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## THE LOUSE POPULATIONS ON SOME DEER MICE FROM WESTERN OREGON<sup>1</sup>

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Between August 27 and 31, 1956 a series of 194 deer mice (*Peromyscus maniculatus* Wagner) were taken from the vicinity of Beverly Beach State Park which is just south of Otter Rock, Lincoln County, Oregon. The animals were collected by setting out lines of snap traps along the trails and old logging roads which traversed the area. The traps were placed one to the station with a spacing of about 30 feet between stations. The traps were baited with peanut butter, and, for the most part, left set for two days. A total of 657 trap stations took 111 deer mice the first night and 620 stations took 87 deer mice the second night of trapping, which is at the rate of 169 and 140 deer mice per 1000 trap stations for the first and second nights, respectively. These trap success figures indicate a very high population density.

To prevent transfers of lice from one host specimen to another and to reduce loss, each mouse was placed in a separate one-pint size polyethylene home food freezer bag immediately on recovery from a trap (Cook, 1954b). Each bag was numbered, and each skin was returned to this original bag after the host was examined, skinned and the skin dried. The recovery of the lice was accomplished by placing the whole skin in a solution of trypsin followed by KOH (Cook, 1954a). The lice were then strained out of the resulting solution.

This report is concerned with the population structure and occurrence of the two species of Anoplura *Hoplopleura hesperomydis* (Osborn) and *Polyplax auricularis* (Kellog and Ferris) which were found on the deer mice.

### RATE OF INFESTATION

In all, 65.3% of the deer mice examined harbored *H. hesperomydis* and/or *P. auricularis*. The former were the more common being found on 57.2% of the hosts while the latter were found on but 18.9%. Only 10.7% of the deer mice were found to be infested with both species of lice.

When it was discovered that two species of lice were com-

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monly found on this host population two hypotheses were set up to be tested. The first was that since some mice do not have lice that there was a difference in the "resistance" to louse infestations among these hosts. If this were true it should follow that the two species of lice would be found on the some hosts more commonly than would be expected by chance. The other hypothesis suggested that either the two species of lice had separate and distinct host requirements or that there would be direct competition between them. In either case they should be found together less often than would be expected by chance distribution. In order to test these hypotheses we calculated Cole's (1949) coefficient of inter-specific association. The value  $C \pm O = 0.007 \pm 0.016$  suggests that neither hypothesis was correct and the two species of lice are distributed among the hosts independently of each other. This situation allows the population data for the two species to be analyzed separately.

*Hoplopleura hesperomydis* was found on about 57% of the deer mice. However, there is some difference in the rate of infestation between the sexes. This louse was found on 62% of the males but on only 52% of the females. A Chi-square value of 7.01 suggests that this is a real difference rather than one to be expected by chance. When the sample is broken down into size groups (these groups are assumed to represent age classes with those over 90 mm. in body length representing adults and those under this length representing sub-adult mice) there is no significant variation in rate of infestation in the male deer mice. There is considerable apparent difference in rate of infestation between the size classes of females with an indication that the adult females have a lower rate of infestation than the sub-adult females. A Chi-square value of 24.3 suggests that this is a real difference. The rate of infestation is much higher than that found by us (Cook and Beer, 1955) from deer mice from northern Minnesota. The Minnesota infestation rates for *H. hesperomydis* were 41 and 15% as compared with 57% for this sample. The tendency for the males to have a higher infestation rate is suggested in both studies. However, the Minnesota deer mouse material showed no indication of shift in infestation rate with size (age) of host in either sex.

A much lower proportion of the deer mice were found to be infested with *P. auricularis* than with *H. hesperomydis*. About

19% of the deer mice were infested by *P. auricularis* and there was again a difference in the rate of infestation of the males and females. About 13% of the female and 25% of the male deer mice were infested. A Chi-square value of 13.8 again suggests that this is a significant difference. There is very little apparent variation in the rate of infestation with size class in either the male or female deer mice. However, the samples are very small and definite conclusions cannot be made in relation to the rate of infestation and age of host.

#### LOUSE POPULATION STRUCTURE

The detailed population structure of the lice on the infested deer mice is given in table 1. In all, 1327 *H. hesperomydis* and 86 *P. auricularis* were examined. The size of the infestations

Table 1.—Louse populations on *Peromyscus maniculatus*

Sex of Host	Body Length in mm.	No. of Hosts Examined	Per Cent Infested	Total Lice	Lice per Infestation			Structure of Louse Populations in per cent				
					Max.	Min.	Ave.	Adults		Developing Instars		
								♂	♀	1st	2nd	3rd
<i>Hoplopleura hesperomydis</i>												
♀ ♀	70-89	63	65	387	59	1	9.4	32	43	13	7	5
	90-105	<u>31</u>	26	<u>168</u>	106	1	21.0	21	47	24	7	1
		94	52	<u>555</u>			11.3	28	44	16	7	4
♂ ♂	70-89	85	61	657	247	1	12.6	27	36	32	4	2
	90-105	<u>17</u>	65	<u>115</u>	37	1	10.5	44	47	7	2	0
		102	62	<u>772</u>			12.3	29	37	28	3	2
<i>Polyplax auricularis</i>												
♀ ♀	70-89	63	14	32	12	1	3.6					
	90-105	<u>31</u>	10	<u>4</u>	2	1	1.3					0
		94	13	<u>36</u>			3.0	19	53	3	25	0
♂ ♂	70-89	85	20	33	3	1	1.9					
	90-105	<u>17</u>	47	<u>17</u>	3	1	2.1					
		102	25	<u>50</u>			2.0	32	48	10	6	4

varied greatly as has been reported from other studies (Cook and Beer, 1954; Hopkins, 1949). The average size of the infestations for *H. hesperomydis* and *P. auricularis* was 11.8 and 2.3 lice, respectively. The maximum number of *H. hesperomydis* was 247 and of *P. auricularis* 12. Both louse species show a skewed distribution of population sizes with the maximum being many times the mean. There is considerable variation in the average size of infestation between size (age) classes as shown in Table 1 but the significance of these differences is difficult to determine

owing to the presence of a few heavily infested animals. For instance, nearly two-thirds of the *H. hesperomydis* found on the adult female deer mice were from one deer mouse. There appears to be little difference between the infestations on the male and female deer mice (see table 1).

The adult lice made up from 66 to 80% of the total population indicating a rather low rate of reproduction at this time. Our studies of *H. hesperomydis* on deer mice in northern Minnesota have indicated a higher proportion of immatures (Cook and Beer, 1954) where we found from 38 to 60% adults with an average of 45%. The sample of *P. auricularis* is too small to discuss in detail except that it appears to follow the same general pattern as that found in *H. hesperomydis*.

The age structure of the *H. hesperomydis* shows a relatively high proportion of 1st instars, a moderate number of 2nd instars, and only a few 3rd instars (see Table 1) indicating either a rather high mortality rate among the young lice or that the 1st instars remain in this stage longer than the later instars. There are no data on the developmental rate of this species. The proportions of the several instars are in line with that reported for Minnesota materials (Cook and Beer, 1954).

In both species of lice the females were more abundant than the males, the male *H. hesperomydis* on the female deer mice made up about 39% of the adults while on the male mice they comprised about 44%. The *P. auricularis* had a similar sex ratio with about 35% of the adults being males.

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