

STUDIES OF MACROPODIDAE IN QUEENSLAND
4. SOCIAL ORGANIZATION OF THE GREY KANGAROO
(MACROPUS GIGANTEUS)*

By T. H. KIRKPATRICK, M.Sc.†

SUMMARY

Small mobs of the grey kangaroo are family groups. The relationships involved are those between a female and her young of the previous year, which may persist for a year, and the sexual association between a male and female, which is transient and related to the time of oestrus of the female. Larger mobs are feeding groups formed by coalescence of the smaller family units.

Adult males and juveniles are irregularly distributed among mobs, and for a random sample from a kangaroo population, collections should be made from mobs of all sizes.

I. INTRODUCTION

The grey kangaroo (*Macropus giganteus* Shaw) is well-known as one of several gregarious macropod species, but the factors involved in the formation of mobs, as groups of these animals are usually called, do not appear to be well understood. Mobs are commonly thought to consist largely of females under the control of adult males, which will fight to retain possession of their "harems"; in western areas it is usually accepted by lay observers that mobs increase in numbers during drought as they congregate near limited food supplies.

Recently Caughley (1964) suggested that mobs were loose aggregations of kangaroos formed on the basis of a strong tendency for kangaroos to avoid being alone, and maintained in a state of flux by an essentially random process of animals joining and leaving.

*In earlier papers in this series *Macropus major* Shaw has been used for the grey kangaroo. *Macropus giganteus* Shaw is now used in accord with Opinion 760 of the International Commission on Zoological Nomenclature (*Bull. Zool. Nomencl.* 22, 292-295, 1966).

†Division of Plant Industry, Queensland Department of Primary Industries.

The present paper is an analysis of observations on social organization made by the author between 1959 and 1964. Some of the conclusions resulting from this study have been published previously (Kirkpatrick 1965*a*).

II. MATERIALS AND METHODS

Kangaroos were collected by shooting, as described elsewhere (Kirkpatrick 1965*c*), during the years 1959-1964; the study areas designated St. George and Warwick in that paper were involved, and as there was no difference between data these have been pooled for presentation.

Only mobs from which specimens were collected were recorded, and entire mobs were collected wherever possible. Escaping members of mobs containing four or fewer animals were identified, using relative size to identify adult males and juveniles, presence of a pouch young to identify females; larger mobs were grouped as more than four and no attempt was made either to count them accurately (a virtually impossible task) or to identify all escaping members.

Activities when first observed, and any apparent relationships among members, were noted. Evidence confirming apparent relationships was also sought, e.g. a lactating teat in the pouch of a female with accompanying juvenile would indicate that the juvenile was her young.

Ages of all specimens were determined from the cleaned skulls (after Kirkpatrick 1965*b*).

III. RESULTS

Numbers of mobs from which various numbers of individuals were collected are given in Table 1.

TABLE 1
NUMBER OF MOBS CONSISTING OF ONE
TO MORE THAN FOUR GREY KANGAROOS,
WARWICK AND ST. GEORGE, 1959-1964

Number in Mob	Number of Mobs
1	92
2	82
3	41
4	11
More than 4	46

Composition, in terms of sex and maturity, of 226 mobs consisting of from one to four animals is given in Table 2.

TABLE 2

COMPOSITION OF MOBS CONSISTING OF ONE TO FOUR GREY KANGAROOS,
WARWICK AND ST. GEORGE, 1959-1964

Key to symbols at foot of table

Number in Mob	Compositions	Times encountered
1	♀	35
	♂	32
	SA♂	12
	J♂	11
	J♀	2
2	♀ + J	63
	♀ + ♂	7
	2 SA♂	7
	2♂	2
	2J	2
	SA♂ + J♀	1
3	♂ + ♀ + J	18
	2♀ + J	7
	♀ + 2J	5
	♂ + 2♀	4
	SA♂ + ♀ + J	2
	3♀	1
	2♂ + ♀	1
	2♂ + J	1
	♂ + 2J	1
	3 SA♂	1
4	♂ + 2♀ + J	4
	2♀ + 2J	2
	3♀ + J	2
	4♀	2
	♂ + ♀ + 2J	1

Key to symbols: ♂ adult male, age greater than 3 years; ♀, reproductively active female; SA♂, sub-adult male in third year of life; J♂, juvenile male in second year of life; J♀, juvenile female in second year of life but not reproducing; J, juvenile, sex unknown

Percentages of mobs including at least one adult male, one adult female and one female plus juvenile, are given in Table 3.

TABLE 3

FREQUENCY OF OCCURRENCE (%) OF GREY KANGAROO MOBS INCLUDING AT LEAST ONE ADULT FEMALE, ONE FEMALE WITH ACCOMPANYING JUVENILE OR ONE ADULT MALE, WARWICK AND ST. GEORGE, 1959-1964

Numbers in Mob	With Adult Female	With Adult Female + Juvenile	With Adult Male
2	86	77	11
3	93	80	61
4	100	82	40
More than 4	100	100	< 50

Distributions according to age and maturity in the population as a whole and in mobs of each size are given in Table 4.

TABLE 4

OCCURRENCE OF SEX AND MATURITY CLASSES IN MOBS CONSISTING OF ONE TO MORE THAN FOUR GREY KANGAROOS, WARWICK AND ST. GEORGE, 1959-1964
Symbols as for Table 2.

Age and Maturity	Occurrence (%)					
	In Population	In Mobs Consisting of				
		1	2	3	4	More than 4
♂	19	35.0	5.0	21.5	7.5	11.5
SA♂	11	13.0	7.5	5.0	5.0	20.0
J	21	13.0	40.0	31.5	27.5	18.5
♀	49	39.0	47.5	42.0	60.0	50.0

Estimated ages of kangaroos found alone and in mobs are given in Table 5.

TABLE 5

AGES OF MALE AND FEMALE GREY KANGAROOS COLLECTED ALONE AND IN MOBS, WARWICK AND ST. GEORGE, 1959-1964

Estimated Age (years)	Male		Female	
	Alone	In Mobs	Alone	In Mobs
2	11	45	2	37
3	12	33	9	46
4	1	12	3	17
5	2	2	2	5
6-7	2	9	3	19
8-10	9	6	10	24
11-13	10	9	1	26
> 14	8	1*	7	18

* Mob of 2, other a large male

IV. DISCUSSION

Mobs of two and three were observed most frequently (Table 1), with isolated animals more often encountered than any mob. It should be noted that an unaccompanied female with a pouch young (this includes most females (see Kirkpatrick (1965c)) is an incipient group of two or three. The frequency of occurrence of the smaller mobs suggests that these are the basic units from which larger mobs are built, and elucidation of the relationships involved in the formation of smaller mobs should indicate the principles basic to social organization of this species.

The essential member of any small mob is an adult female (Table 2) with other animals present related to it. The relationships involved are evident from Tables 2 and 3, the most frequent being that between a female and her young of the previous year, and the only other of apparent consequence the sexual association between an adult male and female.

The relationship between a female and her young of the previous year, which as defined commences when the young is evicted from its mother's pouch, persisted for no more than a year. The distributions of juvenile and sub-adult males (Tables 2 and 5) indicate that a male leaves his mother during his second year of life either to live alone, to accompany other juvenile males or to join the larger feeding groups. All females younger than 2 years and still with their mothers were not breeding. Separation of a young male from his mother occurred when an adult male treated him as a rival, and a young female when she commenced reproductive activity became separated from her mother.

The sexual association between a male and a female was transient and related to the time of oestrus of the female. This was indicated by the observations that the few females accompanied by males in family groups (Table 2, ♂ + ♀ and ♂ + ♀ + J) were carrying either a half-grown or a full-grown pouch young (oestrus may occur at either of these stages in pouch young development (see Kirkpatrick 1965c)); and that females a few days post-oestrus, pregnant or with early pouch young were either alone, with juveniles or in larger mobs, but not normally accompanied by adult males. The distribution of adult males (Tables 2-4) likewise indicates that male did not form permanent associations with females; no doubt the males were ready to mate with any sexually attractive female available. Rivalry between males over a female in oestrus occurred (Table 2, 2♂ + ♀) but was observed infrequently.

Observations did not substantiate the establishment of territories or the accumulation of harems.

Mobs larger than three animals were all either feeding or resting, and were loosely cohesive as indicated by their reactions to disturbances; small groups sometimes joined together to escape in the same direction, larger mobs often divided into groups of two or three and escaped in different directions. It seems reasonable to postulate that larger mobs were formed by the coalescence of the smaller family units which met during random feeding movements. Rupture of these groups would be caused by the onset of reproductive activity or a major

disturbance. Under drought conditions aggregation of the smaller mobs into large mobs could be expected as feeding areas dwindle in size; this has already been proposed (Roff and Kirkpatrick 1962).

An important consideration was the uneven distribution of adult males and juveniles among mobs of different sizes (Tables 4 and 5); adult females were fairly uniformly distributed. For random sampling of a kangaroo population, specimens should be collected as unaccompanied animals and from mobs of all sizes.

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