

## SHORT CONTRIBUTIONS

### TRANSMISSION OF MYXOMATOSIS ON THE SPINES OF THISTLES, *CIRSIUM VULGARE* (SAVI) TEN.\*

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Following chance introduction of the disease in January 1959 an explosive epidemic of myxomatosis almost wiped out a rabbit colony at Canberra which was the subject of a detailed behavioural study (Mykytowycz 1958, 1959, 1960) for more than two years. The first sick rabbit was discovered on January 13, and by the end of the month each of 159 susceptible rabbits in the enclosure was either dead from myxomatosis or showing symptoms. At an early stage—on January 16, when there were ten positive cases—the author, on the suggestion of Dr. R. Mykytowycz, started an investigation of the vectors responsible.

Hot summer drought conditions had practically eliminated surface waters in the surrounding district, but small numbers of larvae of *Anopheles annulipes* Walker and *Culex pipiens australicus* Dobrotworsky & Drummond were found quite close to the enclosure in domestic waters. Exhaustive application of proved methods for collecting winged vectors during the remainder of the active transmission term (approximately 17 days) yielded only 34 culicids and 5 ceratopogonids.

The methods used included man-bait collecting in the enclosure from sunset until 2100 hr by two or more collectors on seven evenings and once at dawn, searching of diurnal nesting places in and around the enclosure on nine days during the forenoon (two collectors), and running a light trap from dusk till 2130 hr on three suitable evenings. Artificial nesting boxes placed in the enclosure were unproductive, as were two stable traps each baited with a pair of rabbits for two nights. Neither the rabbits used as bait in the stable traps nor five others exposed in small mesh cages for two nights contracted myxomatosis. Tests for the presence of myxoma virus on the winged insects collected and on 145 lice, *Haemodipsus ventricosus* (Denny), taken from 46 rabbits, many of which were actually incubating disease at the time the collection was made, proved negative. Of seven blood-engorged culicids tested by the precipitin method three showed positive reaction to fowl antiserum, two to sheep antiserum, and two to human antiserum.

The initial suspicion that locally produced blood-sucking arthropods might be the responsible vectors was therefore not confirmed, and attention was directed to other modes of transmission. The rates of transmission of myxomatosis by normal field contact reported by Bull and Mules (1944) and Myers (1954) indicated that some more efficient factor was operating in the enclosure. Spines of the thistle,

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*Cirsium vulgare* (Savi) Ten., a dense litter of which blanketed the enclosure and which provided almost the only food available to the rabbits, were suspected. Three groups of five susceptible laboratory rabbits were used to demonstrate the infectiousness of those spines. Group 1 was chased about the enclosure for a period of 20 min. The rabbits frequently ran against standing thistles or into heaps of dry mown thistles, and the prickly ground litter was "picked up" on their feet. The animals, by their faltering gait and other reactions, showed obvious discomfort from the spines, which caused numerous small wounds and some minor bleeding. Group 2 was treated similarly, spelled for 15 min, then run several times through short lengths of burrow in an enclosure warren. Group 3 rabbits were run (up to 20 times each) through swinging "Perspex" doors in mouse boxes that had recently been used repeatedly by rabbits suffering from myxomatosis in all stages.

Two rabbits in Group 1 and four in Group 2 later developed myxomatosis, but none in Group 3 were infected. The increased infection shown after passage through the burrows is thought to have resulted from contact with accumulated thistle debris on the floors rather than from contact with the earth walls.

It is widely accepted (Seddon 1952) that the principal means of infection for contagious ecthyma of sheep is through injuries caused by rough and prickly vegetation. The same mode of entry was not unexpected for myxomatosis, which, like "scabby mouth", is a virus relatively resistant to exposure outside the living host. During the earlier years of field investigations of myxomatosis in Australia officers of the Wildlife Survey Section, C.S.I.R.O., encountered several unseasonal localized epidemics where all efforts to locate blood-sucking insects were unsuccessful. During July 1951 J. H. Calaby (unpublished data) investigated outbreaks in the Trangie region, where he found the disease was more or less confined to dense stands of saffron thistle, *Carthamus lanatus* L.. Near Moree in August 1951, during a prolonged cold windy period, the present author observed an outbreak in which disease activity was limited to the dried prickly roly-poly, *Bassia quinquecupis* F. Muell., stand that skirted the Gwydir River. Myers (personal communication), at Albury in 1954, observed a winter outbreak in which disease was restricted to thistle-covered warrens, and rabbits living in thistle-free warrens were not infected.

In each instance epidemics developed only where rabbits made frequent contact with the prickly vegetation either while taking shelter or in their daily foraging routine. Circumstances in the enclosure were even more conducive to spread of the disease, since the inhabitants were forced by starvation not only to touch, but actually to feed on, the agents of transmission.

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