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which would not be detected using standard techniques to census microtines.

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Parasites and Serological Survey of the Common Brushtail Possum (*Trichosurus vulpecula*) from Kangaroo Island, South Australia

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The common brushtail possum (*Trichosurus vulpecula*) is the most familiar and abundant of the Australian possums and may be a host for various metazoan parasites and microbiological agents of such diseases as leptospirosis and tuberculosis which also infect grazing livestock and man (Presidente, 1984, *In* Possums and Gliders, A. Smith and I. Hume (eds.), Surrey Beatty and Sons Pty. Ltd., Chipping Norton, N.S.W., pp. 171–190). Possums are extremely abundant on Kangaroo Island, South Australia. Although normally arboreal they come into close contact with domestic ruminants because they frequently feed on the ground, probably due to a lack of predators (Inns et al., 1979, Natural History of Kangaroo Island, Royal Society of South Australia, Adelaide, South Australia, pp. 91–102). An investigation was therefore carried out at the South Australian Department of Agriculture Research Centre at Parndana, Kangaroo Island, to assess the extent to which possums may be hosts for parasites and diseases known to occur in ruminants in the same area.

Thirty-one possums were captured in cage traps and a further nine road-killed animals were collected from areas around the research center during March and April 1985. Blood samples were collected from the jugular vein of 30 of the trapped animals. The age of each possum was estimated from its total body length (Presidente, 1982, *In* The Management of Australian Mammals in Captivity, Evans (ed.), The Zoological Parks Board of Victoria, Melbourne, Victoria, pp. 55–66). The possums ranged in age from 14 mo to >24 mo (mature). Nineteen males and 12 females were less than 24 mo and a further five male and four females were estimated to be older than 24 mo of age. Each animal was examined for the presence of external parasites. The gastro-intestinal tract was removed and the stomach, small and large intestine were washed separately, preserved in 10% formalin and the washings examined microscopically for helminths.

Specimens of the mite *Ornithonyssus* sp. (family Dermanyssidae) were recovered from the ears of five possums. Because the mites were exclusively males and nymphs they could not be identified further. The tick *Ixodes tasmani* is a common parasite of possums in eastern Aus-

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TABLE 1. Prevalence and intensity of endoparasites in 40 common brushtail possums from Kangaroo Island, South Australia.

Parasite	Prevalence (%)	Intensity	
		Mean	Range
Bertiella trichosuri	12.5	2	1–3
Adelonema trichosuri	15	133	3–610
Trichostronglus axei	2.5	154	—
Trichostrongylus colubriformis	12.5	2	1–5
Eimeria sp.	27.5	—	—

tralia, but the only previous record from South Australia is from an unidentified "possum" (either *T. vulpecula* or *Pseudocheirus peregrinus*) from Bordertown collected in 1904 (Roberts, 1960, Aust. J. Zool. 8: 392–485). The presence of *I. tasmani* on six possums is therefore the first definitive record of this tick on *T. vulpecula* in South Australia. The flea *Choristopsylla ochi* is encountered commonly on the brushtail possum. *Choristopsylla ochi* was found on one possum and has been collected previously in South Australia (Dunnet and Mardon, 1974, A monograph of Australian fleas (Siphonaptera), Aust. J. Zool. Suppl. No. 30, pp. 57–60).

Four species of helminths were recovered (Table 1). Both *Bertiella trichosuri* and *Adelonema trichosuri* have been reported from possums on Kangaroo Island (Beveridge, 1976, Aust. J. Zool. Suppl. No. 44, p. 110; Smales and Mawson, 1978, Aust. Vet. J. 54: 181–182). In earlier studies, no trichostrongylid nematodes were found (Smales and Mawson, 1978, op. cit.) but we recovered *Trichostrongylus axei* from the stomach of one 18-mo possum and *T. colubriformis* from the small intestine of three male and two female possums ranging in age from 16 to 24 mo. *Trichostrongylus axei* has not been recorded previously from possums in Australia. *Trichostrongylus colubriformis* and *T. rugatus* have been found in possums with clinical signs of diarrhea, inappetence and dehydration (Bearup and Bolliger, 1949, Aust. J. Sci. 12: 75–76). The trichostrongylid nematodes recovered in our study were from clinically normal possums and only small numbers of up to 150 nematodes were present. *Trichostrongylus colubriformis* and *T. axei* have been found in 34% and 14%, respectively, of sheep on Kangaroo Island (Beveridge and Ford, 1982, Aust. Vet. J. 59: 177–179). *Paraustrostrongylus trichosuri* is a common herpetostrongylid parasite of *T. vulpecula* elsewhere, but was not found in the 40 possums examined. The replacement of *P. trichosuri* with *Trichostrongylus* infections in brushtail possums feeding in agricultural areas has been discussed by Presidente (1984, op. cit.). Eimerian oocysts of an undescribed species were present in the fecal samples of eight male and three female possums ranging in age from 15 mo to mature. Previous studies have indicated that the species of *Eimeria* found in possums is non-pathogenic (Presidente, 1982, op. cit.).

Serological studies revealed the exposure to only two microbiological agents, *Coxiella burnetti* and Ross River virus. Complement-fixing antibody (titers >1:16) was detected against *C. burnetti* in serum samples from three possums. *Coxiella burnetti* has been reported previously in a possum from Queensland (Derrick et al., 1940, Aust. J. Exp. Biol. 18: 409–413). Antibody to Ross River virus has been demonstrated in many mammalian species including the brushtail possum (Gard et al., 1973, Am. J. Trop. Med. Hyg. 22: 551–560). One mature male possum was found to be seropositive for Ross River virus by the hemagglutination inhibition test (titer >1:80). Although hemagglutinating antibody against *Toxoplasma* has been detected in 19.9% of 196 sheep sampled from Kangaroo Island in 1984 (O'Donoghue et al., 1986, Aust. Vet. J., in press), no hemagglutinating antibody was detected in the 30 possum sera tested. Leptospires iden-

tified as serovar *balcanica* occur commonly in possums in Victoria (Durfee and Presidente, 1977, Aust. Vet. J. 53: 508; Durfee and Presidente, 1979, Aust. J. Exp. Biol. Med. Sci. 57: 191–201) and in New South Wales (Milner et al., 1981, J. Wildl. Dis. 17: 197–202). The two serovars, *hardjo* and *balcanica*, cannot be differentiated by conventional agglutination tests and possums infected with serovar *balcanica* develop microagglutination antibody that reacts with *hardjo* antigen (Durfee and Presidente, 1979, Aust. J. Exp. Biol. Med. Sci. 57: 231–240). We tested serum samples for antibodies to serovars *hardjo*, *pomona*, *copenhageni* and *tarrasovi*. Antibodies were not detected to any of the serovars tested.

It is apparent that the brushtail possum may be a host for certain nematode parasites of ruminants. Although detection of specific antibody indicated exposure to two microbiological agents, both occurred at a low prevalence and *T. vulpecula* is therefore unlikely to be an important host or reservoir for these infectious diseases. Helminth specimens have been deposited in the Australian Helminth Collection housed in the South Australian Museum (S.A.M.) (Accession Nos. 14954–14957) and arthropod specimens have been lodged with the Australian National Insect Collection in Canberra and in the S.A.M. Animals were collected with the permission of the South Australian National Parks and Wildlife Service (permit number S01937).

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Feather Loss of Unknown Etiology in a Gull Colony in Newfoundland, Canada

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Since 1966 13,082 herring gull (*Larus argentatus*) and 626 great black-backed gull (*L. marinus*) chicks have been handled and banded during a variety of studies in the Witless Bay Sea Bird Sanctuary, Newfoundland, Canada (e.g., Threlfall, 1968, Can. J. Zool. 46: 1119–1126; Haycock and Threlfall, 1975, Auk 92: 678–697; Threlfall, 1978, Bird-Banding 49: 116–124). During this period no epizootics were observed, and only one mass die-off of chicks occurred, apparently due to adverse environmental conditions (Threlfall et al., 1974, Auk 91: 846–849).

The northernmost island in the seabird sanctuary is Gull Island (47°16′N, 52°46′W) which is the breeding site for more than one million seabirds of eight species (Nettleship, 1980, A Guide to the Major Seabird Colonies of Eastern Canada, Canadian Wildlife Service, Ottawa, Ontario, 133 pp.). In 1984 during a study of the breeding biology of the great black-backed gull on this island 113 nests were found

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