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STUDIES OF MACROPODIDAE IN QUEENSLAND. 6. SEX DETERMINATION OF ADULT SKULLS OF THE GREY KANGAROO AND THE RED KANGAROO

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SUMMARY

Discriminant functions to determine the sex of adult skulls of the grey and the red kangaroos are presented. The measurements used are basal length of skull and molar index, and discrimination due to length is significant at the 1% level.

Current studies of the grey and the red kangaroos (*Macropus giganteus* Shaw and *Megaleia rufa* Desmarest) in southern Queensland involve the collection of heads discarded by professional shooters, and a means of determining the sex of the skulls prepared from these heads has been developed. The method is based on the size difference between male and female adults of the same age and species and uses the basal length of the skull (B.L.) (i.e. from the anterior tips of the premaxillae to the anterior rim of the foramen magnum) and molar index (M.I.) (as defined by Kirkpatrick 1964) as measures of size and age respectively.

For each species approximately 200 skulls of known sex and molar index above 1·75 (younger kangaroos are classed as sub-adults, and are taken by professional shooters only occasionally) were used. Measurements for each species were grouped for sex and the following discriminant functions calculated.

Grey kangaroo: $Y = 0{\cdot}02388$ M.I. $-0{\cdot}02335$ B.L.

The calculated discriminant value of $Y = -0{\cdot}2997$.

Red kangaroo: $Y = 0{\cdot}04266$ M.I. $-0{\cdot}03827$ B.L.

The calculated discriminant value of $Y = -0{\cdot}461$.

For both expressions, discrimination due to basal length is significant at the 1% level.

In using the functions, basal length (in cm) and molar index for a particular skull are appropriately substituted. For a grey kangaroo skull a value of Y above —0·2997 indicates a female, and below a male. For a red kangaroo skull a value of Y above —0·461 is from a female, and below indicates a male. Accuracy was tested using independent samples of 60 female and 40 male adult grey kangaroo and 35 female and 24 male adult red kangaroo skulls: successes were 57, 39, 34 and 23 respectively. These functions apply only to skulls with molar indices above 1·75; younger skulls are barely differentiated for sex and discriminant functions based on data including measurements of such skulls, which are unnecessary for the present purpose, are less accurate.

TABLE 1

THE GREY AND THE RED KANGAROOS: DISCRIMINANT VALUES OF MOLAR INDEX FOR SKULLS OF PARTICULAR BASAL LENGTH

Skulls with molar indices above a given value are females; those below are males.

Basal Length (cm)	Molar Index		Basal Length (cm)	Molar Index	
	Grey Kangaroo	Red Kangaroo		Grey Kangaroo	Red Kangaroo
14·0	..	1·75	16·5	3·58	3·99
14·1	..	1·84	16·6	3·68	4·08
14·2	..	1·93	16·7	3·77	4·17
14·3	..	2·01	16·8	3·87	4·26
14·4	..	2·10	16·9	3·97	4·35
14·5	..	2·19	17·0	4·07	4·44
14·6	1·72	2·28	17·1	4·16	4·53
14·7	1·82	2·37	17·2	4·26	4·62
14·8	1·92	2·46	17·3	4·36	4·71
14·9	2·01	2·55	17·4	4·46	4·80
15·0	2·11	2·64	17·5	4·56	4·89
15·1	2·21	2·73	17·6	4·65	4·98
15·2	2·31	2·82	17·7	4·75	5·07
15·3	2·40	2·91	17·8	4·85	5·16
15·4	2·50	3·00	17·9	4·95	5·24
15·5	2·60	3·09	18·0	5·04	5·33
15·6	2·70	3·18	18·1	5·14	5·42
15·7	2·80	3·27	18·2	5·24	5·51
15·8	2·89	3·36	18·3	5·34	5·60
15·9	2·99	3·45	18·4	5·44	5·69
16·0	3·09	3·54	18·5	5·53	5·78
16·1	3·19	3·63	18·6	5·63	5·87
16·2	3·29	3·72	18·7	5·73	5·96
16·3	3·38	3·81	18·8	5·83	6·05
16·4	3·48	3·90	18·9	5·92	6·14

Calculated molar indices giving discriminant values for adult skulls are presented in Table I. For a skull of a particular basal length, a molar index above that shown indicates a female, below a male. In practice, grey kangaroo skulls of basal lengths above 16·8 cm and red kangaroo skulls of basal lengths above 16·3 cm are all males.

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REFERENCE

KIRKPATRICK, T. H. (1964).—Molar progression and macropod age. *Qd J. Agric. Sci.* 21:163-5.

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