

A study on Morphology and Karyology of *Prometheomys schaposchnikowi* Satunin, 1901 (Mammalia: Rodentia) in Turkey

Ercüment ÇOLAK, Nuri YIĞİT, Mustafa SÖZEN, Reyhan VERİMLİ
Department of Biology, Faculty of Science, University of Ankara-TURKEY
Şakir ÖZKURT

Department of Biology, Education Faculty of Kırşehir, University of Gazi, Kırşehir-TURKEY

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Abstract: Karyological, morphological, bacular and phallic aspects of *Prometheomys schaposchnikowi* were examined based on 22 specimens collected in Ardanuç and Ardahan. The diploid number of chromosomes is $2n=56$, the number of autosomal arms is $NFa=100$, and the fundamental number is $NF=104$, the X chromosome is a large submetacentric, and the Y chromosome is the smallest metacentric. In adults, sagittal crest begins in frontal region, ends in parietal region into two parts. The phallus is covered with spines. The length of phallus is 15.94 mm in average. The median part of distal baculum is 1.51 in length. Proximal baculum is 3.74 mm in length.

Key Words: *Prometheomys schaposchnikowi*, Morphology, Karyology, Turkey

Türkiye'deki *Prometheomys schaposchnikowi* Satunin, 1901 (Mammalia: Rodentia)'nin Karyoloji and Morfolojisi Üzerine Bir Çalışma

Özet: Ardanuç ve Ardahan'dan toplanan 22 *Prometheomys schaposchnikowi* örneğinin karyolojik, morfolojik, baculum ve phallus özellikleri incelendi. Diploid kromozom sayısı $2n=56$, otozomal kromozomların kol sayısı $NFa=100$, temel kromozom kol sayısı $NF=104$, X kromozomu büyük submetasentrik ve Y kromozomu ise en küçük metasentriktir. Sagittal çıkıntı ergin örneklerde frontal bölgede başlamakta ve parietal bölgede sonlanmaktadır. Phallus diken benzeri çıkıntılarla kaplıdır. Phallusun boyu 15.94 mm'dir. Distal baculumun ortadaki parçasının uzunluğu 1.51 mm'dir. Proksimal baculumun uzunluğu 3.74 mm'dir.

Anahtar Sözcükler: *Prometheomys schaposchnikowi*, Morfolojisi, Karyolojisi, Türkiye

Introduction

Satunin (1) described *Prometheomys schaposchnikowi* from Gudaur (Georgia), examining a male specimen. Vinogradov and Argyropulo (2) and Ognev (3) recorded this species from various localities in Caucasia. Spitzenberger and Steiner (4) gave the first record of *P. schaposchnikowi* from Turkey, and noted that it needs the use of the enamel pattern in taxonomic view. The aim of this study is to review karyological and morphological aspects of *P. schaposchnikowi*, and contribute to its taxonomic status.

Material and Methods

We collected 19 specimens from two localities (Kutul plateau of Ardanuç 7, and 15 Km North of Ardahan 12). Bacula and phalli were prepared in accordance with Lidicker (5). Six specimens were karyotyped from the bone marrow of the colchicined animal (6). Twelve slides

were prepared from each animal, and twenty-five metaphase cells, whose chromosomes are well separated, were examined in order to determine the diploid number of chromosomes ($2n$), the fundamental number (NF), and the number of autosomal arms (NFa) as well as metacentric (m), submetacentric (sm), telocentric (t), acrocentric (a), and sex chromosomes (X and Y). After the age of all specimens were determined, adult specimens were biometrically evaluated. The skulls, skins, phalli, bacula were deposited in Mammal Museum at the Department of Biology, Faculty of Science, University of Ankara.

Results

Prometheomys schaposchnikowi Satunin, 1901.

1901. *Prometheomys schaposchnikowi* Satunin, Central Caucasus, Zoologischer Anzeiger, V. 25: 572-575.

Distribution: Fig. 1 shows the distribution of *P. schaposchnikowi* in Turkey.

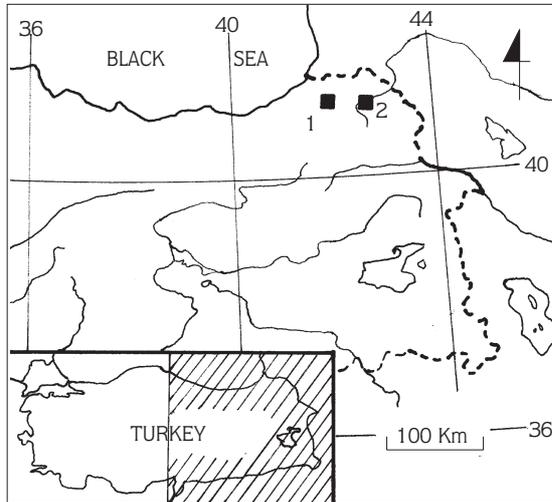


Figure 1. Recorded localities (■) of *P. schaposchnikowi*.
1. Ardanoç 2. Ardahan

Habitat: *P. schaposchnikowi* lives in burrows in meadows above the treeline at 2000-2200 m elevation. There are numerous mounds in meadows in which this species inhabits. We counted 80 mounds in an area of about 50 m², and captured a female and three males from a burrow in Ardahan (Fig. 2).



Figure 2. Habitat of *P. schaposchnikowi* in Ardahan

External characters: Maximum total length is 195 mm (Table 1). The fur coloration is changeable from young to adult. In young, the fur is dark gray. In adult specimens, it is reddish brown in dorsal aspect, turning light brown to flanks. The demarcation line along the flanks is indistinct. Underparts are dark gray with reddish tinge. The eyes are very small. The ears are concealed with long hairs. The tail is basally thick, densely covered with whitish brown hairs, and its tip is white. The nails of fore foot are longer than those of hind foot. Fore and hind feet are covered with white hairs. The heel of hind foot is hairy, and its soles are naked.

Cranial characters: Interorbital distance is very much constricted. Braincase is more even in dorsal aspect in young than in adults. There is no sagittal crest in young, whereas in adults it begins in frontal region, dividing in parietal region into two parts in 12 specimens. Occipital processes are markedly laterally developed. Upper and lower incisors are anteriorly covered with yellow enamel and internally whitish. There are two holes behind incisors. Palatal bone is ended in a notch in 10 out of 19 specimens (Fig. 3).

Dentition: Upper and lower molars have two roots in adults. In contrast to adult specimens, in young there is a concavity in the anterior edge of M¹ and a small crack in the posterior lobe of M₃. M₁ has 3-4 external and 4-5 internal salient angles, M₂ and M¹ have 3 external and internal salient angles, M₃ has 2-3 external and internal salient angles. M² and M³ have 2 external and 3 internal salient angles. Enamel fields in upper and lower molars

| Characters | n | Mean | Range | ±SD |
|-----------------------------|----|-------|-----------|------|
| Total length | 19 | 184.4 | 179-195 | 6.50 |
| Head and body | 19 | 142.1 | 143-151 | 5.40 |
| Tail | 19 | 43.4 | 38-49 | 2.10 |
| Hind foot | 19 | 25.4 | 24-27 | 1.01 |
| Ear | 19 | 14.8 | 14-16 | 0.71 |
| Weight (g) | 19 | 60.1 | 50-80 | 15.1 |
| Zygomatic breadth | 18 | 17.22 | 16.5-19.2 | 0.6 |
| Interorbital constriction | 19 | 4.2 | 4.1-4.5 | 0.13 |
| Condylbasal length | 19 | 30.12 | 29.3-32.5 | 0.99 |
| Greatest length of skull | 19 | 32.1 | 29.4-33.8 | 1.10 |
| Basal length | 19 | 28.2 | 25.9-29.8 | 1.22 |
| Nasal length | 19 | 9.8 | 8.6-10.7 | 0.48 |
| Nasal width | 19 | 3.75 | 3.5-4.2 | 0.22 |
| Mastoid breadth | 18 | 10.56 | 9.7-11 | 0.31 |
| Height of braincase | 19 | 11.72 | 11-12.3 | 0.40 |
| Braincase length | 18 | 13.30 | 13.2-14.1 | 0.55 |
| Braincase width | 18 | 12.55 | 12.3-12.9 | 0.22 |
| Palatal length | 19 | 15.96 | 14.8-16.7 | 0.37 |
| Bullae length | 18 | 7.60 | 6.9-8.0 | 0.25 |
| Diastema | 19 | 9.90 | 8.7-10.7 | 0.42 |
| Foramen incisiva | 19 | 5.54 | 5-6 | 0.30 |
| Occipital width | 19 | 15.16 | 14.1-16.1 | 0.62 |
| Mandible | 18 | 21.25 | 19.7-22.1 | 0.71 |
| Upper molar alveolar length | 19 | 7.21 | 6.6-7.7 | 0.30 |
| Lower molar alveolar length | 19 | 7.51 | 6.9-7.8 | 0.23 |

Table 1. Measurements (mm) of the external and cranial characters of Turkish *Prometheomys schaposchnikowi* (n: number of specimens, SD: Standard Deviation).

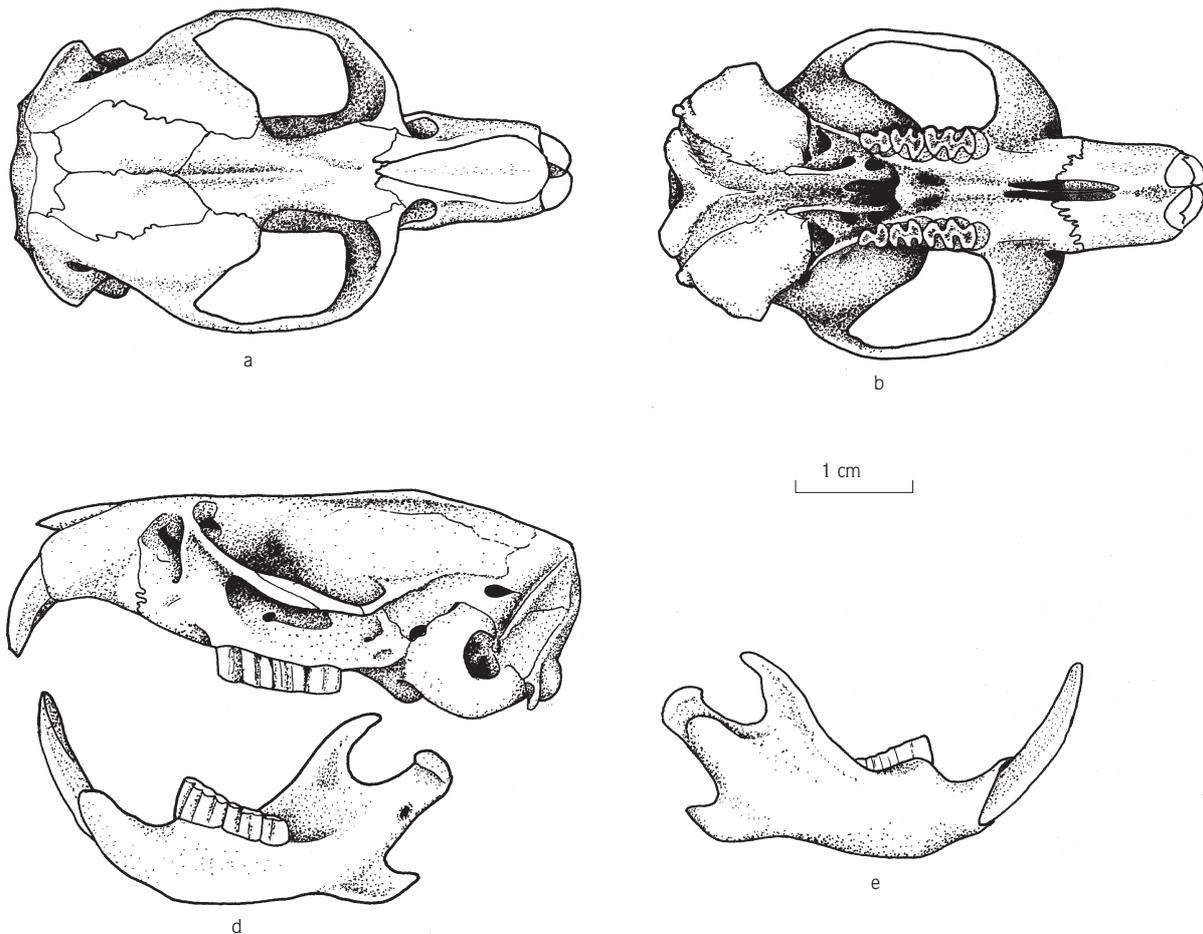


Figure 3. The skull of *P. schaposchnikowi* from Ardahan a. Dorsal b. ventral c. lateral view d, e. Mandible

are generally opened. There are 2-3 enamel fields in M^2 , 2 in M^3 and M_1 . There are variations in patterns of enamel fields between young and adults. In adult specimens, anterior edge of M^1 is rounded and small internal salient angle in posterior lobe of M_3 is lost (Fig. 4).

Phallus: The phallus is completely covered with spines. We measured 9 phalli from fresh material in the field. The length of phallus is 15.94 mm in average. It is broadened towards its tip, and becomes an appearance of fist-shaped (Fig. 5).

Baculum: The baculum is composed of distal and proximal baculum. Distal baculum has a trifid cartilageous pars. The median part of distal baculum is longer than lateral ones, it is 1.51 mm in length. Proximal baculum

contains a shaft with marked bulbous tip, with more expanded base (Fig. 6). Proximal baculum is 3.74 mm in length and 1.74 mm across the base with a thick of 0.81 mm. There are variations in the morphology of baculum depending on the age. In young specimens, the basal of baculum is pointed, whereas in adult ones it is blunt (Fig. 7).

Karyology: Diploid number of chromosomes is $2n=56$, the number of autosomal arms is $NFa=100$, and the fundamental number is $NF=104$. Autosomal set consists of 12 metacentrics, 34 submetacentrics, and 8 acrocentrics. The X chromosome is a large submetacentric, and the Y chromosome is the smallest metacentric (Fig. 8).

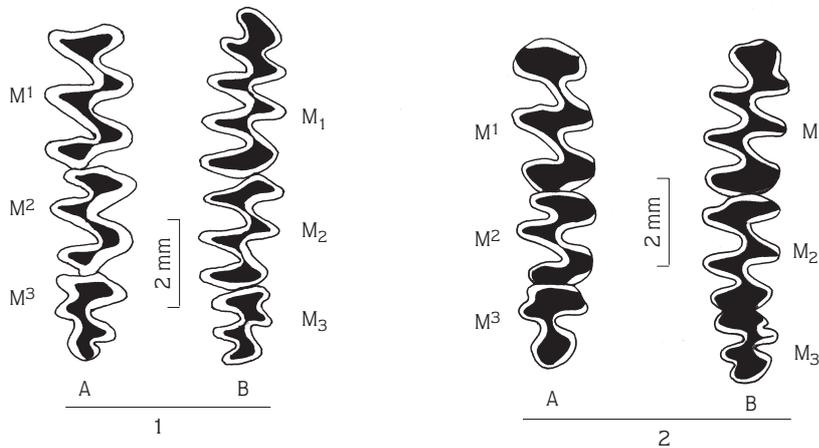


Figure 4. Enamel pattern of upper (A) and lower (B) tooth row of *P. schaposchnikowi*
1. Young 2. Adult specimen

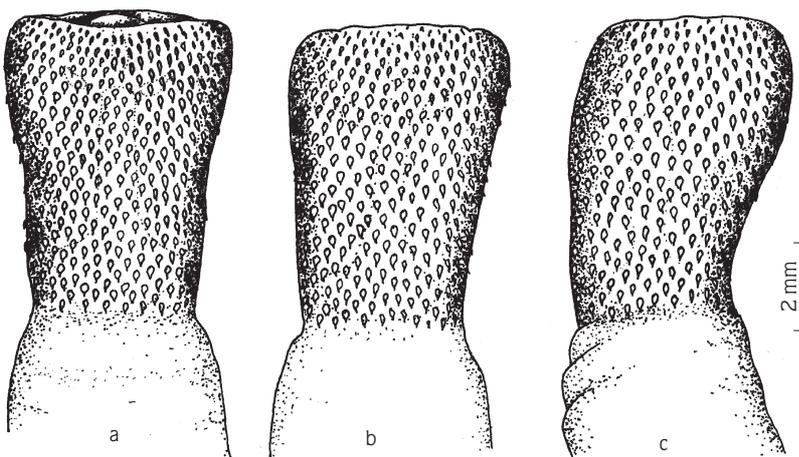


Figure 5. Phallus of *P. schaposchnikowi* from Ardahan
a. Dorsal b. ventral c. Lateral view

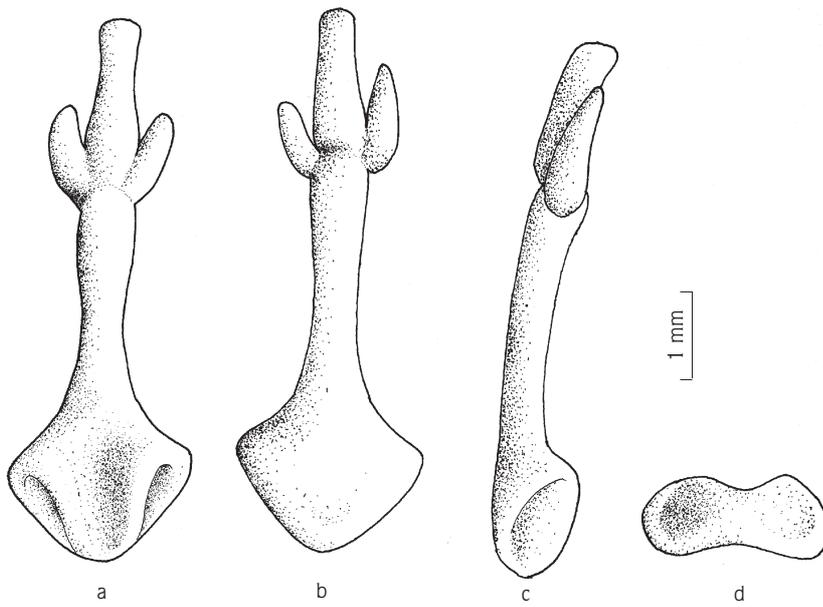


Figure 6. Baculum of *P. schaposchnikowi* from Ardahan
a. Dorsal b. Ventral c. Lateral
d. Basal view

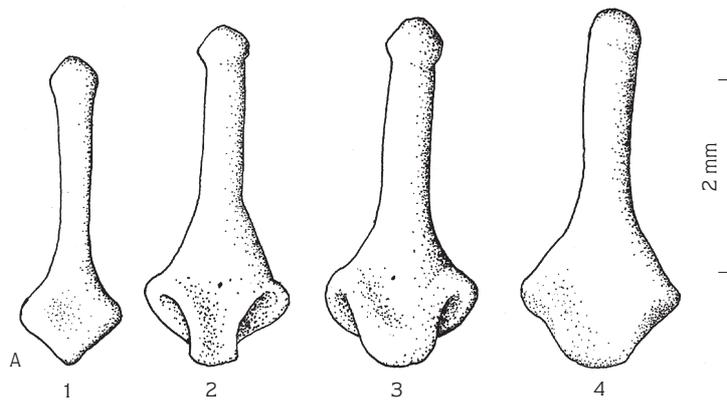
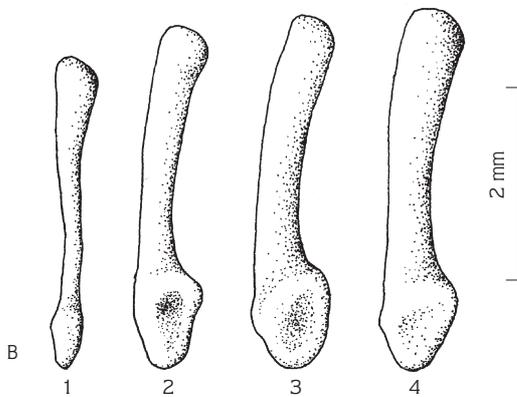


Figure 7. Variations depending on the age in baculum of *P. schaposchnikowi*
A. Dorsal B. Lateral view
1. Young 2. Subadult 3. Adult 4. Old specimen



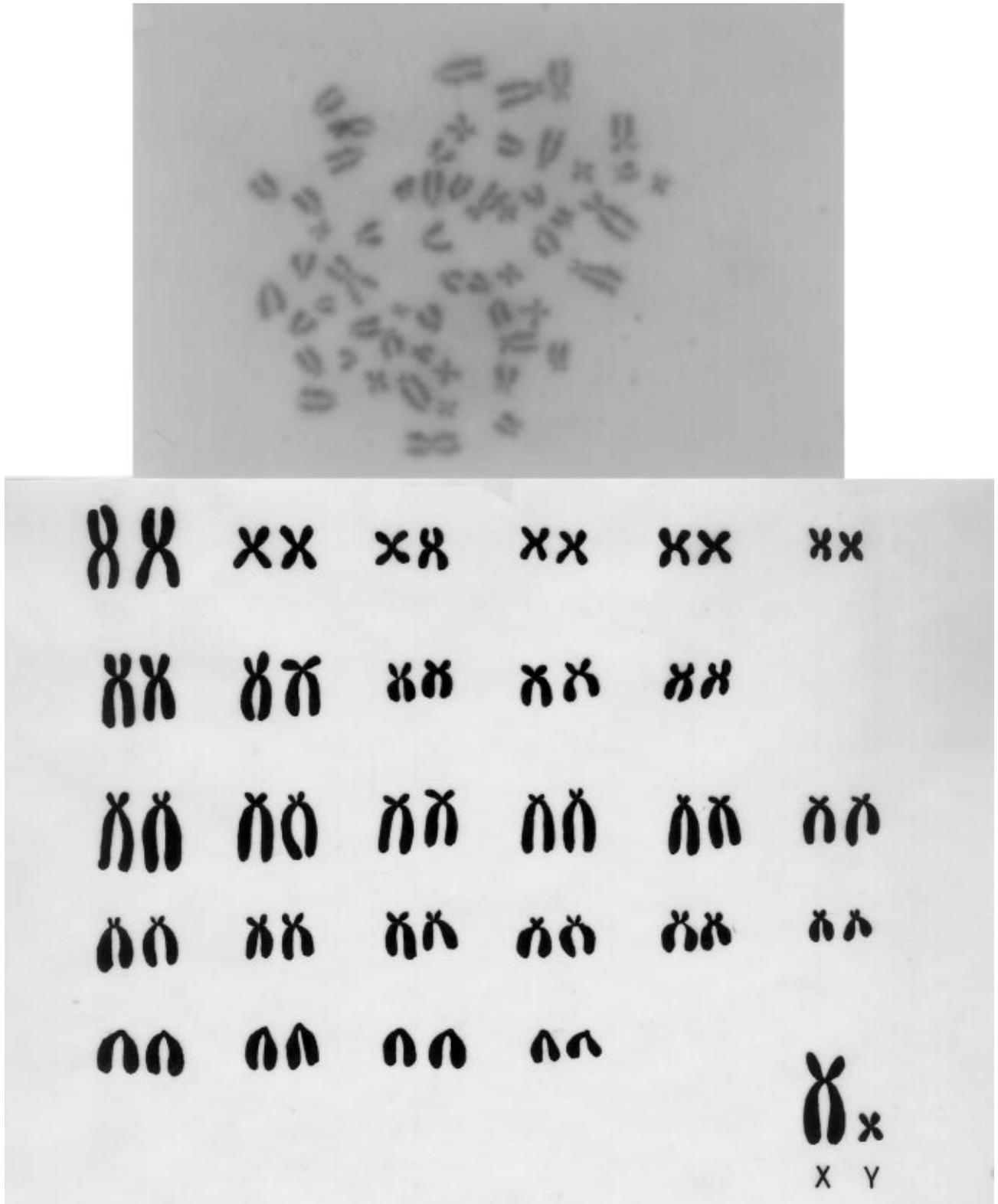


Figure 8. Karyotype of male *P. schaposchnikowi* from Kutul plateau

Discussion

Satunin (1) gave measurements of three external and seven cranial characters for the type, Vinogradov and Argyropulo (2) four external characters for specimens in Caucasia and Ognev (3) four external and 11 cranial characters for specimens in Caucasia and Spitzenberger and Steiner (4) four external and six cranial characters for specimens in Ardanuç (Turkey). We have compared these measurements with those of specimens in this study and found that character measurements of Turkish population seems to be in variation range of those of Caucasian populations. According to Vinogradov and Argyropulo (2), and Ognev (3) sagittal crest extends from the frontal to the interparietal region in old specimens, whereas the sagittal crest in Turkish specimens is ended in parietal region. The enamel pattern of molars of specimens in Turkey is consistent with that of specimens in Caucasia (2, 3).

Baculum and phallus of specimens in Caucasia were examined by Ognev (3). Contrast to Ognev (3), the proximal baculum of *P. schaposchnikowi* in Turkey is basally more expanded than in Caucasia and phallus becomes broadened towards its tip, and phallus is completely covered with spines. On the basis of morphology of baculum and phallus, Turkish population of *P. schaposchnikowi* differs from Caucasian populations.

According to Zima and Kral (7), NFA is 70 and the Y chromosome is the smallest metacentric. Matthey (8) described the karyotype of this species from Caucasia. We examined a metaphase plate appeared in his paper and found that it is similar to that of Turkish specimens.

Even if there are some differences between Turkish population and Caucasian population. It is necessary to compare Turkish specimens to Caucasian ones for a definite decision about subspecific status of *P. schaposchnikowi*.

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