myiasis was associated with decreased cottontail numbers, and it was suggested that, in Wisconsin, cottontails may serve as the primary natural host for *W. vigil*.

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