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Traumatic Injuries Occurring in Possums and Gliders in the Blue Mountains, New South Wales

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ABSTRACT: Twenty common brushtail possums (*Trichosurus vulpecula*), 23 ringtail possums (*Pseudocheirus peregrinus*) and five sugar gliders (*Petaurus breviceps*) from the Blue Mountains, New South Wales, Australia were evaluated for traumatic injuries between 1989 and 1990. Ten brushtail possums and five ringtail possums were hit by motor vehicles with injuries primarily to the anterior of the body. Fifteen ringtail possums and all sugar gliders were attacked by cats. Four brushtail possums were attacked by dogs. The remaining nine possums had evidence of intraspecific fighting ($n = 2$) or other types of trauma. Brushtail and ringtail possums were presented primarily during their main breeding seasons. There was no sex predilection. More ringtail than brushtail possums were subadults and these were injured primarily at the time of dispersal.

Key words: Possums, *Trichosurus vulpecula*, *Pseudocheirus peregrinus*, gliders, *Petaurus breviceps*, trauma, pathologic findings.

Finnie (1985) found that motor vehicle induced trauma was the most common cause of injuries in common brushtail possums (*Trichosurus vulpecula*). Griner (1983) mentioned injuries in a ringtail possum (*Pseudocheirus peregrinus*) and a brushtail possum resulting from capture and restraint. Intraspecific trauma involving dominant males has been recorded as the most common problem encountered in young possums (Presidente, 1982). Trauma through predation has been reported (Thomson and Owen, 1964; Seebeck, 1976; Suckling, 1984). Our objective was to determine the causes and types of injuries occurring in free-living possums and gliders of the Blue Mountains region of Australia.

Between February 1989 and November 1990, 48 free-living possums and gliders with suspected trauma were presented to the Springwood Veterinary Clinic (SVC), Springwood, New South Wales (NSW),

Australia (Table 1). These originated within an area of the Blue Mountains (150°19' to 150°37'E, 33°40' to 33°45'S) approximately 80 km west of Sydney and at an altitude of 371 m; the area consisted of urban development abutting forest and scrubland. Possums and gliders were classified as back-young when observed carried on their mother's back or on the basis of body size. Animals independent of their mother but not yet mature adult body size were classified as sub-adults according to established criteria (Presidente and Correa, 1981; McKay, 1983; Suckling, 1984).

All animals were examined clinically and plain radiographs were taken of animals with suspected fractures. Necropsies were done on 36 animals. Tissues for histopathologic examination were fixed in 10% formalin, embedded in paraffin, and sectioned for staining with hematoxylin and eosin.

Twenty brushtail possums, 23 ringtail possums and five sugar gliders (*Petaurus breviceps*) were presented with various forms of trauma (Table 1). For brushtail possums, five of the nine males were presented during the main breeding season (March to May), and a further two males were presented in June (Table 2). Six of these were struck by motor vehicles and one was attacked by a dog. For ringtail possums, six of the 11 adults were seen from May to August which corresponds to the main breeding period. Six of the eight sub-adults were seen from January to April. Eleven of the 15 ringtail possums attacked by cats were presented in these two periods.

Ten brushtail possums and five ringtail possums were struck by motor vehicles. The head, either solely or in combination

TABLE 1. Age and sex for possums and gliders presented to Springwood Veterinary Clinic, New South Wales, 1989 to 1990.

Age class	<i>Trichosurus vulpecula</i>		<i>Pseudo-cheirus peregrinus</i>		<i>Petaurus breviceps</i>	
	Fe-male	Male	Fe-male	Male	Fe-male	Male
Back-young	1	—	1	1	—	—
Sub-adults	—	4	3	5	1	1
Adults	8	7	6	7	2	1
Totals	9	11	10	13	3	2

with injuries to the thorax, abdomen or pelvis, was the most common site of injury and affected seven brushtail possums and four ringtail possums. The remaining possums sustained injuries to the thorax, abdomen, pelvis and spine. All of these animals, except one brushtail possum, died or were euthanatized by intravenous or intraperitoneal overdose of pentobarbitone (Lethabarb®, Arnolds of Reading, Boro-nia, Victoria).

Fifteen ringtail possums had been attacked by cats. Most had injuries to the neck or thorax but intra-abdominal trauma and spinal dysfunction also were seen. One possum was diagnosed as having cellulitis and toxemia based on histopathologic examination. Of the five sugar gliders presented for attacks by cats, two had few obvious wounds, one had multiple hind-limb fractures and two animals had hind limb paralysis. All of these possums died or were euthanatized except for one sugar glider and one ringtail possum for which the outcomes are unknown. Four brushtail possums were attacked by dogs and sustained abrasions and bruising, intra-thoracic trauma, intra-abdominal trauma and/or spinal injuries. Three of these possums died or were euthanatized.

One adult female brushtail possum was attacked by another brushtail possum and a back-young ringtail possum was attacked by another juvenile. The brushtail possum recovered but the ringtail possum died.

Miscellaneous cases of obvious trauma for brushtail possums consisted of two

TABLE 2. Monthly distribution of possums and gliders presented for traumatic injuries to Springwood Veterinary Clinic, New South Wales, 1989 to 1990.

Month	Females			Males			Total
	BT ^a	RT ^b	SG ^c	BT	RT	SG	
January	—	1	—	1	1	—	3
February	—	2	—	—	2	—	4
March	—	2	—	1	2	—	5
April	2	—	—	2	1	—	5
May	—	—	1	3	—	1	5
June	1	2	—	2	—	1	6
July	1	1	—	—	1	—	3
August	1	—	—	1	3	—	5
September	1	—	—	0	—	—	1
October	1	2	2	—	1	—	6
November	2	—	—	—	1	—	3
December	—	—	—	1	1	—	2
Total	9	10	3	11	13	2	48

^a Brushtail possums, main breeding season March to May.

^b Ringtail possums, main breeding season May to August.

^c Sugar gliders, main breeding season August to October.

traumatic amputations and one elbow luxation. One possum with a traumatic amputation died; the other two possums recovered. Two brushtail possums were presented with tetraparesis and ataxia and two ringtail possums were presented with hindlimb paralysis of unknown cause. Trauma was suspected on the basis of clinical findings for the brushtail possums and necropsy and histologic findings for the ringtail possums. One of the brushtail possums recovered whereas the other three possums died or were euthanatized.

Lesions which may not have been directly due to trauma were detected in four brushtail possums. These comprised bronchopneumonia, a focal necrotic hepatic lesion of some duration and two cases of gastrointestinal ulceration. One ringtail possum had characteristic crystals of oxalate deposited in scattered proximal tubules while an incidental finding was non-inflammatory renal proximal tubular infection with protozoa having the microscopic features of *Klossiella* sp.

The findings that motor vehicle accidents and predation were common reasons for presentation of possums and gliders in the Blue Mountains region, and that motor

vehicle accidents were more common in brushtail possums and attacks by cats more common in ringtail possums and sugar gliders were not unexpected. The boldness of brushtail possums and their less strictly arboreal behavior would expose them to motor vehicle accidents while their size would protect them from attacks by cats. As ringtail possums are more elusive and travel infrequently on the ground and as sugar gliders are forest dwellers, they would be less likely to be struck by motor vehicles. Moreover, their small size would make them more susceptible to cat attacks.

There was no apparent difference in risk by sex for trauma among the brushtail possums in the current study; but eight females with dependent young appeared to be over-represented. The low proportion of male sub-adults was unexpected as the mortality rate of these possums is considered to be high during dispersal (How, 1983). The fact that most males were presented during or around the main breeding season probably reflected their increased movement in this period. Similarly, among motor vehicle-related mortalities in wildlife in another region of NSW, one-third of all deaths among brushtail possums occurred during the major breeding season, and another one-third occurred between August and November, the minor breeding season (Vestjens, 1973).

Ringtail possum mortality did not differ by sex but, in contrast to the brushtail possums, more sub-adults died. High mortality previously has been recorded among sub-adult ringtail possums (Thomson and Owen, 1964). Most sub-adults were presented from January to April probably because this is the period of dispersal (McKay, 1983; Presidente, 1982). Most adults were presented from June to August which corresponds closely to the period of increased breeding activity (Thomson and Owen, 1964). Seasonal and sex-associated variation in the incidence of traumatic injury in other marsupials has been recorded previously (Coulson, 1982; Weigler et al., 1987).

The lack of injuries to the caudal part of the body in possums struck by motor vehicles in this study is similar to the findings of Canfield (1987) for koalas struck by vehicles. The preponderance of injuries to the anterior part of the body may be related to the tendency for possums and koalas to become stationary and stare when facing a bright light, such as a spotlight, at night (Wilson, 1988). Motor vehicle headlights presumably have the same effect as spotlights, and possums would be transfixed at a height conducive to anterior body injuries.

In this study, concurrent disease did not appear to be an important factor in predisposing possums and gliders to traumatic injury; significant lesions other than those directly due to trauma were uncommon. Similarly, it has been reported that underlying disease is of limited importance for free-living koalas subjected to trauma (Canfield, 1987; Weigler et al., 1987).

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