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Variation and Correlation in the Genital Bones of Ranch Mink

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Eingang des Ms. 15. 2. 1970

Introduction

Form, function and variability of the genital bones in mammals have received scant investigation (LONG and FRANK 1968). Aside from studies on bacular development in respect to aging (ELDER 1951; LECHLEITNER 1954; PAUL 1968), variation of the genitalia in the mink (*Mustela vison*) has been scarcely investigated. LONG and FRANK (1968) reported a coefficient of variation of 5.1 ± 1.3 for length of the baculum, based on a small sample of eight bones, and described the specialization and form of the mink baculum in relation to that of some other Mustelidae. LONG (1969a) described the gross morphology of the mink penis. Ranch mink provide an excellent opportunity to study phenotypic variability of bacula of given age. Furthermore, the environmental component of variation is controlled by similar environments. In this investigation the variation and correlation of dimensions and weight in large samples of bacula of ranch mink are discussed. The only description of an os clitoridis in the *Mustela* is that for *M. sibirica* by SIMOKAWA (1938), „kleiner, beinahe zylindrischer Clitorisknochen“ 0.3 mm in length and somewhat pointed at both ends. We describe below the minute mink os clitoridis, its frequency of occurrence in our sample, and its remarkable variation. This vestigial structure may be the most variable bone so far known to science.

Methods

Fifty-nine penises from adult (“approximately one year old”) mink obtained in November 1966, and March 1967, and forty penises obtained in January 1969, from Barr’s Mink Ranch, Greenwood, Wisconsin, were boiled in ammonia hydroxide, and cleaned of the softened flesh. The 59 bacula were uniformly dried and then weighed on a Top Balance accurate to 0.0001 g. Dial calipers accurate to 0.02 mm were used to measure tip-to-base length, length of the „handle“ (base), and widths of the tip and handle. One angular measure proportional to the sharp bend of the baculum was obtained by the method of LONG and FRANK (1968). No significant differences (0.05 level) were observed in the two samples making up the 59 bones, and

they were lumped. Coefficients of variation (cv's) and correlation (r 's) were determined for these measurements and weights. Inasmuch as several r 's were negative and approached significance, another sample of bacula (40 bones) was measured, and four r 's were determined from the total sample of 99 bones. In January 1968, fifty female mink were collected; each clitoris was stained with alizarin red and KOH, cleared in glycerin, and dissected to determine the presence of an os clitoridis.

Results and Conclusions

Table 1 shows the mean measurements and coefficients of variation. The CV of tip-to-base length (4.08) is comparable to other normal mammalian variations (LONG 1969b). Variations of the length and breadth of the handle are similar and very high. The

Table 1

Mean measurements and coefficients of variation (\pm standard error) of the baculum of ranch mink, in mm

The sample of 99 bacula includes two subsamples that differ in some mean measurements, probably because the mink in one were slightly immature.

	Length Tip-to- base	Length handle	Breadth handle	Breadth tip	Angle, tip and basal shaft	Weight dry g
Mean (N, 59)	45.45	4.68	1.95	2.03	13.25	.293
Coefficient of variation (N, 59)	4.08 \pm .38	15.70 \pm 1.4	15.23 \pm 1.4	9.06 \pm .83	12.89 \pm 1.2	10.92 \pm 1.0
Mean (N, 99)	44.60	4.10	1.78	1.98	13.72	—
Coefficient of variation of all bacula (N, 99)	4.89 \pm .11	23.7 \pm .53	18.8 \pm .42	9.4 \pm .21	14.1 \pm .3	—

variation of the breadth of the tip (9.06) is high but comparable to that of other bacula discussed by LONG and FRANK (1968). The CV of the weight (10.92) is high but significantly less than that (16.2) we calculated from Elder's data (1951) on adult ranch mink. Both values compare favorably with the CV for weight of the raccoon baculum (15.5) reported by LONG and FRANK (1968).

Correlation coefficients are shown in Table 2. As expected, weight and length are strongly correlated. Weight also correlates significantly with the breadth of the tip and of the base but not with the length of the base. The length correlates significantly with the breadth and length of the handle. The angle correlates negatively with all measurements, but the r 's do not differ significantly from zero. The breadth of the tip correlates significantly with the length of the handle but not with its breadth. The breadth of the handle is negatively correlated with its length, but not significantly.

Some of the negative correlations approach significance. The negative r of tip-to-base length and the angle indicates that a shorter baculum tends to be less curved or bent, *vice versa*, a condition suggested also for the baculum of *Procyon* (LONG and FRANK 1968). Inasmuch as marked growth occurs at the base, its negative correlation with the angle strengthens the above hypothesis. A larger sample might reveal that the negative correlations are significant. Four correlations utilizing the total of 99

Table 2

Coefficients of correlation (r) for paired variables of the baculum in ranch mink,

Values significantly different (0.05 level) from zero with 58 degrees of freedom are marked with an asterisk. For the total sample (N, 99) four r 's are listed in the upper right half of the table. None was significantly different from zero.

	Length tip-to-base	Breadth tip	Breadth handle	Length handle	Angle, tip and basal shaft
Length tip-to-base		.008			-.049
Breadth tip	.185				
Breadth handle	.369*	.064		.124	
Length handle	.339*	.279*	-.200		-.127
Angle, tip and basal shaft	-.195	-.020	-.110	-.224	
Weight	.564*	.267*	.324*	.089	-.155

bacula are listed in Table 2. None was significantly different from zero. Thus, none of the negative correlations appear important and the angle does not seem so.

The dimensions that appear strongly intercorrelated are the tip-to-base length, length of handle, breadth of handle, and breadth of tip indicating a strong overall size factor.

The os clitoridis is so minute and intimately associated with muscle it is easily overlooked. By careful dissection of 50 clitorises six bones were found. Without doubt the bone was usually absent in our sample.

The form and size of the os clitoridis is extremely variable (Fig. 1), but nevertheless it usually has a long axis along which is found a more or less distinct groove (the groove is considered ventral). The simplest bone, also the smallest, is nodular, roughly sub-

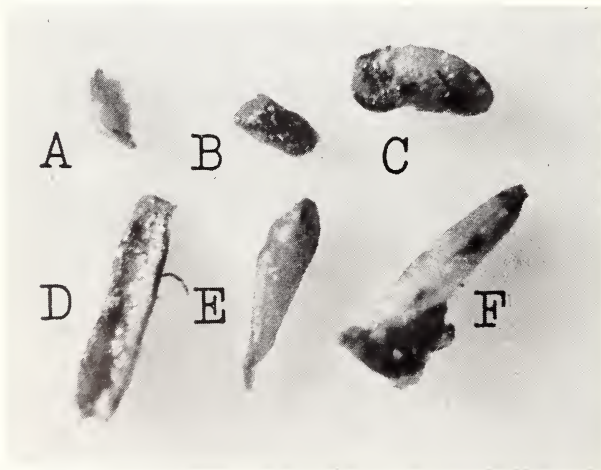


Fig. 1. The os clitoridis of the mink. Six bones found in 50 female mink

quadrangular and grooved on one side (Fig. 1 B, A). In lateral view the bone is much thinner than in dorsal view. One fairly large bone shows the form of a tear drop. This bone appears bent slightly and not fusiform in lateral view (Fig. 1 E). Another bone (Fig. 1 C) is bean-shaped in lateral view. The walls of this groove form a bifurcation at one end (as in the baculum). Also bifurcate at one end is a fairly long, slender bone (Fig. 1 D) bearing a prominent sulcation. This bone is thin

in lateral view. The largest bone (Fig. 1 F) resembles a shoe, being expanded at one end; the shallow groove is the "sole" and the "toe" is rounded. The side opposite the groove in this bone is convex. Measurements in millimeters are as follows: A, .50; .55; C, .85; D, 1.50; E, 1.30; F, 1.45.

No other morphological structure known to us has such a high measured variation (CV, 44 ± 12). In width and depth the bone is also highly variable. There is little doubt that the female structure is much more variable than the male homologue (the baculum) in *Mustela vison*, in accordance with the conclusion of LONG and FRANK (1968) that the larger bone in males is generally less variable than is the os clitoridis.

Acknowledgements

We thank the Barr Minkery, Greenwood, Wisconsin, for the 150 specimens used in this study.

Summary

Coefficients of variation and correlation for five measurements and weight of 99 bacula of approximately one-year-old ranch mink are reported and discussed. The vestigial os clitoridis (six bones) found in 50 female ranch mink is described. Variation of this vestigial structure may be the highest (CV, 44 ± 12) so far reported for any bone, but homology with the mink baculum is revealed by the constant presence of a groove.

Zusammenfassung

Variations- und Korrelationskoeffizienten für 5 Maße und Gewichte von 99 Bacula einjähriger Farmnerze werden mitgeteilt und diskutiert. Das Os clitorides weiblicher Farmnerze wird beschrieben.

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Zeitschrift/Journal: [Mammalian Biology \(früher Zeitschrift für Säugetierkunde\)](#)

Jahr/Year: 1969

Band/Volume: [35](#)

Autor(en)/Author(s): Long Charles A., Shirek Linda R.

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