Concerning zygomatic breadth, eccentric values exceed six and are seen in *Tupaia, M. pennsylvanicus,* some populations of *C. lupus, L. lutra, Hydrurga* females, and *Odobenus.*

To sum up, by making frequency distributions for each kind of measurement and using the inflection point at $3k$ to define eccentric variations, resolution for categorization of high estimates of variability is possible. Furthermore, $3k$ is not merely an arbitrary and practical value, but is derived from a general equation which seems to describe the empirical frequency distributions, and is the theoretical point at which the frequency curve changes from convex to concave. Other considerations of the general equation reveal that the height of the peak depends in part on the sample size, and that the mode and variability in general appear related to the theoretical minimal estimate of variability.

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MARKING BEAVERS

ZNAKOWANIE BOBRÓW

Experiments with marking 10 beavers by depigmentation of frostbitten sites were made in 1969. Marking was carried out with cast iron numbering stamps cooled in liquid nitrogen (—195.8°C) and applied to the beaver's tail. Depigmentation in the form of legible numbers was obtained within a period of 3—9 weeks from the time of marking. The way in which marking was carried out and the animal's age affected the rate of appearance of depigmentation.

Lasting and legible marking of beavers is an extremely important operation in scientific work and breeding practice, although the methods hitherto used are not fully satisfactory. Web punching between the digits of the hind feet (Aldous, 1940), tail branding and fixing rivets on the

tail (Bradt, 1947, cited after Miller, 1964) and placing tags on the ears (Lavrov, 1953) all necessitate direct contact with the animal in order to read the number. In addition punched holes and branded numbers close over, become illegible and difficult to distinguish from scars left by injuries and bites received in the natural course of the animal's life. A large percentage of rivets and tags are lost when the margin of ear or tail are torn. Miller (1964), by combining the ear-tag with plastic markers of different colour and shape, solved the problem of identifying marked animals at a distance. This identification, however, involved the use of a fairly complicated key.

During the period from 1960—1970 on the experimental beaver farm at Popielno Research Station animals were marked by means of ear-tags, web punching between the digits of the hind legs, and branding numbers on the tail. All the methods used for marking the beavers proved to be unreliable to a greater or lesser degree. Ear-tags were relatively the most functional, but only in the case of very quiet animals. Several individuals

Table 1.
Rate of depigmentation in different animals.

No of animal	Age	Date of exp.	Time of pressure of the number stamp (in seconds)	Date of full depigmentation of the number
34	7 yrs	Sept. 6	2×30	Nov. 1
102	4 mths	Sept. 6	2×30	Sept. 25
95	18 mths	Oct. 28	15	Dec. 20
97	18 mths	Oct. 28	30	Dec. 20
105	6 mths	Oct. 28	15	Dec. 20
106	6 mths	Oct. 28	15	Dec. 20
107	6 mths	Oct. 28	30	Dec. 20
108	6 mths	Oct. 28	30	Dec. 20
109	6 mths	Oct. 28	20	Dec. 20
110	6 mths	Oct. 28	20	Dec. 20

retained their ear tags for 10 years, but the majority lost them fairly quickly, by tearing the ear concha. Under the farm conditions it was possible to replace the lost ear-tags but this possibility was limited by the small area of the concha in the beaver. A different method of marking had to be used for animals which had twice lost their ear tag.

In 1969 an attempt was made to utilize the phenomenon of depigmentation of the skin in frostbitten places for marking the beavers. The marking was carried out with the cast iron numbers used for branding numbers on cows' horns. The numbers were cooled in liquid nitrogen (−195.8°C) and then placed on the beaver's tail, with a constant pressure of 10 kg. The time for which pressure was maintained differed for different individuals. The results of the experiment are given in Table 1.

In the first group of beavers number stamps were placed on the same place twice, with a 30 second interval required for freezing the number again. It would seem that this had an important influence on the rate at which the numbers appeared. Full depigmentation of the frozen places

occurred a month earlier (beaver no. 102) than in beavers marked only once (nos 105—110). Such freezing was, however, too intense and caused deep injury to the tissues.

The changes in time of pressure with the number stamp which were made later did not produce any perceptible differences in the rate of appearance of numbers. The way in which depigmentation appears in the form of spots, parts of figures and single figures, regardless of the duration of pressure, suggests that appearance of numbers depends on the state of the tissues in the marking place. Thickness of the epidermis, fat deposits on the tail and blood supply to the marked surface all play a part here. In the second group the numbers could be read within a week. Fragmentary depigmentation was then found only in beavers nos 105 and

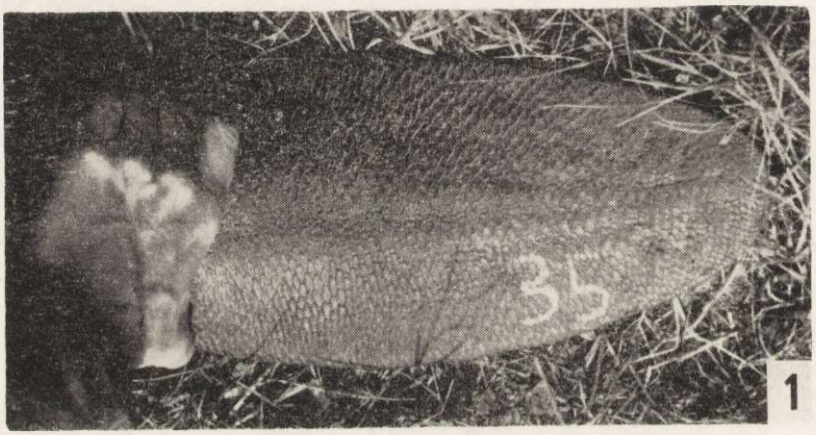

Fig. 1. Correctly marked number on beavers' tail. (photo by J. J. Pollesch).

110. During the following week fragmentary depigmentation was observed in all the marked beavers in this group. It was necessary to wait for approximately 25 days for full depigmentation of the numbers (Fig. 1). No important differences were observed in this experiment between beavers 6 and 18 months old in their reaction to frostbite. The tissue of the epidermis is probably sufficiently delicate in 18-month old animals which are still growing.

An adult beaver was marked (no. 34). The epidermis of the skin in this beaver was very horny and although the number stamp was placed on the tail twice, depigmentation did not appear until two months later and the number is not fully legible. This beaver was also marked at the same time by means of a cattle numbering stamp and a number formed from 2 mm copper wire. The same marking technique was used. The number stamped by means of the wire numbering stamp was even fainter, and it would appear that the heat volume was too small. This experiment suggests the need for applying the frozen numbering stamp two or three times when marking adult animals.

The legibility of the markings obtained is excellent. The numbers on the beavers could be read with ease at a distance of 5 m, and with a field

glass at a distance of 30—40 m. These numbers are also visible when the animals are swimming under water, as they contrast sharply with the dark colour of the tail. This method of marking animals on farms is so useful as to appear indispensable, and it can also be successfully used for marking free-living animals. When bringing this method into general use for marking beavers it would be desirable to design special numbering stamps with figures of suitable size with a distinct fine outline to the figures and considerable heat volume.

The only disadvantage of this method is that the numbers do not appear until a fairly long time after the operation.

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ADDITIONAL MOLAR IN EUROPEAN RED DEER

DODATKOWY TRZONOWIEC U JELENIA

A description is given of a case of additional molar occurring in a stag shot in 1968 in the Mazurian region of Poland. The additional tooth had caused elongation of *margo alveolaris*, a change in the form of the tooth-socket of M^3, and of *tuber maxillare*. The appearance of an additional tooth can be explained by early splitting of the tooth bud of M^3.

Anomalies in the teeth of European red deer occur very rarely. An additional M_3 in the red deer was described by Pekelharing (1968) as the only case found among the 580 red deer he examined, which had been shot in Fiordland in New Zealand. A similar case was found in a hind from the Szczecin voivodship by Chełkowski & Melosik (1970). In both cases the other premolars and molars had developed normally and exhibited normal wear. The additional tooth described by Chełkowski & Melosik (1970) was higher than the remainder and had very slight traces of wear on the anterior margin from the buccal side. Additional teeth do not differ morphologically from their neighbouring molars.

A case of an additional M^3 in a 10-year old wapiti doe (*C.e. canadensis* Erxleben) was the only tooth anomaly found among the 130 wapiti deer examined (Pekelharing, 1968). Morphologically the additional tooth was similar to the third molar, except for the absence of traces of wear on the prominent margins.