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ECTOPARASITES OF THE EUROPEAN HARE (*LEPUS EUROPAEUS* (PALLAS)) IN TWO REGIONS OF VICTORIA

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Abstract

Hares from the Mallee and central regions of Victoria were examined for ectoparasites. Hares from the Mallee carried the stickfast flea *Echidnophaga myrmecobii* and the mite *Leporacarus gibbus*. Hares from central Victoria carried the lice *Haemodipsus setoni* and *H. lyriocephalus*. *H. setoni* was found mainly on the body of the hare, *H. lyriocephalus* on the head.

The recently introduced rabbit flea, *Spilopsyllus cuniculi* was found on hares in both regions.

Introduction

The European hare *Lepus europaeus* (Pallas) was introduced into Australia in about 1860. It is now widespread throughout the agricultural areas of Victoria but its numbers are generally low except in the grazing and cereal growing areas of western and northern Victoria.

In the United Kingdom it is host to several ectoparasites including the mite *Leporacarus gibbus** (Pagenstecher) (Lisrophoridae), and the lice *Haemodipsus lyriocephalus* (Burmeister) (Hoplopleuridae) (Mead-Briggs and Page 1967) and *H. setoni* Ewing (Clay personal communication, and Broekhuizen 1971). The common rabbit mite *Cheyletiella parasitivorax* (Megnin) (Cheyletidae) has not been found on hares in the United Kingdom (Mead-Briggs and Page 1967).

The rabbit flea *Spilopsyllus cuniculi* (Dale) (Pulicidae) occurs commonly on hares in the United Kingdom (Mead-Briggs and Page 1967) and in parts of Europe (Wasylik 1965). Its numbers on hares increased sharply when myxomatosis severely reduced the wild rabbit population (Rothschild 1963). *S. cuniculi* did not establish in Australia with the rabbit but was introduced in 1966 as a vector for myxomatosis (Sobey and Menzies 1969).

Materials and methods

Hares were collected from Meringur and Walpeup in the Mallee and Point Cook in central Victoria. They were shot and examined in the field for the presence of *S. cuniculi* and *Haemodipsus* spp. They were then skinned and the skins placed in plastic bags and returned to the Keith Turnbull Research Institute for microscopic examination by the method reported previously (Shepherd and Edmonds 1973). With one collection from Point Cook during 1974 the head and body fur were kept in separate plastic bags. This was suggested by Dr T. Clay to see whether different lice species lived on separate areas of the hare.

Results

Hare numbers were low in the north-west Mallee and only three skins were collected from Meringur in November 1972 and two from Walpeup in December 1974. A single specimen of *L. gibbus* and seven female specimens of *Echidnophaga myrmecobii* Rothschild (Pulicidae) were found at Meringur. The only specimens found at Walpeup were three male *S. cuniculi* on one hare. The original release site for *S. cuniculi* at Pine Plains is approximately 17 km south-west of the area where this hare was shot.

The species collected at Point Cook and their numbers are shown in Tables 1 and 2. Thirteen of the 32 hares examined from Point Cook carried *L. gibbus* with a maximum infestation of 23 mites (9 ♂♂ and 14 ♀♀) on one unsexed adult and 17 (5 ♂♂ and 12 ♀♀) on one pregnant female.

Seven out of eight hares collected at Point Cook in August 1972 carried *H. setoni*. The highest numbers were found on males. Three out of eight collected in November 1972 carried *H. setoni*.

* Originally *Listrophorus gibbus* designated *Leporacarus* by Fain (1970).

Fourteen out of the 16 hares collected in November 1974 and March 1975 carried *H. setoni*. Numbers per hare were higher than in previous collections. The highest numbers collected during November were 29 found on a male and 14 on a pregnant female. In March 65 were found on the body of a lactating female.

H. lyriocephalus was not found until November 1974. It occurred on two of the six hares, one female on a male hare and three females on a pregnant hare. In March 1975 *H. lyriocephalus* was found on the head of one pregnant female and on the head and body of one male (Table 2).

The four hares carrying *H. lyriocephalus* also carried *H. setoni*.

Three specimens of mesostigmatid mites and one of a red spider mite (*Tetranychus* sp. Id. R. Domrow) were collected from hares in August and November 1973 respectively, presumably as stragglers from the pasture.

S. cuniculi was released at Werribee near Point Cook in 1969. Hares collected there during August 1972 did not carry *S. cuniculi*. Five of the eight hares shot in November carried *S. cuniculi* but in low numbers (maximum four). The flea was found on three out of six hares collected during November 1974, on both males and females, but again in very small numbers (maximum four). One gravid *S. cuniculi* was found on a pregnant hare which was carrying three foetuses.

Five of the ten hares caught in March 1974 carried *S. cuniculi*. The fleas were mainly found attached to the pinnae of the pregnant hares. The maximum number found was 13 on a hare carrying two foetuses. These *S. cuniculi* detached soon after the animal was shot and moved over the body of the hare. One young hare carried two *S. cuniculi* in the pinna. One male hare carried one *S. cuniculi* in the head fur.

One female *Ctenocephalides canis* (Curtis) (Pulicidae) was found on a young female hare.

Discussion

The occurrence of the stickfast flea, *E. myrmecobii* on hares in the Mallee was expected since the flea infests a wide range of animals (Shepherd and Edmonds unpublished data). The hares were shot at the time of year when *E. myrmecobii* was common on rabbits.

L. gibbus occurs on rabbits in the far north-west of Victoria. The infestation rate is about 25% and numbers are generally low (Shepherd and Edmonds unpublished data). The collection of a single specimen from one hare suggests that the infestation rate and numbers are also very low on hares.

S. cuniculi was found on rabbits as well as on hares shot near Walpeup. Fewer *S. cuniculi* were found on the hares than on rabbits.

Forty-one per cent of the Point Cook hares carried *L. gibbus*. This compares with 99% of rabbits infested in the same area (Shepherd and Edmonds unpublished data). The numbers on hares are very much lower than on rabbits (Shepherd and Edmonds 1973). Although the hare is a common host for *L. gibbus* it is of minor importance compared with the wild rabbit.

Wasylik in Poland (1965) found that all hares he examined over an eleven-month period carried *L. gibbus*. The average number for male hares was 43 (range 6-88) and for female hares was 33 (range 2-86). *L. gibbus* was not as common or present in such numbers in Victoria. Mead-Briggs and Page (1967) found that *L. gibbus* occurred frequently on different species of hare in the United Kingdom. Infestation rates on *L. europaeus occidentalis* de Winton, *L. timidus scoticus* Hilzheimer and *L. timidus hibernicus* Bell were 67, 60 and 80% respectively. The incidence of infestation did not appear to vary greatly geographically or between the various species of hares.

The occurrence of the louse, *H. lyriocephalus* is of interest. It has been found recently at Point Cook but only in low numbers. It has not been found in New Zealand (Pilgrim personal communications), where *H. setoni* is the usual louse found on hares. Since New Zealand hares are known to have originated from both English and

TABLE 1
ECTOPARASITES OF *L. EUROPAEUS* AT POINT COOK SHOWING MEANS, RANGES AND NUMBERS OF HARES INFESTED FOR EACH SPECIES

Collection date	Number of <i>L. europaeus</i> examined	<i>L. gibbus</i>		<i>H. setoni</i> †	<i>H. lyriocephalus</i> *	<i>S. cuniculi</i>		Other species
		Males	Females and nymphs			Males	Females	
August 1972	8	—	1 (0-2) {3}	3 (0-12) {7}	—	—	—	Mesostigmatid mite {3}
November 1972	8	1 (0-9) {2}	3 (0-14) {5}	1 (0-2) {4}	—	1 (0-1) {1}	1 (0-3) {5}	<i>Tetranychus</i> sp. {1}
November 1974	6	1 (0-5) {3}	3 (0-12) {5}	10 (2-29) {6}	1 (0-3) {2}	1 (0-3) {2}	1 (0-4) {3}	—
March 1975	10	—	1 (0-1) {1}	5 (0-9) {8}	1 (0-11) {2}	1 (0-2) {5}	2†(0-15) {4}	<i>C. canis</i> {1}

* Most *H. setoni* and *H. lyriocephalus* were identified by Dr T. Clay, British Museum.

† One *S. cuniculi* was gravid.

TABLE 2
ECTOPARASITES OF THE HARE *L. EUROPAEUS* COLLECTED AT POINT COOK DURING MARCH 1975

Hare	Sex*	<i>L. gibbus</i>	<i>H. setoni</i> †		<i>H. lyriocephalus</i> †		<i>S. cuniculi</i>	
			Head	Body	Head	Body	Head	Body
H31	F	—	—	—	—	—	—	—
H32	F	—	—	2	—	2	—	1M, 2F
H33	F	—	—	5	—	—	—	1M, 2F
H34	F	—	2	3	—	—	—	2M, (13 unsexed)
H35	F	—	2F	7	—	—	—	1M, 3F
H36	M	—	—	9	—	6M, 3F	2	—
H37	F	—	—	65	—	—	—	—
H38	F	—	—	2M, 5F	—	—	—	—
H39	F	—	—	—	—	—	—	—
H40	F	1F	1	8	—	—	—	—

* Lactating and pregnant does are shown by L and P.

† Not all *Haemodipsus* spp. were sexed.

+ One *S. cuniculi* was gravid.

Victorian sources (Flux 1967) it is possible that *H. lyriocephalus* will be found there after more careful examination of hare material.

Both *H. lyriocephalus* and *H. setoni* occur on hares in the United Kingdom (Clay personal communications, van den Broek 1965). Mixed populations were found on *L. europaeus* at Durham, England (van den Broek 1965) and in France and Switzerland (Broekhuizen 1971). Although *H. setoni* was not identified until 1924 (Ewing 1924) (from *L. californicus melanotis*) it must have been present in small numbers on the original *L. europaeus* brought to Australia. *H. lyriocephalus* must also have been present. It is not known of course whether the lice were present on separate animals or as mixed populations. As yet *H. lyriocephalus* has not been found alone on *L. europaeus* in Victoria, it occurred less frequently than *H. setoni*. van den Broek (1965) mentions *H. lyriocephalus* as rather rare on *L. europaeus* in the Netherlands, whereas Mead-Briggs and Page (1967) found only *H. lyriocephalus* in a survey of the United Kingdom of 151 hares, including 128 specimens of *L. europaeus*.

Burmeister (1839) described *H. lyriocephalus* as "the louse of the hare, *L. europaeus*". However it seems that *H. setoni* is more deserving of this title in Victoria and New Zealand as it occurs more frequently than *H. lyriocephalus*. A similar situation was observed by Broekhuizen (1971) during her three years of investigation in the Netherlands.

Mixed infestations were found on four hares only. *H. lyriocephalus* appeared to be more common on the head fur than the body fur although the infestation was light (1-9). *H. lyriocephalus* was only found in the summer months, but the sample is too small to draw conclusions on seasonal variations. All hares caught were healthy. Broekhuizen (1971) found that *H. lyriocephalus* was very rare on healthy hares, more common on diseased hares.

The numbers of *H. setoni* found on Point Cook hares declined from spring to early summer and rose to their highest towards late summer. The samples are too small to draw any conclusions on variability in infestations. However the decrease in numbers of hares infested is similar to the pattern in the infestation of rabbits by *H. ventricosus* in the same district (Shepherd and Edmonds unpublished data).

The collection of *C. canis* may be the first record of the flea on *L. europaeus*. Dunnet and Mardon (1974) do not list *L. europaeus* as a host. Apparently no dog fleas have been recorded on *L. europaeus* in Australia before. Foxes, *Vulpes vulpes* (L), at Point Cook and Werribee have been found to carry *C. canis*.

In the United Kingdom, Mead-Briggs and Page (1967) found that the percentage of hares carrying *S. cuniculi* ranged from about 40 to over 70 and the numbers per hare ranged up to 70. Rothschild (1963) reported 5% of hares shot during September 1961 carried a large number of *S. cuniculi* attached to the ears, and that 80 to 90% of all hares carried 1-3 *S. cuniculi*. Further shoots showed hares harbouring 20 to 25 *S. cuniculi*.

The very small numbers of *S. cuniculi* found on hares at Point Cook suggest that either the climax association has not yet been reached, five years after *S. cuniculi* was released, or that there has been less pressure for *S. cuniculi* to use hares as a host than in the United Kingdom.

Rothschild and Ford (1965) have suggested that the presence on lactating *L. europaeus* of both gravid *S. cuniculi* and females which have been fertilized and laid eggs, may indicate the adaptation of *S. cuniculi* to the different hormone cycle of the hare. The finding of gravid *S. cuniculi* on pregnant *L. europaeus* at Point Cook indicates either that the *S. cuniculi* which were imported from the United Kingdom were already adapted to the hormone cycle of the hare or that the adaptation has occurred within about five years.

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