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## A New Bat, Myotis nattereri (Kuhl, 1818) (Vespertilionidae), in the Fauna of Iraq

Nowy nietoperz *Myotis nattereri* (Kuhl, 1818) (*Vespertilionidae*) w faunie Iraku

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*Myotis nattereri* (Kuhl, 1818), found in Iraqi Kurdistan, is a new species in the fauna of Iraq. This bat differs in respect of certain morphological features from populations inhabiting neighbouring areas and may belong to a new subspecies.

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During the expedition to the Near East organized by the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences in Kraków, in August 1977, 11 examples of bats of the genus *Myotis* were collected in Iraqi Kurdistan. A colony of about 25 individuals of both sexes was found in a rock crevice above the bank of a small mountain river near the Gali Ali Beg waterfall (36°38'N, 44°25'E) in the Erbil district.

The thickened margin, densely covered with stiff hair, of the membrane stretching between the rear legs in this bat, shows that the individuals caught belong to *Myotis nattereri* (Kuhl, 1818) a species not as yet recorded in Iraq. There were 5 males and 4 females in the group of 9 individuals examined. These bats have relatively dark fur on the back and lighter fur on the ventral side of the body, ears with faintly defined incision on their posterior edge and tragus shorter than $^2/_3$ of the length of the ear.

In general outline the skull is similar to that of the nominative form *Myotis nattereri nattereri*, although it is longer than the latter and more flattened in the nasofrontal region. *Foramen infraorbitale* in the individuals from Iraq is situated at a slightly greater distance from the orbital foramen than in the nominative form. The teeth are slightly more massive. $I^2$ has a strongly developed cingulum which on the labial

Table 1

*Myotis nattereri* (Kuhl) from Iraq — dimensions of skull and mandible.

| Number | 5148 | 5150 | 5151 | 5152 | 5153 | 5154 | 5155 | 5156 | Min. | Avg. | Max. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Greatest length of skull | 16.38 | 16.44 | 16.25 | 16.00 | 16.08 | 15.75 | 16.65 | 16.40 | 15.75 | 16.24 | 16.65 |
| Condylobasal length | 15.40 | 15.28 | 15.13 | 15.05 | 15.45 | 15.05 | — | 15.48 | 15.05 | 15.26 | 15.45 |
| Zygomatic breadth | 10.30 | 10.45 | 10.38 | 10.32 | 10.10 | 9.95 | 10.20 | 10.14 | 9.95 | 10.23 | 10.45 |
| Interorbital constriction | 3.95 | 3.71 | 3.70 | 3.73 | 3.60 | 3.58 | 3.58 | 3.74 | 3.58 | 3.70 | 3.95 |
| Max. cheek-teeth $C$-$M^3$ | 6.33 | 6.40 | 6.20 | 6.30 | 6.40 | 6.12 | 6.43 | 6.32 | 6.12 | 6.30 | 6.43 |
| Length of $M^1$-$M^3$ | 3.58 | 3.75 | 3.65 | 3.56 | 3.64 | 3.70 | 3.70 | 3.51 | 3.51 | 3.64 | 3.75 |
| Length of mandible with $I_1$ | 11.10 | 11.25 | 10.82 | 10.76 | 11.17 | 10.90 | 11.30 | 11.22 | 10.76 | 11.06 | 11.30 |
| Height of mandible ramus | 3.80 | 3.54 | 3.63 | 3.61 | 3.44 | 3.45 | 3.45 | 3.53 | 3.44 | 3.56 | 3.80 |
| Mand. cheek-teeth $C$-$M_3$ | 6.78 | 6.77 | 6.66 | 6.79 | 6.88 | 6.70 | 6.85 | 6.72 | 6.66 | 6.77 | 6.88 |
| Length of $P_2$-$P_4$ | 2.07 | 2.10 | 2.00 | 2.10 | 2.10 | 1.96 | 2.02 | 1.92 | 1.92 | 2.03 | 2.10 |
| Length of $P_4$-$P_3$ | 4.89 | 4.96 | 4.95 | 4.95 | 5.02 | 4.88 | 4.98 | 4.84 | 4.84 | 4.93 | 5.02 |
| Length of $M_1$-$M_3$ | 4.00 | 4.03 | 4.05 | 4.08 | 4.15 | 4.08 | 4.14 | 3.94 | 3.94 | 4.06 | 4.15 |
| Length of $P_4$ | 0.92 | 0.92 | 0.98 | 0.98 | 1.00 | 0.92 | 0.97 | 0.98 | 0.92 | 0.96 | 1.00 |
| Width of $P_4$ | 0.76 | 0.77 | 0.81 | 0.81 | 0.72 | 0.76 | 0.70 | 0.71 | 0.70 | 0.75 | 0.81 |
| Length of $M_3$ | 1.33 | 1.39 | 1.36 | 1.37 | 1.41 | 1.36 | 1.45 | 1.35 | 1.33 | 1.38 | 1.45 |

Table 2

*Myotis nattereri* (Kuhl) — dimensions of the subspecies.

| Forearm | | | Condylobasal length | | | Interorbital constriction | | | Maxillary cheek-teeth, $C$-$M^3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Range | Avg. | N | Range | Avg. | N | Range | Avg. | N | Range | Avg. | N |
| *Myotis nattereri*, Gali Ali Beg. Iraq. | | | | | | | | | | | |
| 39.1—41.8 | 40.8 | 9 | 15.05—15.45 | 15.3 | 7 | 3.6—3.95 | 3.7 | 8 | 6.1—6.4 | 6.3 | 8 |
| *Myotis nattereri*, Soviet Union, Kuzyakin, 1950 | | | | | | | | | | | |
| 36.5—40.5 | — | — | 14.0—14.9 | — | — | 3.6—4.0 | — | — | 5.8—6.3 | — | — |
| *Myotis nattereri*, Europe, Several authors | | | | | | | | | | | |
| 35.0—43.5 | — | — | 14.0—15.0 | — | — | 3.5—4.0 | — | — | 5.5—6.2 | — | — |
| *Myotis n. araxenus*, Kuzyakin, 1950 | | | | | | | | | | | |
| 42.3—47.8 | 44.1 | 12 | 16.2—16.8 | 16.4 | 12 | 4.1—4.4 | 4.2 | 12 | 6.4—7.3 | 6.8 | 12 |
| *Myotis n. araxenus*, Harrison, 1963 | | | | | | | | | | | |
| 42.6—42.7 | — | 2 | 15.7—16.4 | 16.05 | 2 | 4.0—4.1 | — | 2 | 6.2—6.5 | 6.35 | 2 |
| *Myotis n. tschuliensis*, Kuzyakin, 1935 | | | | | | | | | | | |
| 41.7—42.0 | — | 4 | 15.0—15.1 | — | 4 | 4.0—4.1 | — | 4 | 5.8—6.2 | 5.9 | 4 |
| *Myotis n. hoveli*, Harrison, 1964 a and b | | | | | | | | | | | |
| 38.2—40.3 | 39.3 | 24 | 14.2—14.9 | 14.6 | 15 | 3.1—3.7 | 3.4 | 15 | 5.4—5.9 | 5.7 | 16 |

side separates into three cusps arranged in a row. The base of the crown of the upper canine tooth is more rounded in relation to the narrow base of this tooth in *M. n. nattereri*. The most obvious feature differentiating the teeth of the two forms is however the centrad shifting

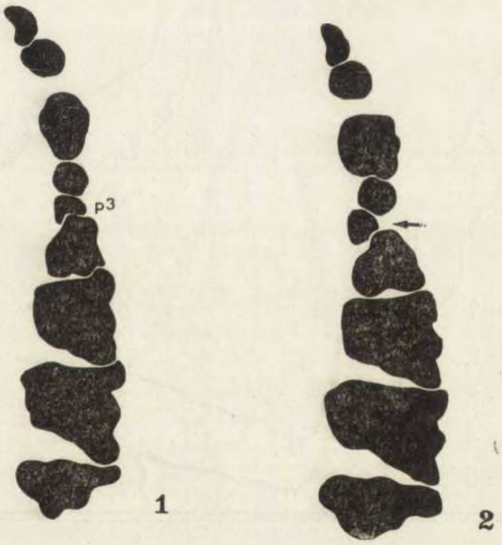


Fig. 1. Scheme of crowns of the upper left maxillary tooth-row.
1. *Myotis nattereri nattereri* from Poland, 2. *Myotis nattereri* from Gali Ali Beg (Iraq).

from the tooth row of the small premolars $P^2$ and $P^3$, in particular the smaller $P^3$, which is consequently difficult to see from the external side of the jaw (see Fig. 1). The mandible is longer, with a higher *processus coronoideus*, and its teeth are also more massive. $I_3$ is broader in its posterior part in comparison with this tooth in the nominative form. $P_4$ has a strongly developed cingulum and slightly deeper sinus on the integral margin of the tooth.

The description of the morphology and the dimensions given in tables 1 and 2 show that the individuals from Iraq are slightly larger than the nominative form and the small upper premolars are positioned differently. Three other subspecies have been described up to the present from areas neighbouring Iraq: *Myotis nattereri hoveli* Harrison, 1964; *M. n. tschuliensis* Kuzyakin, 1935 and *M. n. araxenus* Dahl, 1947 (see Fig. 2).

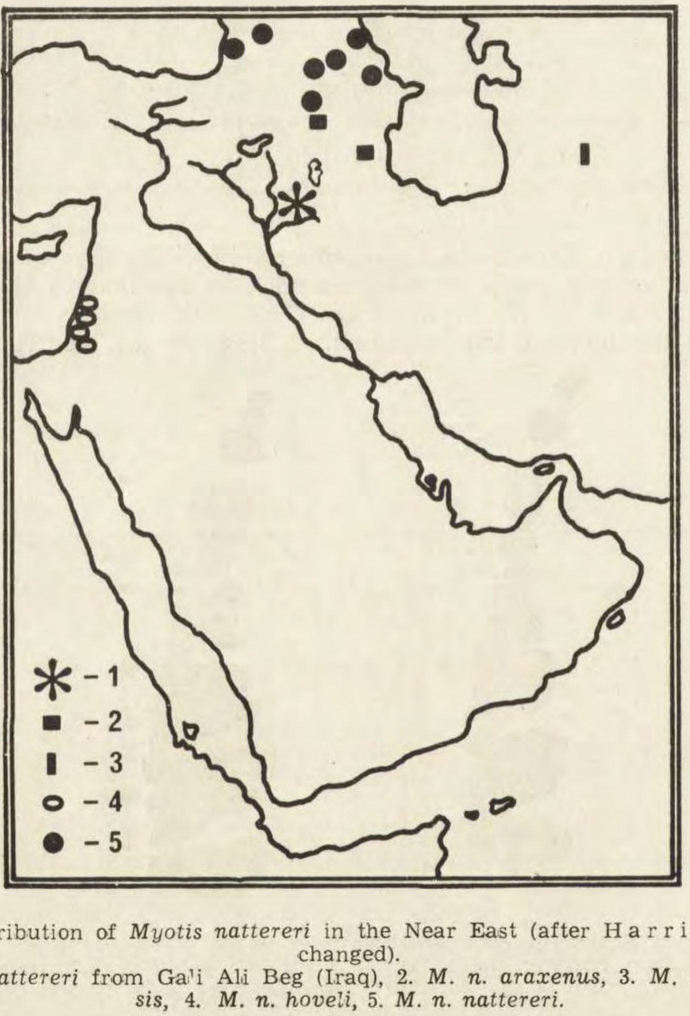


Fig. 2. Distribution of *Myotis nattereri* in the Near East (after Harrison, 1964b changed).
1. *Myotis nattereri* from Ga'i Ali Beg (Iraq), 2. *M. n. araxenus*, 3. *M. n. tschulensis*, 4. *M. n. hoveli*, 5. *M. n. nattereri*.

The subspecies *M. n. hoveli* is known from Israel (Harrison, 1964a) and differs from the Iraqi individuals in respect of its smaller dimensions, lighter-coloured fur, more arched nasofrontal part of the skull. Its upper $P^2$ and $P^3$ are situated in one row and are clearly visible from the external side of the jaw. *M. n. tschuliensis* described from Tschuli in North West Kopet-Dag (Turkmen SSR) (Kuzyakin, 1935) is more or less the same size as *M. nattereri* from Iraq, but differs in respect of the lighter-coloured fur typical of desert animals, the greater incision of the external margin of the ear (being similar to *Myotis emarginatus* in this respect), more strongly arched nasofrontal part of the skull and situation of the upper premolars, which lie in the tooth row. The subspecies *M. n. araxenus*, although the regions in which it has been found up to the present are situated closer to the border of Iraq at Dakla in Armenia (Dahl, 1947; Kuzyakin, 1950) and in the Zagros Mountains (Suphur caves at Guter-Su) (Harrison, 1963) differ from individuals from Gali Ali Beg by its far greater dimensions. In addition its fur is lighter in colour, the skull profile is more arched and the upper premolars are not thrust out of line.

The comparisons made thus show that the Iraqi population is a separate one and since the locality described is situated more to the south (not taking into account isolated occurrence of *M. n. hoveli*) it is not impossible that it is a question here of a new subspecies.

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1974). Such variations not infrequently create considerable difficulties of a taxonomic nature, particularly when there are no other criteria available making it possible to differentiate between species. This is the case *inter alia* when segregating parts of the jaws of mice of the genus *Apodemus* and distinguishing among them representatives of the subgenus *Apodemus* Kaup, 1829 and *Sylvaemus* Ognev & Vorobiev, 1923, found in owl pellets or in greatly disintegrated fossil material.

## 2. MATERIAL AND METHODS

Skulls of the genus *Apodemus* Kaup, 1829, obtained from both owl pellets and captures, and collected in Poland by the Mammals Research Institute, Polish Academy of Sciences at Białowieża, were used for the studies. Examination was made of a series of *A. agrarius* (n=3228) and *Sylvaemus* (n=4911) for either presence or absence of supraorbital ridges on the frontal bones, and also tooth $M^2$ for absence or presence of the *t*3 mesio-labial cone. Supraorbital ridges (=Supraorbital-Leisten), defined by Kahmann (1953) and Zimmermann (1962) form the upper margin of *incisura orbitalis* of the frontal bones in the striped field mouse. Definitions of tooth cones were taken after Missone (1969) and Michaux (1971). The frequency of an additional *t*3 mesio-labial cone in $M^2$ in different populations of *A. agrarius* was entered on a map of Poland, converting values in percentages into degrees. A similar method was used for calculating the percentage formed by individuals in a *Sylvaemus* population which were distinguished by the lack of *t*3 as a subgenus characteristic adding, in order to simplify localization of the spot within Polish territory, the name of the place and its position in a UTM square (Table 1).

Table 1

Frequency of co-occurrence of additional *t*3 mesio-labial cones in *A. agrarius* in $M^2$ and absence of *t*3 in *A. sylvaticus* in samples from analogical populations obtained from owl pellets found in Poland.

| Locality in UTM system | *Apodemus agrarius* Σ | n | % | Angle, ° | *Apodemus sylvaticus* Σ | n | % | Angle, ° |
|---|---|---|---|---|---|---|---|---|
| FE 20 Knyszyn | 28 | 1 | 3.6 | 12.9 | 13 | 1 | 7.7 | 27.7 |
| EC 00 Wsola | 63 | 2 | 3.2 | 11.5 | 19 | 1 | 5.3 | 19.1 |
| EC 21 Brzoza | 47 | 2 | 4.3 | 15.5 | 18 | 1 | 5.6 | 20.2 |
| VT 82 Koło | 165 | 1 | 0.6 | 2.2 | 21 | 1 | 4.8 | 17.3 |
| CB 97 Kamieńsk | 10 | 0 | 0 | 0 | 12 | 1 | 8.3 | 29.9 |
| CB 13 Olesno | 89 | 0 | 0 | 0 | 13 | 1 | 7.7 | 27.7 |

## 3. RESULTS

Supraorbital ridges as a characteristic of the subgenus *Apodemus* occurred in 100% of the skulls of *A. agrarius* examined, but were absent in all the *Sylvaemus* skulls.

In the whole of the skull material of *A. agrarius* examined a well formed *t*3 cone was found in the second molar $M^2$ in 128 cases (3.9%), while absence of *t*3 was found only in 6 skulls of *Sylvaemus* forming 0.1% (Plate XXVIII). In different populations of *A. agrarius* $M^2$ with an additional *t*3 occurred in from 0.6—6.3%, and in extreme cases this sometimes rose to as much as 33% and 40% (Fig. 1). In general the rarer $M^2$ in *Sylvaemus* without $t3$ cones formed from 4.8—8.3% of the samples examined in certain populations. This frequency is always greater than the percentage of *A. agrarius* skulls with $M^2$ possessing a well formed $t3$ cone, in collections of skulls from the same localities (Table 1). It is remarkable that in one pellet of a barn owl from Brzoza (EC 21) a skull of a striped field mouse and a wood mouse were found with non-typical $M^2$ teeth. It may therefore be concluded that co-occurrence of the character of additional presence and also absence of $t3$ cone in $M^2$ in both these species from the same place is not in fact so great a rarity as it might seem.

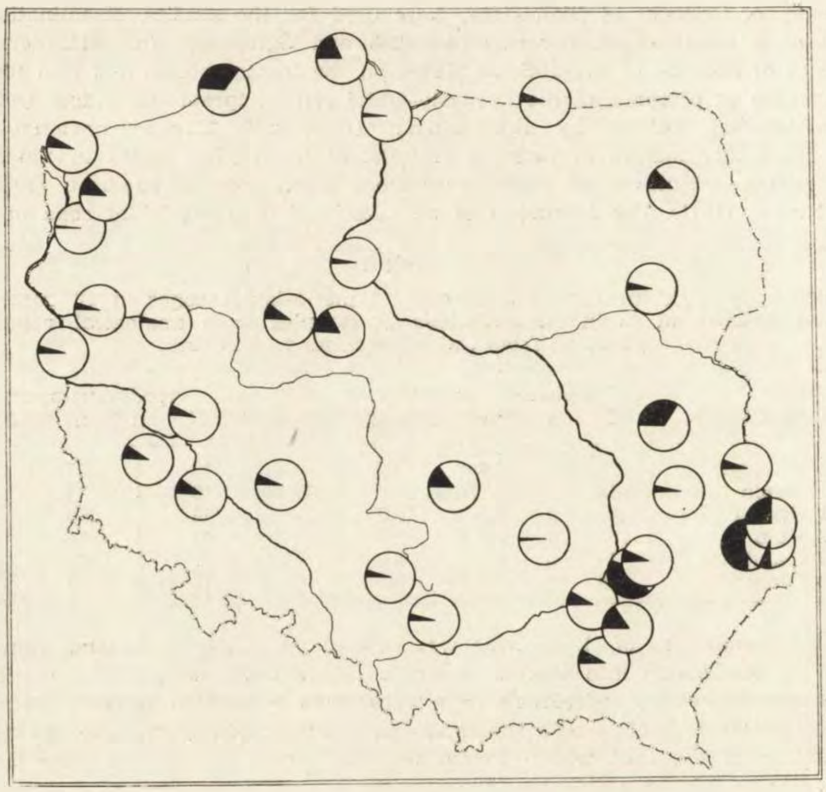

Fig. 1. Occurrence of $t3$ mesio-labial cone in $M^2$ in *A. agrarius* from the population aspect.

As can be seen from the map the distribution of $t3$ frequencies in different populations of striped field mice in Poland forms a mosaic, except that a distinct aggregation of a high degree of density of this character occurs in the south-eastern part of Poland (Fig. 1).

The results obtained show that in distinguishing the skull fragments of representatives of the genus *Apodemus* into two subgenera: *Apodemus* and *Sylvaemus*, it is only the supraorbital ridges on *os frontale* and the first upper molar (Plate XXVIII) which possess indisputable taxonomic value. The diagnostic value of $M^2$ is under such circumstances minimal and can at most be of supplementary significance only.

The following practical conclusions can be reached on the basis of the author's own studies and data from literature:

1. If there are remains of the frontal bones of mice of the genus *Apodemus* in bone material, whether fossil or obtained from owl pellets, it is possible to classify these fragments into one of the subgenera — *Apodemus* or *Sylvaemus* — on the basis of the presence or absence of supraorbital ridges.

2. Fragments of maxilli possessing $M^1$, with cones not excessively worn and consequently still showing its general configuration, permit of identification of the striped field mouse or *Sylvaemus*. If however the fragment of *Sylvaemus* maxilli is connected with intermaxillare possessing an incisor with sagittal breadth equal to or greater than 1.3 mm, it can be identified as the yellow-necked mouse.

3. Fragments of the maxilli possessing only $M^2$ or $M^3$ can be identified as *Apodemus* sp. on the basis of the number of $M^1$ alveoli.

## 4. DISCUSSION

It is still difficult to draw conclusions of a more general nature on the basis of variations found in the number and arrangement of tooth cones in *Apodemus*, and further systematic studies are essential. It is however known that representatives of the subgenus *Sylvaemus* made their appearance as long ago as the early Pleistocene in Europe (Zimmermann, 1962; Pasquier, 1974) and *Apodemus* in the postglacial period. Generally speaking the $M^2$ in *Sylvaemus* (chiefly the wood mouse) is far more constant in the occurrence of the *t*3 mesio-labial cone than the analogical tooth in the striped field mouse in the case of additional *t*3. Polish populations of *Sylvaemus* occur in the centre of the palaearctic range of this subgenus, while analogical populations of *Apodemus* are located, as far as Polish territory is concerned, on the western extreme limits of the range of this subgeneric form (Zimmermann, 1962). It is not therefore impossible that the feature of the supernumerary *t*3 in Polish field mice inhabiting the limits of this range may be intensified in them. Confirmation of this assumption is provided by the high frequencies of this feature in striped field mice from the south-eastern part of Poland. It would appear interesting to examine the occurrence of this feature in other populations of *A. agrarius* originating from a more extensive area and also to trace inheritance of this feature under laboratory conditions.

An attempt may be made at indirect interpretation of the genesis of additional *t*3 cones in the $M^2$ of striped field mice. The genesis of the absence of *t*3 in its $M^2$ in the wood mice can be explained by the fusion of this cone with cone *t*5. This process began in European *A. sylvaticus* in the middle Pleistocene and has lasted up to the present, being expressed in the differing frequency of fusion of *t*3 with *t*5 in different local populations (Pasquier, 1974).

The occurrence of additional cones $t3$ in $M^2$ in the striped field mouse and their absence in the wood mouse is undoubtedly a polymorphic feature, since it may occur in a considerable percentage of the individuals in some local populations of striped field mice as in the case of additional cones from the aboral side of $M^1$ and $M^2$ in wood mice from Yugoslavia (Tvrtković, 1976) and also buccal cones in $M_1$ and $M_2$ in Japanese representatives of the genus *Rattus* (Miyao *et al.*, 1966).

When polymorphic features are encountered in the teeth of mammals it becomes necessary to convey such information in the first place to authors of keys to identification of different species, in order that they may in revised issues of such keys take into account of the results of current studies, this applying chiefly to paleontologists. The devaluation of the taxonomic value of a given feature of tooth pattern does not mean that it cannot form a suitable object of future studies on polymorphism in a given species constituting evidence of its variations both in time and in space.

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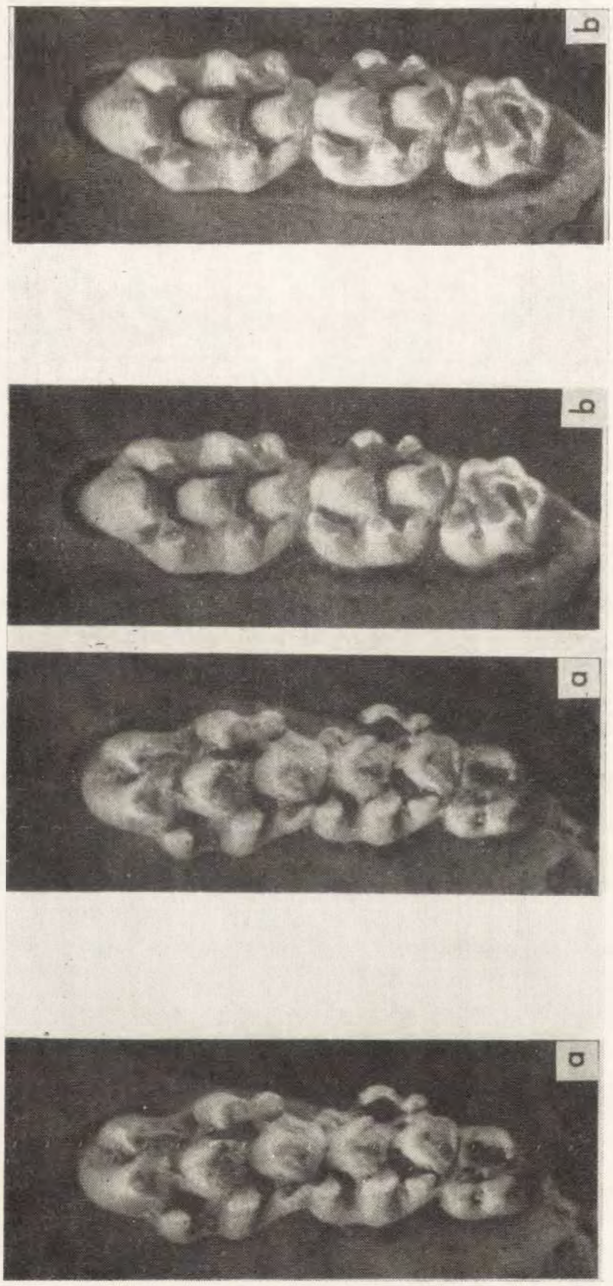
## EXPLANATION OF PLATE XXVIII

Fig. 1. Additional $t3$ mesio-labial cone in the striped field mouse (a). Absence of $t3$ in the wood mouse (b).




A. L. Ruprecht L. Sych *phot.*