

pulation of the mouflon and was now described as the Slovakian mouflon, *O. a. sinesella* Turček, 1949. In the United States the first introductions with the mouflon was made in Texas by Mark Loss (Llano) in 1946, in California in 1953 and into Hawaii (Lanai) in 1954.

The present stock of the world for 1968 was estimated of approximately 32000 heads, which portaked about to $\frac{2}{3}$ on the Old and $\frac{1}{3}$ on the New World. However, the mostly populations no more exist as pure mouflon strains (in Texas from 10000 heads less than 500) and are more or less mixed samples of crossings between the mouflon and few races of the domestic and feral sheep (in Hawaii and Texas specially!).

This is a dangerous fact, which is not considered on the international game trophy exhibitions to time. It is recognized, that the crosses have horns with a greater spread, lenght and basic circumference as well as the pure mouflon rams and also early reached the time of maturity of their trophies (in Texas $1\frac{1}{2}$ years early as the pure mouflons).

The »Council International de la Chasse« and the »International Game Union« may be developed a new guide to measure the trophies of few sources on the base of a different system to calculate the fair count of points.

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SOME DESCRIPTIVE CHARACTERS OF THE SKULL IN *MICROTUS*

NIKTÓRE CECHY OPISOWE CZASZKI NORNİKÓW (*MICROTUS*)

Examination was made of the position of *foramen mandibulare* in mandible material of *Microtus oeconomus* (n = 2,134) from different localities in Poland. The *agrestis* type position was found in 20% and the *arvalis* type in 45% of the specimens. The shape and arrangement of *foramina palatina* was studied in the collection of skulls of *Microtus arvalis* and *Microtus oeconomus* (n = 100), when it was found that this descriptive character permitted objective differentiation between *M. oeconomus* in 96.4% and *M. arvalis* in 86.7% of the cases. The position of *for. mandibulare* is of no taxonomic value.

I. INTRODUCTION

Determination of the species characters of *Microtus* in fossil material, or material obtained from owl pellets, is often rendered difficult by varying degrees of damage to the skull. In these circumstances descrip-

tive characters, primarily those elements which are best preserved, *i.e.*, mandibula and maxilla, are of considerable importance.

The arrangement and shape of the *foramina palatina* (Nichols, 1937; Ognev, 1950) have been used, *inter alia*, as a basis for identification of *Microtus*. The position of the *foramen mandibulare* (Zimmermann, 1955) permits distinguishing between the mandibulae of two morphologically similar species, *Microtus arvalis* (Pallas, 1779) and *Microtus agrestis* (Linnaeus, 1761). Later studies showed that the situation of *foramen mandibulare* does not always enable complete distinction to be made between these species, since it may occur in intermediate positions in these voles (Krommenhoek & Slob, 1967; Dienske, 1969; Fedyk & Ruprecht, 1971).

Authors dealing with the systematics of voles do not state whether the central position of *foramen mandibulare* is unique in *M. agrestis*, or whether it may occur in other species of voles (*cf.* Zimmermann, 1955; Kowalski, 1964).

During the course of identification of bone material obtained from owl pellets it was noticed that the position of *foramen mandibulare*

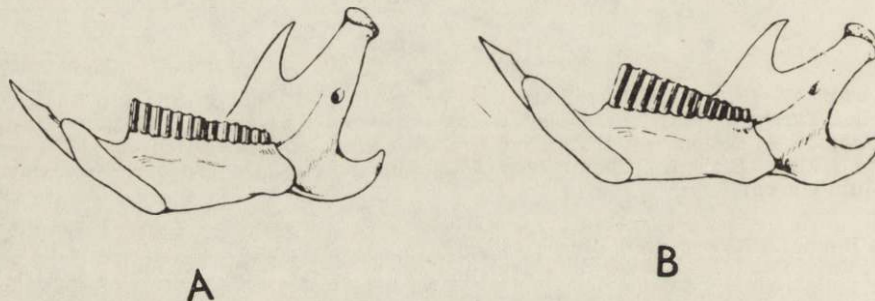


Fig. 1. Position of *foramen mandibulare*: A — in *M. agrestis*, B — in *M. arvalis*. After Gaffrey, 1953.

characteristic of *M. agrestis* also occurs in *Microtus oeconomus* (Pallas, 1776), and the question therefore arises as to what degree this character is common to the two species. An attempt was also made to estimate the taxonomic value of the *foramina palatina* for differentiating the skulls of *M. arvalis* and *M. oeconomus* in bone material.

II. MATERIAL AND METHOD

The position of *for. mandibulare* was examined in a series of 2,134 mandibulae of *M. oeconomus*, the majority of which were obtained from the pellets of *Tyto alba* (Scop.) collected in Poland. The other mandibles (N = 280) of *M. oeconomus* were obtained from trapping (Mazurian Lake District — Jazy, in the Augustów administrative district).

Three types of position of *for. mandibulare* were distinguished: 1) central, on the alveolar thickening of I_1 (Fig. 1, A) — *agrestis* type, 2) on the upper margin of the thickening (Fig. 1, B) — *arvalis* type, 3) intermediate between the above two types.

The division of Poland into regions after Kondracki (1965) was adopted in analyzing the material.

The degree to which variations occur in the position of *foramina palatina* in *M. oeconomus* and *M. arvalis* was determined by comparison with material from these species. The reference material was obtained from owl pellets complete and accurately identified, collected in the Kętrzyn administrative district. Each test skull was compared with the reference material by a person unaware of which species the given skull belonged to. Variations in the position of both *for. mandibulare* and *for. palatina* were defined visually under a binocular microscope.

III. RESULTS

1. Variations in the position of *for. mandibulare* in *M. oeconomus*

To ascertain to what degree the position of *for. mandibulare* may vary in *M. oeconomus* examination was made of material obtained from 32 populations of this species in Poland. Localities from which the collections of owl pellets were made were situated within a given regional

Table 1

Position of *foramen mandibulare* in mandible of *Microtus oeconomus* from various regions.

Macroregions	No of populations	n	<i>agrestis</i> type %	<i>arvalis</i> type %	<i>arvalis</i> type %
West coastal Pomorze	3	334	20.4	35.3	44.3
East coastal Pomorze	1	40	15.0	35.0	50.0
West lake Pomorze Region	2	117	18.0	35.9	46.2
East lake Pomorze Region	1	16	18.8	37.5	43.8
South lake Pomorze Region	3	167	21.0	34.1	44.9
Old Noteć Valley	4	218	23.4	36.2	40.4
Wielkopolski lake Region	4	261	21.8	34.9	43.3
South Wielkopolska Lowland	3	37	16.2	32.4	51.4
North Mazovian Lowland	1	100	21.0	36.0	43.0
South Mazovian Lowland	5	221	20.4	33.5	46.2
Lublin Upland	1	76	22.4	32.9	44.7
Staropruska Lowland	2	191	18.8	35.6	45.6
Mazurian Lake Region	1	280	20.4	37.5	42.1
Polesie Lubelskie	1	76	22.4	32.9	44.7
Total/average	32	2,134	20.0	35.0	45.0

unit (macroregion). A second division of working stations was also made according to administrative units (voivodships), and in both cases a very regular percentage of proportions of each skull type was found. The *agrestis* type occurred in ranges from 15—23%, *arvalis* from 40—51%, and intermediate from 32—37% in different populations (Table 1). Hence the central position of *for. mandibulare* as a feature characteristic of *M. agrestis* also occurs in *M. oeconomus*, on an average in 20% of the specimens. The *M. arvalis* character occurs in the mandibles of *M.*

oeconomus in the highest percentage, with an average of as much as 45% of the specimens. It must be emphasised here that the variable position of *for. mandibulare* is a feature extraordinarily characteristic of *M. oeconomus* and appears regardless of the age of the individuals. Each of the described types of position of *for. mandibulare* was found in the mandibles of both young, adult and old individuals.

The results obtained thus disqualify the position of *for. mandibulare* as a taxonomic character, although it is given without reservations in keys to identification of mammals (cf. Zimmermann, 1955; Kowalski, 1964).

2. Position of *foramina palatina*, and distinction between *M. oeconomus* and *M. arvalis*

Foramina palatina differ in the two species primarily in respect of shape. In *M. arvalis* they are kidney-shaped, broadened at the oral end, whereas in *M. oeconomus* they are shaped like channels with parallel margins (Fig. 2).

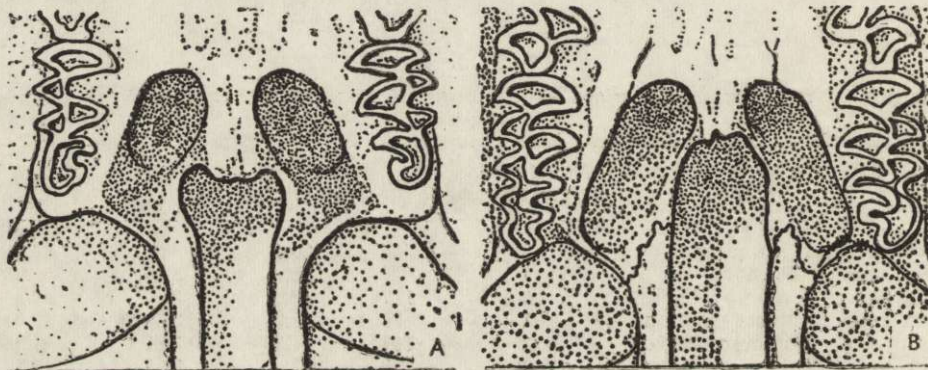


Fig. 2. Shape of *foramina palatina*: A — in *M. arvalis*, B — in *M. oeconomus*.

Table 2
Result of test identification of voles based of *foramina palatina* position.

Species	n	Correct identifications	
		n	%
<i>M. oeconomus</i>	55	53	96.4
<i>M. arvalis</i>	45	39	86.7

The results of the test showed that the skulls of *M. arvalis* can be distinguished on the basis of this character in 86.7%, and the skulls of *M. oeconomus* in 96.4% of cases (Table 2). It may therefore be stated that the position and shape of *for. palatina* in these species of voles is of real taxonomic value, but it must be added that this character requires

careful visual assessment by a »seasoned« eye, and is more useful when identifying skulls of adult and old animals, since in young voles these foramina are not as distinctly formed.

The results obtained thus fully confirm the taxonomic usefulness of this character, previously postulated by Nichols (1937) and Ognev (1950) in the systematics of voles, and also the need for taking it into consideration in detailed descriptions of the taxonomy of *Microtus*.

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