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Microtus socialis (Pallas) [Rodentia]
in the Lebanon Mountains

Microtus socialis (Pallas) [Rodentia] w górach Libanu

The holarctic genus *Microtus* Schrank in the Old World is widely distributed over the area formed by Europe and Siberia, whence a few forms only penetrate further to the south. Two species have been well known for a long time in the Lebanese Republic: *Microtus guentheri* (Danford & Alston) and *Microtus nivalis* (Martins).

Microtus guentheri (Danford & Alston) occurs in cultivated lowland areas and lower mountainous regions, and during a period of mass occurrence causes great damage. Bodenheimer (1949) considers that this species is represented here by its typical sub-species, *M. g. guentheri* (Danford & Alston), described for the first time from Asia Minor. O. Thomas (1917), it is true, described from Palestine *M. philestinus* Thomas, but he himself recorded its close resemblance to *M. guentheri* (Danford & Alston). Opinions are divided as to the systematic value of this form. Aharoni (1932) accepts *M. philestinus* Thomas as a separate species, at the same time stating that this is the form occurring in the Lebanon. Ellerman and Morrison-Scott (1949) give *M. philestinus* Thomas as one of the sub-species of *M. guentheri* (Danford & Alston). Finally Bodenheimer (1949), basing his statement on the largest amount of material, considers both names as synonyms.

Microtus nivalis (Martins) was described by Miller (1908) from Hermon in Anti-Lebanon as *M. hermonis* Miller. This form is now generally considered as a sub-species of *M. nivalis* (Martins). Bate (1945)

found this species to be present in the Lebanon Mountains in owl pellets. On account of the fragmentary nature of the material she did not give her opinion as to the sub-species to which the skulls found belong.

In 1827 Brants (after Aharoni, 1932) described the species *Hypudaeus syriacus* Brants, giving as the locality in which it was found „Syrien”. Aharoni (1932) presumes that this specimen comes from the Lebanon, which at that time formed part of Syria. There is no doubt that the species described by Brants is identical with *M. nivalis* (Martins), and it is for this reason that this name takes priority over that given at a later date to specimens from the Alps. It would seem desirable to apply for the abolishment of this priority.

In 1945 D. Bate, when investigating owl pellets found in two localities in the Lebanon Mountains, in Bécharré and near Laklouk, found there *M. socialis* (Pallas), which had not hitherto been noted from the Lebanon, as the dominating species. The material collected included numerous skulls, mainly of young individuals. The author gives drawings of a skull and of the molar patterns of the form found, but does not, on account of the fragmentary nature of the material, give a more exact definition of its systematic place within the species. She also puts forward the assumption that the specimens from Hermon given by G. Allen (1915) as *M. guentheri* (Danford & Alston) may also belong to *M. socialis* (Pallas). Allen (1915) has already drawn attention to their similarity to this species.

During my stay in the Lebanon in the spring of 1958 I caught 10 specimens of voles in the Jebel Kammouha area on the northern boundary of these mountains and Jebel Sannine in the southern part. It was then apparent that they were identical with the species identified by D. Bate (1945) as *M. socialis* (Pallas). As I had a series which, although small, was composed of complete specimens, I was able to supplement the data given by Bate by new details. The case was the more interesting because the Lebanon is territory very far distant from the main range of occurrence of this species. I am also giving here data collected at random on the habitat and biology of the vole found. It is a characteristic fact that I did not succeed in catching a single specimen of *M. nivalis* (Martins); possibly this species occurs at higher mountain levels, or in different habitats.

The material examined consisted of 10 skins and skulls from Jebel Kammouha and Jebel Sannine in the Lebanon Mountains. The specimens are kept in the Cracow Department of the Institute of Zoology of the Polish Academy of Sciences.

Description: The fur has reddish shade on surface. Along the back the hair is slightly darker, becoming lighter on the flanks. The belly

is silver-grey with no trace of red. The dividing line between the colour of the belly and of the back is sharp and distinct. Individual colour variations are considerable in the material examined. One specimen, a young female (No. 58/18) has a distinctly different juvenile colouring: the fur is far darker and there is a smaller admixture of the red colour

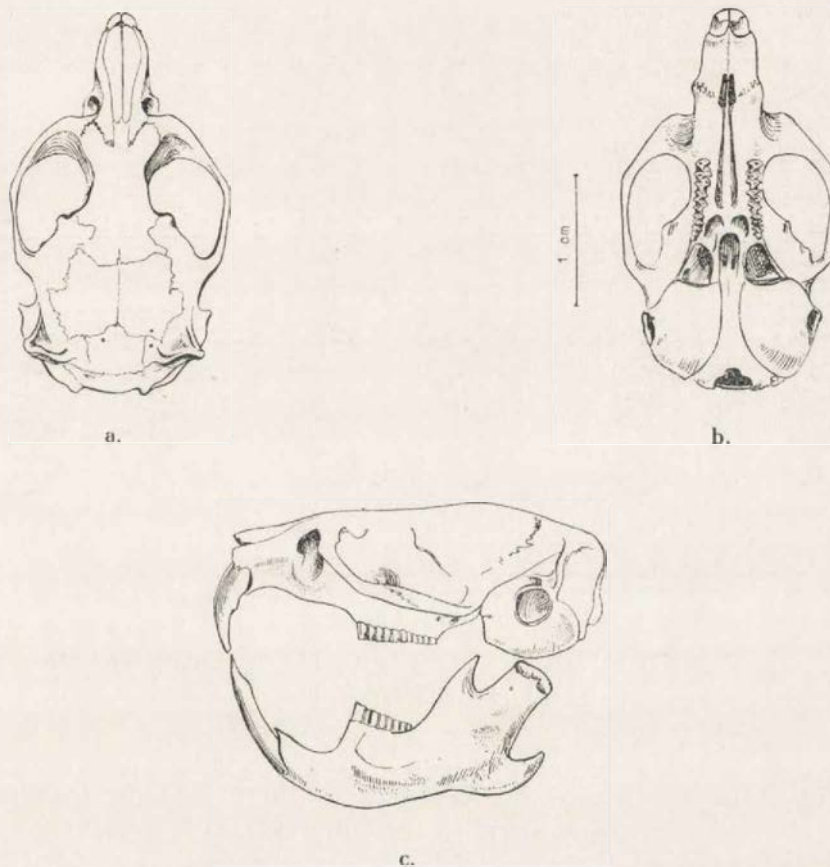


Fig. 1. Skull of *M. socialis* (Pallas) from the Lebanon Mountains; no. 58/15.

The tail is bi-coloured, the upper side being dark brown, and the underside silver-grey.

The ear is short, densely furred, and only slightly protruding from the fur. There are five plantar pads on the hind foot.

The skull is low, with rounded contours, ridges are not strongly marked (Fig. 1). In the posterior orbital margin there is a distinct forward-protruding growth. Bullae osseae are dilated, fairly large. Nasal bones are long, narrow to the rear. The upper incisors do not exhibit a specially strong forward slant.

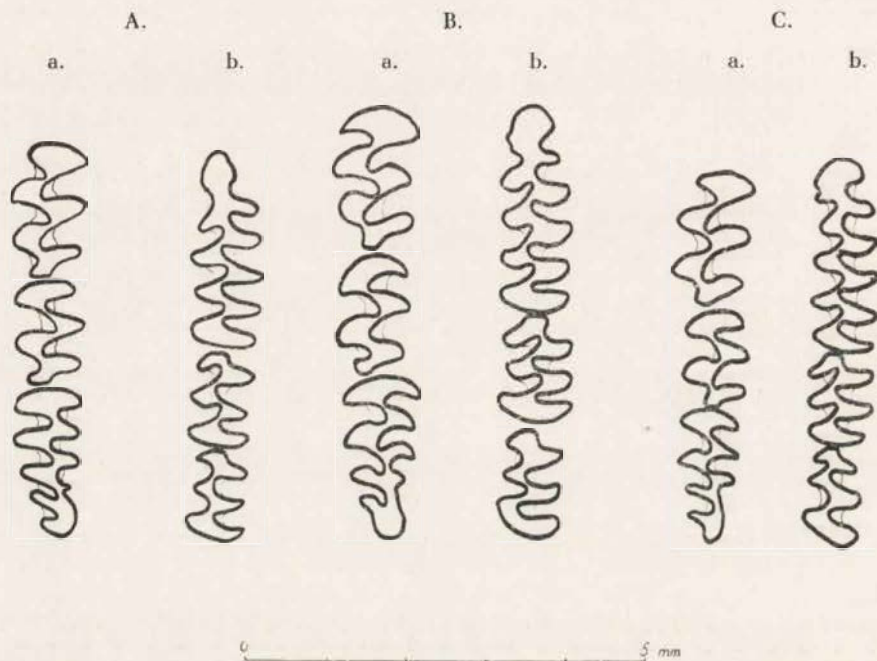


Fig. 2. Molar pattern of *M. socialis* (Pallas): a) maxillar tooth, b) mandibular tooth.

A — ♀ no. 58/15; B — ♂ no. 58/19; C — ♀ no. 58/12.

In M^1 in only two of the specimens is there a slight, indistinct fourth posterior salient angle on the outer side. In M^2 in all the specimens examined, there is a distinct third inner salient angle at the back of the tooth, although the degree of development varies. M^3 has as a rule 4 internal and 2 external salient angles, with the posterior external salient angle only slightly differentiated, and in two specimens this is completely missing. In one specimen, a fifth salient angle is visible on the inner side of this tooth. In another specimen this salient angle occurs on one tooth; in the other maxilla of this specimen M^3 has only 4 salient angles on the inner side (Fig. 2).

Bate (1945) found a variation similar to that described above in the more numerous material from owl pellets which she examined.

In M¹ we have a closed posterior loop, five completely closed triangles of enamel, two anterior triangles broadly connected with each other, and an anterior loop equally broadly connected with them. This tooth did not exhibit any marked variations. The dimensions of the specimens examined are given in table form (Table No. 1).

Microtus socialis (Pallas) from the Lebanon exhibits distinct morphological differences in relation to all the known sub-species of *M. socialis* (Pallas). It differs from the two subspecies occurring in the southern limits of the range of this species, *M. s. binominatus* Ellerman and *M. s. paradoxus* Ognev & Heptner, by its distinctly smaller body measurements, especially clear in the case of the smaller bullae osseae. The Lebanese form differs, however, by its greater dimensions from the nominal form, *M. s. socialis* (Pallas) from beyond the Ural Mountains and the river Volga, as regards both body and skull measurements.

The remaining four subspecies constitute a group of forms, the dimensions of which are very similar to each other and to the Lebanese form, but differ markedly from this latter as to dimensions and shape of certain elements of the skull. Thus *M. s. nikolajevi* Ognev from the Crimea has strongly shortened nasalia, which is not the case with the Lebanese specimens. In *M. s. gravesi* Goodvin from Kazakhstan and *M. s. schidlowskii* Argypulo from Georgia and Armenia, the growths on the posterior orbital margin are less strongly developed, while in the case of *M. schidlowskii* Argypulo the tail is shorter and the ear longer than in the Lebanese form. In the *M. s. parvus* Satunin from Dagestan, the bullae osseae are distinctly longer than in our specimens. In view of the difficulty in describing colour and the impossibility of direct comparison of the series of specimens, I am omitting possible differences in colouring.

The question of the relation of the Lebanese form to voles included in the species *Microtus guentheri* (Danford & Alston) is more difficult to decide on account of the very slight knowledge possessed of *Microtinae* of the Middle East. Thanks to the courtesy of the director of the Mammals Department of the Natural History Museum in Berlin, I was able to compare specimens from the Lebanon with the skins (without skulls) of *Microtus guentheri* (Dan-

Table No. 1.
Measurements of *M. socialis* (Pallas) from Lebanon Mountains.

No. Coll.	Locality	Date	Sex and age	Body	Tail	Hind foot	Ear	Condylbasal length	Zygomatic breadth	Interorbital constriction	Nasal length	Diastrama	Maxillary tooth-row	Height of skull per bullae	Breadth of brain case	Length of brain case	Length of bullae ossae	Remarks	
58/11	Jebel Kammouha	5.IV.1958	♀ ad.	140(?)	27	17	—	25,5	15,3	4,2	7,0	7,7	6,5	9,2	12,3	12,2	8,2		
58/19		5.IV.1958	♂ ad.	106	30	17	12	26,4	15,9	4,2	7,5	8,2	6,4	9,5	13,0	12,7	8,0		
58/18		7.IV.1958	♀ inv.	88	23	15	10	22,3	13,5	4,0	6,1	6,9	5,2	8,5	11,0	11,2	7,3		
58/14		11.IV.1958	♂ ad.	95	—	16	10	25,6	15,0	4,1	6,9	8,0	6,0	9,4	12,6	12,7	8,2		
58/15		11.IV.1958	♀ ad.	108	25	17	11	25,3	15,6	4,0	6,9	8,0	5,9	9,4	12,4	12,9	7,9	5 Embr.	
58/20		12.IV.1958	♀ ad.	103	26	16	11	26,1	15,6	3,9	—	8,1	5,9	9,5	13,0	12,8	7,8	5 Embr.	
58/17		Jebel Sannine	13.IV.1958	♀ inv.	93	25	16	10	25,3	14,6	4,2	6,0	7,3	5,6	8,8	11,6	11,7	7,8	
58/12			13.IV.1958	♂ ad.	105	23	16	11	25,6	14,3	4,0	—	7,8	6,1	9,3	12,4	12,8	8,0	
58/16			14.IV.1958	♀ ad.	92	—	15	10,5	24,2	14,8	4,2	—	7,5	5,8	—	11,5	12,3	7,8	7 Embr.
58/13		14.IV.1958	♀ ad.	97	22	16	10,5	24,3	14,5	4,1	6,3	7,4	5,5	—	11,5	12,6	8,0		

ford & Alston) from south-east Bulgaria, and found that the Bulgarian specimens differ distinctly from the Lebanese in colour — the colour of the belly is reddish and mingles gradually with the colour of the back. Also the dimensions of the Bulgarian specimens are greater. Aharoni (1932) also states that *M. philestinus* Thomas and *M. guentheri* (Danford & Alston) exhibit a reddish colour on the ventral side. Bate (1945) writes that her Lebanese specimens differ markedly as to skull structure from the lowland specimens from Syria. I was able to study some specimens of skulls of voles from Azaz, to the north of Aleppo in Syria, in the museum in Berlin, part of the Aharoni collection. They were not determined, but had been collected from the same locality as that given by Aharoni (1932) for *M. philestinus* Thomas. They agreed with the description of this form given by this authoress. The skulls examined appear to me to be practically identical with the skulls of my specimens from the Lebanon Mountains. I have therefore refrained from giving a definite opinion as to the subspecies to which the specimens from Lebanon belong, as this will be possible after making a revision of the whole of the *Microtinae* material from the Middle East.

It should also be mentioned that Ogniev (1950) considers *M. guentheri* (Danford & Alston), *M. irani* Thomas and other related species of vole as belonging to *M. socialis* (Pallas). This view cannot be wholly maintained, as Matthey (1953) demonstrated the difference between the chromosomes of *M. guentheri* (Danford & Alston) and *M. irani* Thomas.

The nearest position to the Lebanon Mountains on which the *M. socialis* (Pallas) was shown to occur with certainty is Lake Van in eastern Anatolia (Neuhäuser, 1936). It is very probable that this species has a more continuous range and also occurs in the mountains of Anatolia. It should, however, be assumed that the Lebanon lies on the southern limit of its range, as is the case with many other northern forms.

It is interesting that *M. socialis* (Pallas) from the Lebanon is more similar, as regards dimensions, to the northern subspecies of *M. socialis* (Pallas), while the forms closest geographically, *M. s. binominatus* Ellerman and *M. s. paradoxus* Ogniev & Heptner, are decidedly larger. On the other hand the shape of the surface of the molars, and in particular the presence of an additional

salient angle of enamel on M^2 are common to the form from Lebanon and the two southern subspecies given above.

The habitat in which *M. socialis* (Pallas) lives in the Lebanon Mountains differs greatly from the typical habitat of this species, i.e. steppes and semi-deserts. It is, of course, a known fact that in certain sections of its range *M. socialis* (Pallas) has previously been observed in mountainous areas up to 2400 m above sea level (Ogniev, 1951).

It is difficult to decide whether *M. socialis* (Pallas) occurring in the Lebanon should be regarded as a relict of a colder period, or as a newcomer of recent date. In the fossil material from the Pleistocene from the caves of Mount Carmel in Palestine (Garrod & Bate, 1937), fossil species of the genus *Microtus* Schrank occur which are closely allied to the contemporary *M. nivalis* (Martins) and *M. guentheri* (Danford & Alston), but there are no forms from the *M. socialis* (Pallas) group. This would seem to point to the later invasion of this form.

Biology. At present *M. socialis* (Pallas) is known to occur on the following localities in the Lebanon:

1. Jebel Kammouha, in the extreme north of the Lebanon Mountains belt. I caught it here at a height of about 1200 m, in scrubs and on the fringes of a loosely-wooded fir forest.

2. Bécharré, in a cedar forest (Bate, 1945). Skulls were found there in the pellets of a long-eared owl, *Asio otus* (Linnaeus), at a height of about 1950 m.

3. Laklouk, at a height of about 1800 m (Bate, 1945), in owl pellets, probably of *Bubo bubo ruthenus* Buturlin & Zhitkov.

4. Jebel Sannine, NE of Beirut. I caught specimens here at a height of 2000—2100 m above sea level in a tree-less area sparsely covered with clumps of prickly plants.

As will be seen from the above, *M. socialis* (Pallas) probably occurs throughout the entire mountain belt of the Lebanon. Its occurrence in the Anti-Lebanon mountain belt is very probable (Allen, 1915; Bate, 1945).

The area in which *M. socialis* (Pallas) occurs in the Lebanon consists chiefly of non-wooded chalk slopes, with poor vegetation (Plate XXV, fig. 1, Plate XXVI, fig. 2). The soil here is very scanty. Rainfall is over 1000 mm per annum, snow lies from December to March, and in higher areas it lies in places until May. Despite the

high rainfall the area is dry in summer on account of the high temperature (20—22° C) and also a result of the karstic substratum.

At one time this area was covered by extensive forests, which were destroyed to a large extent in antiquity. They have been preserved up to the present in the form of remnants, e.g. in the form of small forests of cedars, or large, but scantily wooded areas in Jebel Kammouha, where spruce trees grow.

M. socialis (Pallas) in the Lebanon, as a result of the poverty of the soil, does not dig extensive burrows. The openings to its burrows are as a rule to be found in the centre of clumps of prickly bushes. Small heaps of excavated earth can be seen in front of these openings (Plate XXVI, fig. 2). In Jebel Sannine, where I caught *M. socialis* (Pallas) in an area which not long since had lost its snow covering, although many burrows were visible, only a very few were inhabited. These latter could be recognised by the freshly dug earth, lumps of excrement and the branches of green plants lying both within and in front of the opening. In one clump of bushes there were always several openings, doubtless leading to one system of burrows. These inhabited systems of burrows were encountered at intervals of 50—100 m. This scattered settlement of the area is probably accounted for by the poverty of the vegetation. Immediately after the disappearance of the snow it is also possible to observe tunnels dug under the snow in the very surface of the soil, and sometimes even on the surface of clumps of plants. Most probably these tunnels were made by *M. socialis* (Pallas), (Plate XXVI, fig. 3).

In one case in Jebel Sannine I caught two females near the same burrow during the course of one day: one had 7 embryos, the second was an adult, but had no foeti.

In Jebel Kammouha at the beginning of April I caught 3 specimens — one adult female, one adult male and one young female, with juvenile colouring, probably born that spring. A few days later, in Jebel Sannine, 1000 m higher, I caught 2 males with strongly developed testicles, two females without foeti, and three with embryos. The number of embryos was respectively: 5, 5 and 7. In one of the females with 5 foeti, one embryo was clearly in process of resorption. In the case of the female with 7 embryos, they were all very small, whereas in the other two cases they were about the size of a small bean.

I caught *M. socialis* (Pallas) in snap traps, using bread as bait. The remainder of plants in the openings of the burrows and contents of the stomachs indicated that their normal food consists of the green parts of plants, which are at least partially dragged into the burrows.

The specimens I obtained were caught at dusk or during the night. Only once during the day-time did I see a single specimen at the entrance to its burrow.

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EXPLANATION OF PLATES

Plate XXV.

Fig. 1. The habitat of *M. socialis* (Pallas) in Jebel Kammouha in northern Lebanon.

Plate XXVI.

Fig. 2. The habitat of *M. socialis* (Pallas) in Jebel Sannine in southern Lebanon.

Fig. 3. Winter tunnels visible on the surface of plants after the snow had thawed, probably formed by *M. socialis* (Pallas). Jebel Sannine, Lebanon.

STRESZCZENIE

Autor opisuje serię 10 okazów *Microtus socialis* (Pallas) zebranych w górach Libanu, podaje ich wymiary (Tabela 1), oraz omawia stosunek formy libańskiej do znanych dotąd podgatunków *M. socialis* (Pallas) i gatunków pokrewnych. Przedstawia również środowisko, w którym żyje omawiany gatunek w górach Libanu i nieco obserwacji biologicznych (Tablica XXV, fot. 1; Tablica XXVI, fot. 2—3).

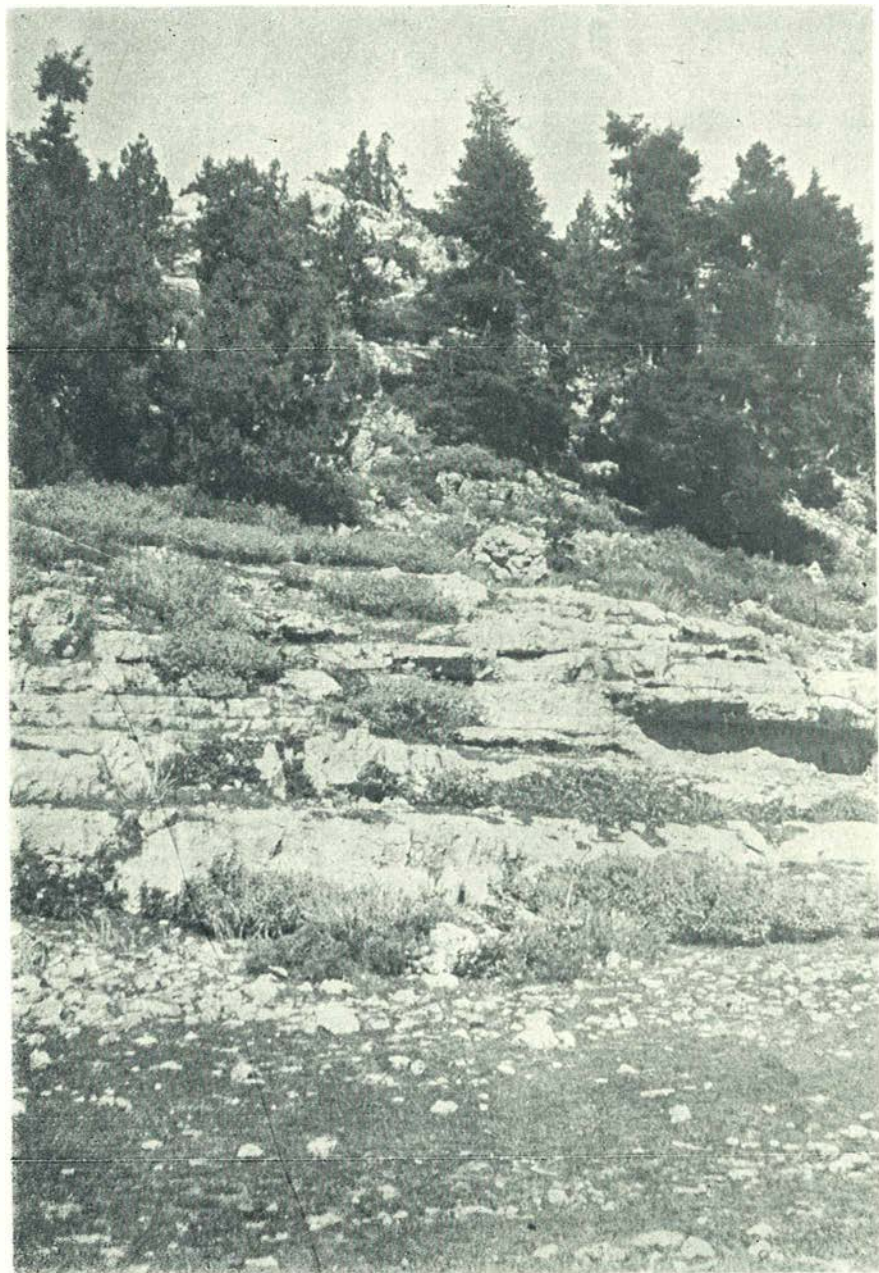


Fig. 1.

Kazimierz Kowalski

auctor phot.



Fig. 2.



Fig. 3.

Kazimierz Kowalski

auctor phot.

