

SKULL DIMENSIONS AND
THE LENGTH/WEIGHT RELATION OF
THE BACULUM AS AGE
INDICATIONS IN THE COMMON OTTER

Lutra lutra (Linnaeus, 1758)

BY

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MED DANSK RESUMÉ:
KRANIEMÅL OG PENISKNOGLENS LÆNGDE-VÆGT FORHOLD
SOM ALDERSINDIKATORER HOS ODDEREN
(*Lutra lutra* L.)

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INTRODUCTION

For taxonomic research as well as for wildlife management, to know whether one deals with adult animals or with juvenile ones is very important. This general truth, of course, holds also for the Common Otter, *Lutra lutra*. The natural history of this species is very little known and only a few years ago the first special studies on this subject were published (Stephens, 1957; Jensen, 1964; Van Wijngaarden & Van de Peppel, 1964). In the mentioned papers also attention was paid to the problem of the age determination. However, not much could be said on this aspect by lack of exact data.

Except for a few scattered notes in literature on hunting, the only precise data on growth and age were obtained by keeping and studying Otters in captivity (Stephens, 1957; Jensen, 1962 & 1964 and Hurrell, 1963). The few animals studied, however, were only under observation a relatively short time and one is never completely sure whether the data obtained by study of captive animals can also be used for wild animals.

The most obvious method for age study would be tagging young animals, but beside the problem how to tag them, the greatest difficulty lies in the actual rarity of the species in Western Europe. This rarity and the desire to preserve Otters in appropriate numbers make it impossible to go out to shoot or to catch them. For research one is almost completely dependent on Otters, which are killed accidentally or killed as pests (e.g. in fishfarms) and which are sent to scientific institutes. Mostly the animals arrive in such bad conditions that histological studies of the gonads are of little use. As an exception to this we may refer to the study of Hamilton & Eadie (1964) on *Lutra canadensis*.

Nevertheless several methods have been tried to estimate the age (real or relative age) of Otters (Hooper & Ostenson, 1949 and Friley, 1949 for *Lutra canadensis*; Stephens, 1957; Jensen, 1964 and Van Wijngaarden & Van de Peppel, 1964 for *Lutra lutra*). The last mentioned authors used the weight/length relation of the intact animals, but naturally, this method is not very reliable. The weight/length relation is too much subject to variation, caused by local and temporary food conditions, to be used in age determination, except for very young and young animals. Besides, a distinction must be made between males and females.

SKULL DIMENSIONS

Better results can be obtained, however, by study of the skulls of the Otters. After the studies of Miller (1912), Pohle (1919), Hysing-Dahl (1959) and after our own data, it seems that in Western Europe only one species of Otter occurs, which almost certainly cannot be divided into different subspecies. Furthermore it is known that in *Lutra lutra*, as in other Mustelids, a clear sexual dimorphism in skull dimensions is found. A third feature is, that in Otters the skull keeps growing, even to old age (Pohle, 1919; Hysing-Dahl, 1959). Lastly, as in other Mustelids, in *Lutra lutra* some parts of the skull have a different growth rate.

By combining these features and by using additional data, it is possible to get reliable growth curves, which in turn can be used for a relative age determination. The clearest this is demonstrated when a scatter diagram is made of the condylobasal lengths (horizontal) against the postorbital constrictions (vertical). In fig. 1 this is done for 83 skulls of Otters from Denmark (cf Jensen, 1964) and in fig. 2 for 51 skulls of Otters from the Netherlands. It can be seen that with increas-

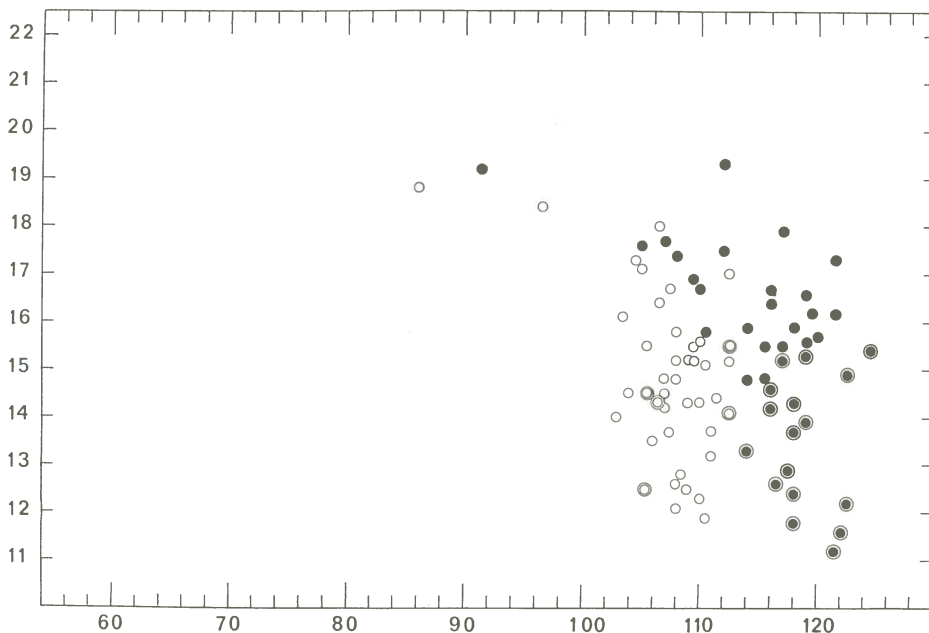


Fig. 1. Relation between the condylobasal length (horizontal) and the postorbital constriction (vertical) of skulls of *Lutra lutra* from Denmark (cf Jensen, 1964). Dimensions in millimeters; open circles are females, dots indicate males. Skulls of which was known they belonged to sexually mature animals are marked in a special way.

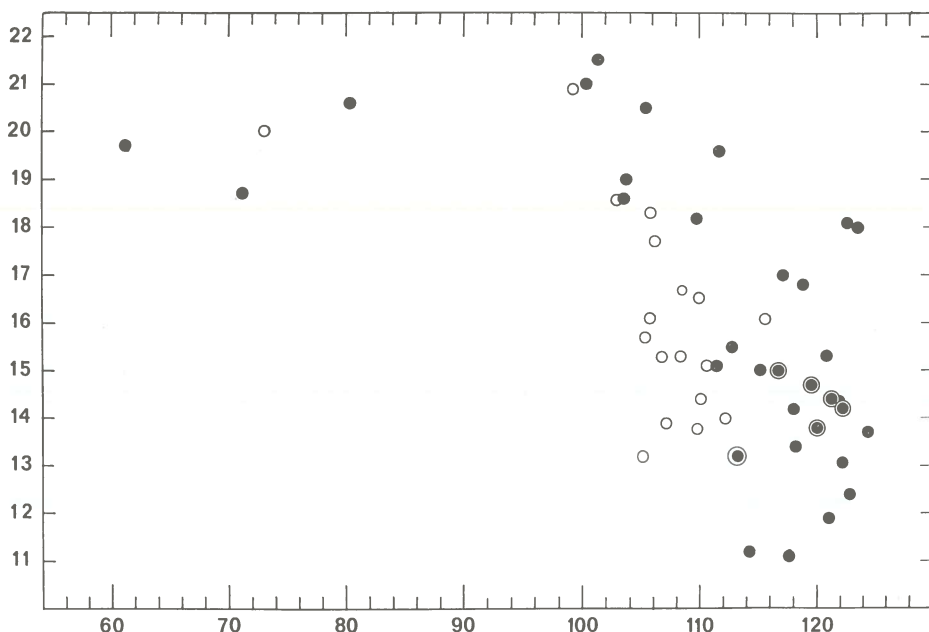


Fig. 2. Relation between the condylobasal length and the postorbital constriction of skulls of *Lutra lutra* from the Netherlands. For particulars, see caption of fig. 1 and the article itself.

ing dimension of the condylobasal length, the postorbital constriction gets relatively and actually smaller. These relatively higher values for the postorbital constriction in small skulls become still more evident if we mention the same dimensions of two small male Otter cubs found at Beverwijk, the Netherlands, viz. condylobasal length 41.3 and 42.8 mm and postorbital constriction 16.7 and 16.0 mm.

Among the females from the Danish sample, 5 animals were either pregnant or lactating; these animals are marked in a special way in fig. 1. In the Netherlands sample of only one female it is known with certainty it was sexually adult. The skull of this female is, however, damaged and only the postorbital constriction could be measured (14.4 mm). Skull measurements of 4 animals with foetuses are given by Hysing-Dahl, 1959 (condylobasal lengths and postorbital constrictions resp.: 109.5–12.8; 106.7–15.4; 111.4–13.0 and 107.8–14.3 mm). After incorporating these data in our figures, we can say that these 9 sexually mature females have a condylobasal length of more than 105 mm and a postorbital constriction of less than 16 mm.

In males the baculum (os penis) can be used to know whether the animals are sexually mature or not. Its shape, length and weight are decisive for that state;

see last part of this note. If we mark the sexually adult males in our figures, we come to the result that these males have a condylobasal length of more than 112 mm and a postorbital constriction of less than 16.0 mm. In the Danish sample (fig. 1) all males could be classified as immature or mature on base of the shape, length and weight of their baculum. In the Netherlands sample (fig. 2) the known sexually mature males are also marked in a special way; in this sample, however, in a number of males the baculum was not available for study, so simple black dots may indicate sexually immature animals or sexually mature ones.

There may be, of course, some variation but we believe the given limits, at least for the males, are in general acceptable for sexually mature animals. The advantage of this method is, that also if we only have the skull of an Otter, we can indicate the (relative) age of the animal and to a certain limit, also its sex.

LENGTH/WEIGHT RELATION OF THE BACULUM

In young Otters the baculum increases in both length and weight. At puberty the longitudinal growth almost ceases but the bone gets thicker and heavier. At the end of puberty the definite shape is acquired (see fig. 16, page 33 in Jensen, 1964). We consider bacula with a length of more than 60 mm and with a weight of about 2 grams or more belonging to adult Otters (cf Jensen, 1964), though even bacula measuring a little less may belong to sexually mature animals. In fig. 3 we publish the length/weight relation of 43 bacula of Otters from Denmark, of 10 bacula (two other ones had been broken and were healed forming calli) of animals from the Netherlands and of 12 bacula of Otters from France.

By calculating a size-index for the baculum (weight divided by length) and a skull-index (postorbital constriction divided by condylobasal length), the change in skull dimensions and baculum shape in relation to age and sexual maturing can be illustrated directly. This is done in fig. 4 for a sample of 49 male Otters (39 specimens from Denmark and 10 specimens from the Netherlands). The baculum, e.g. with size-index 30 (nr. 8 in fig. 16, Jensen, 1964) clearly represents a transitional stage between the smaller bacula of immature animals and the bigger ones of mature Otters and at the same time, this animal obtained a skull-index smaller than that found in immature animals.

The bacula of Otters from France could be studied thanks to the kind cooperation of Mr. F. Chanudet of the Museum d'Histoire Naturelle at La Rochelle. The Otter material from the Netherlands in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden, could be used thanks to the kind permission of Dr. A. M. Husson. We are grateful to both gentlemen for their help. Further Netherlands material belongs to the collection of the Zoological Museum in Amsterdam and the material from Denmark to the Game Biology Station at Kalø.

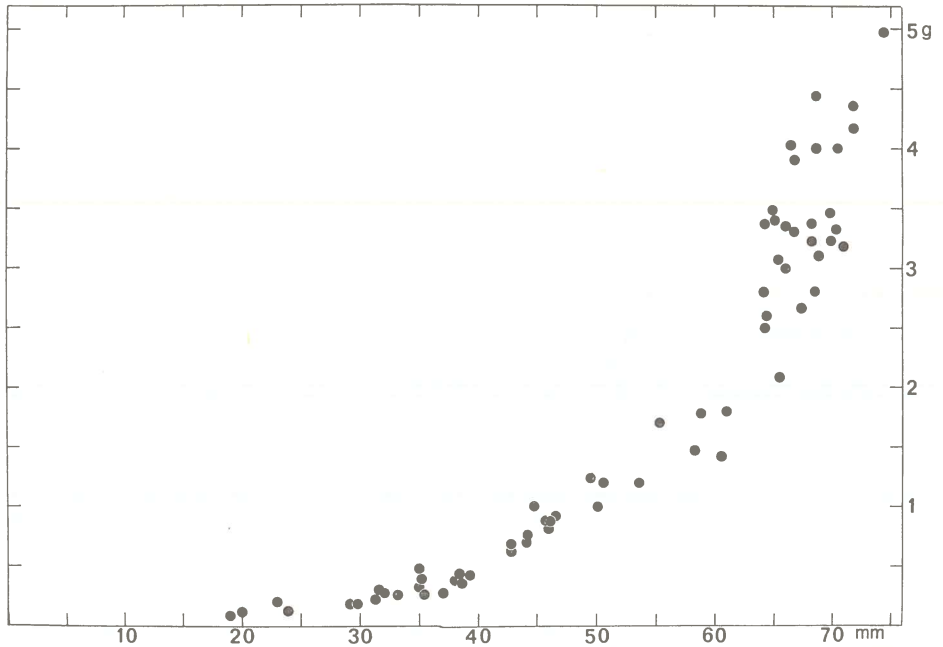


Fig. 3. Relation between the length (horizontal) and the weight (vertical) of bacula of *Lutra lutra* from Denmark, the Netherlands and France.

DANSK RESUME

Ved mange vildtbiologiske arbejder er det af betydning at kunne opdele et materiale af, f. eks. skeletter eller skeletdele efter alder og køn. Kun sjældent vil man ganske vist være i stand til at foretage en detaljeret aldersklassificering, men det er af stor værdi blot at kunne skelne mellem unge, ikke kønsmodne og ældre, kønsmodne individer.

Ved målinger på odderkranier fra Danmark (fig. 1) og Holland (fig. 2) kunne det konstateres, at kraniebredden mellem øjenhulerne (postorbital-indsnævringen) ikke blot målt i forhold til kranielængden (condylobasallængde), men også absolut var mindre hos ældre dyr end hos de unge. Hos ældre dyr fandtes også en tydelig forskel på kranielængden mellem de to køn, idet de største kranier fra voksne hunner sjældent er så store som de mindste kranier fra voksne hanner. Efter de foreliggende målinger vil det nu ofte være muligt at afgøre, om et kranie stammer fra et ungt eller fra et voksent dyr, og for kranier af voksne dyr om det drejer sig om han eller hun. Postorbital-indsnævringen er for unge dyr over

Age indications in the Common Otter

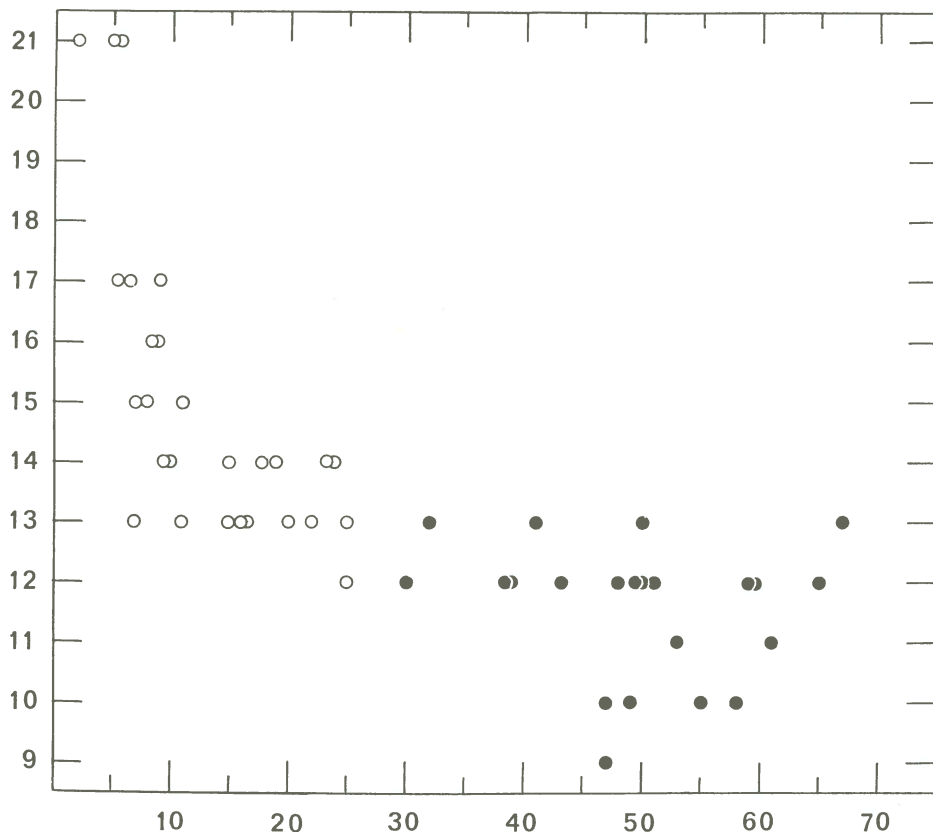


Fig. 4. Relation between baculum-index (horizontal) (weight divided by length $\times 100$) and skull-index (vertical) (postorbital constriction divided by condylobasal length $\times 100$) in males of *Lutra lutra* from Denmark and the Netherlands. Circles indicate immature animals, dots mature males.

15-16 mm og for voksne dyr under, og blandt de voksne dyr har ♀♀ oftest en condylobasallængde under ca. 113 mm og ♂♂ derover.

I fig. 3 er vist forholdet mellem længde og vægt for penisknogler fra odder. Hos unge dyr tiltager knoglen både i længde og vægt, men ved kønsmodningen, når knoglen er godt 6 cm lang og vejer op mod 2 g, ophører længdevæksten næsten, men der sker stadig en vægtforøgelse.

I fig. 4 er direkte illustreret forholdet mellem penisknoglestørrelse (vægt/længde $\times 100$) og kranie-mål (postorbital-indsnævring/condylobasallængde $\times 100$). Her er kønsmodne dyr angivet ved udfyldte cirkler og ikke-kønsmodne med åbne.

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