

Saiga tatarica. By Vladimir E. Sokolov

Published 2 May 1974 by The American Society of Mammalogists

Saiga Gray, 1843

Saiga Gray, 1843:xxvi. Type species *Capra tatarica* Linnaeus, by monotypy.

Siaga Gray, 1843:160, a misspelling.

Colus Wagner 1844:419. Type species *Antilope saiga* Pallas, by monotypy.

CONTEXT AND CONTENT. Order Artiodactyla, Suborder Ruminantia, Family Bovidae, Subfamily Caprinae. The genus *Saiga* now includes one species, *Saiga tatarica*, as treated below.

Saiga tatarica (Linnaeus, 1766)

Saiga Antelope

Ibex imberbis Gmelin, 1760:345. Type locality Tara, on River Irtysh, Siberia (unavailable because the work is not consistently binominal).

Capra tatarica Linnaeus, 1766:97. Type locality Asia.

Antilope saiga Pallas, 1766:6. Renaming of *Ibex imberbis* Gmelin.

Antilope scythica Pallas, 1767:9. Renaming of *Ibex imberbis* Gmelin.

Capra sayga Forster, 1768:344. Type locality Volga Basin, Russia.

Gemas colus Oken, 1816:736. Renaming of *Ibex imberbis* Gmelin (Oken's work also is not consistently binominal).

Saiga mongolica Bannikov, 1946:391. Type locality Shargin, Gobi, Duchman-Tala, 150 km w Bayan-Somon, western Mongolia.

CONTEXT AND CONTENT. Context noted in generic summary above. Two subspecies are recognized (Geptner *et al.*, 1961) as follows:

S. t. tatarica (Linnaeus, 1766:97), see above (*sayga* Forster is a synonym).

S. t. mongolica Bannikov, 1946:397, see above.

DIAGNOSIS. Because the genus includes only one species, the following diagnosis applies both to the genus and species. Total length is 1.04 to 1.46 m, height at shoulder .57 to .79 m, height at sacrum .57 to .73 m, length of tail without terminal hairs 60 to 120 mm, length of ear 70 to 120 mm; build rather robust, legs relatively short and thin; head large, front part swollen and hooked, the nose forming a short, soft, mobile proboscis that hangs over mouth (figure 1); nostrils are rounded, closely-set and directed downward. Only males

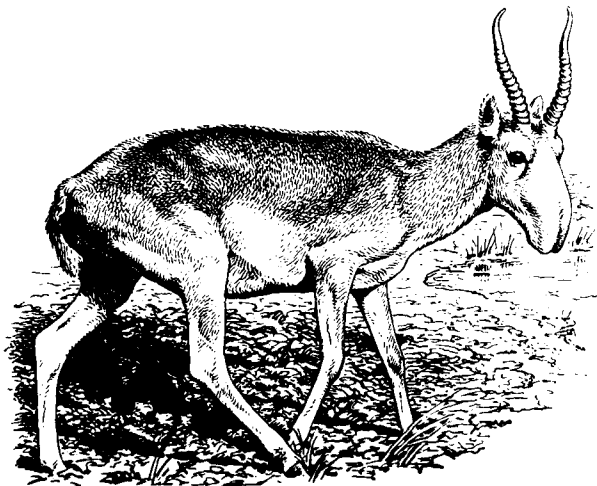


FIGURE 1. A male saiga.

have horns, which measure 280 to 300 mm along the curve, are semi-transparent, of light waxy color, and almost vertically set and lyre-shaped; the lower two-thirds of horns have 12 to 20 ring-like ridges; horn almost round in cross-section. In the skull, nasal bones are considerably reduced and raised upward (figure 2), the large lacrimal bones forming lateral sides of nasal foramen (unique case among Ungulata); nasal foramen opens not only forward but also upward; eye-sockets are pipe-shaped; ethmoidal foramen is absent; preorbital fossa is poorly developed; dentition i 0/3, c 0/1, p 3/2, m 3/3, total 30.

GENERAL CHARACTERS. A more detailed description, anatomical illustration, figures of the cranium, and black-and-white photographs appear in Sokolov (1959), Geptner *et al.* (1961) and Bannikov *et al.* (1961).

DISTRIBUTION. As late as the years from 1600 to 1800, saiga ranged west to the Carpathians and the Southern Bug and Prut rivers, and in Europe saiga inhabited the entire steppe zone and most of the forest-steppe. A great reduction in saiga distribution took place after 1800. By the 1920s and 1930s in Europe, the saiga was only found in remote parts of the Kalmyk steppe. The range in Kazakhstan was likewise considerably reduced. The range became discontinuous (figure 3). In the late 1920s in the European part of the USSR and in the 1930s in Kazakhstan, the restoration of the former saiga range began, and now the species occupies virtually the whole of the habitats available. Its range is limited now by cultivated lands, and, recently, some reduction has been caused by agricultural development.

FOSSIL RECORD. No fossils earlier than Pleistocene have been recorded. Morphologically, Pleistocene saigas do

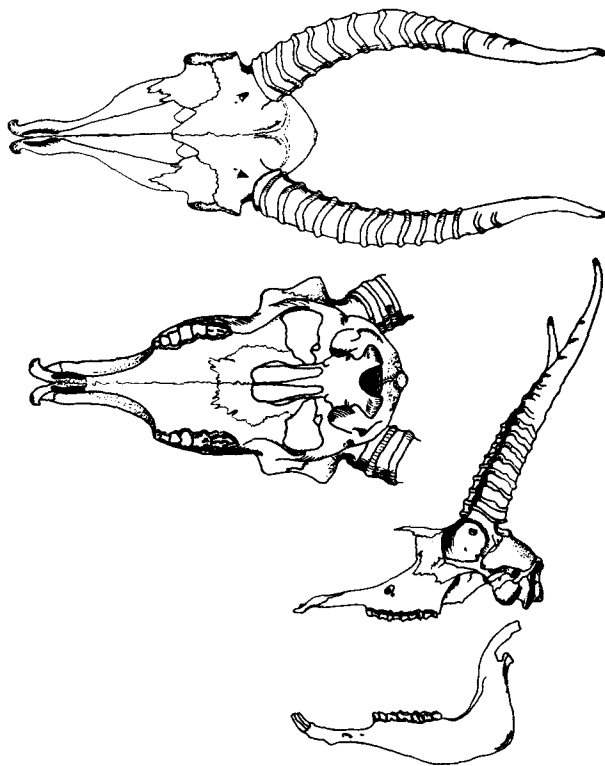


FIGURE 2. Dorsal, ventral, and lateral views of skull, and lateral view of lower jaw of male saiga (Zoological Museum of Moscow University no. 62095). Scales vary.

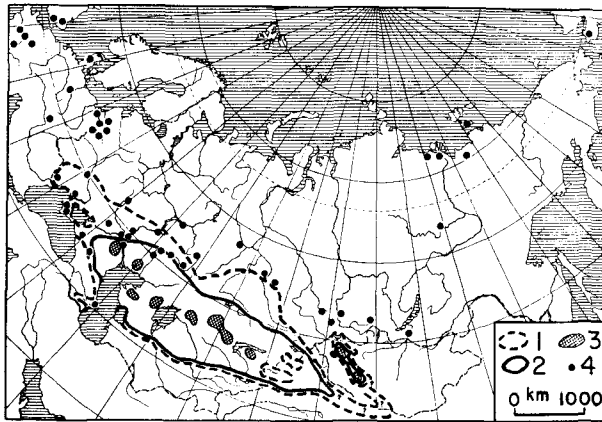


FIGURE 3. Saiga distribution: 1, distribution within historic times; 2, distribution at present; 3, distribution in the 1920's; 4, fossil findings (Bannikov, 1961).

not differ from those of Recent times, but they ranged from England in the west to northern Siberia in the east, up to the Novossibirsk Islands, and, presumably, Alaska.

FORM. Saiga pelage comprises three kinds of hairs (Adolf, 1959). In summer, the length of the pelage is equal over the entire body (18 to 30 mm). In winter, the pelage is considerably longer (40 to 70 mm). The longest hair is on the neck, a mane 120 to 150 mm in length being formed. The pelage is yellowish-red in summer, the sides being of a paler tint than the back. The belly and chest are white. From the back of the head onto the neck, a broad band passes that is darker than the general color of the back. In winter, the color of the pelage is pale, dull, and of a clay-grayish tint. The throat, chest and belly are whitish with a brown-gray touch. There is a dark-brownish or, occasionally, black patch of 70 by 40 mm around the sacrum. There are two molts a year, in spring (April to May), and in autumn (from late September or early October to late November or early December). Some specific skin glands are as follows: interdigital, preorbital, inguinal, and carpal. The interdigital gland is comprised of a large number of sudoriferous glands, the carpal gland is comprised of sebaceous glands. The most marked characteristic of the saiga respiratory tract is a high development of the nasal vestibule to form a mobile proboscis (for details see Lodyzhenskaya, 1952). The development of a large vestibule lined with well-formed integument of a type containing numerous large-sized glands and diverticula, and the abundant circulatory supply to the respiratory part are features that appear to be adaptations to rapid and extended running in dusty semi-deserts. Thereby, the respiratory part, which is generally more easily damaged, became protected from the dust by having been retracted the whole length of the proboscis (Bannikov *et al.*, 1961).

Saiga lungs are distinctly lobular. Their weight in adults is 1.3 to 1.6% of the total body weight. The bronchi have poorly-developed cartilages and no glands. The relative heart dimensions are high as compared with a number of other mammals. The liver and kidneys are large, which is evidently due to a high-rate metabolism.

ONTOGENY AND REPRODUCTION. Saigas are polygamous. The females become sexually mature at 7 to 8 months and the males at 2 years of age. The breeding period lasts from late November to late December. Before the rut, a "harem" of females is grouped around a male. The number of females in the "harem" ranges from five to 10 (occasionally up to 50). Fights between males are frequent. Pregnancy lasts 5 months. Most pregnant females gather in certain localities, which are the same from year to year. These are open plains with scattered saucer-shaped depressions. The percentage of females giving birth is high. So the number of new-born saigas may amount to five or six individuals per hectare (Fandeev, 1960). Calving occurs at different periods in different places. It starts in late April in Kalmykia, its onset being 10 days later in Kazakhstan. Calving occurs 10 days later in Mongolia than in Kazakhstan. Calving lasts about a month (Bannikov, 1958). Females usually give birth to two young. The sex ratio among the new born is about one to one. At an age of 4 to 8 days young saigas are able to graze. The lactation period is about

4 months. The average weight of a new-born saiga is about 3.5 kg. The total length (head included) is .53 to .67 m. At an age of one month, the weight is 6 to 9 kg, the body length being up to .70 to .80 m. When 6 months old, males weigh 18 to 27 kg and females 16 to 24.5 kg. The total body length figures are, respectively, 1.09 and 1.07 m. When a year old, males weigh about 28 kg, females 24.2 kg. The total length figures are, respectively, 1.16 and 1.10 m. Female growth ceases by 20 months of age. Males continue to grow for up to 2 years of age. Small horns appear when males are 1 month old. By the age of 6 months, horns reach the length of 100 mm and are black; they become pale-colored by the age of 13 to 14 months. The length of the horns is 170 to 230 mm at an age of 1 year. Horns cease growing when the animal is 20 months old. The milk dentition of a new-born saiga is $i\ 0/3$, $c\ 0(1)/1$, $p\ 3/3$. The milk premolars are fully-developed at an age of 2 months, after which time the molar teeth are cutting. These achieve full size by 17 to 18 months of age. The replacement of milk premolars by permanent teeth begins at an age of 12 to 13 months, and is completed when the animal is 15 months old. The substitution of the milk incisors and canines begins with the middle incisors at an age of 13 to 14 months and is completed when the animal is 20 to 24 months old, by which time the canines also have been replaced (Kchusainov, 1959). When a young saiga is 2 weeks old the first (evidently partial) molt occurs, the juvenile hair comes out, and the animal acquires the adult summer hair. The molt lasts rather long and is completed in early August.

ECOLOGY. The wolf is the principal enemy of saiga. Rakov (1955) believed that in Kazakhstan wolves are responsible for the loss each year of 20 to 25% of the total saiga population. New born saigas may be attacked by the fox, steppe eagle, golden eagle, stray dog, and raven. Stomatitis epidemica may cause saiga epizootic. About 35 kinds of parasitic worms have been found in the saiga. Ectoparasites include lice (Bezuklandnikova, 1957) and the mites *Hyaloma scupense*, *H. plumbeum*, and *Rhicephalus sanguineus* (Kon-drashkina *et al.*, 1955; Dal *et al.*, 1958). Generally, the saiga has no competitors among associated wildlife, but *Microtus socialis*, *Lagurus lagurus*, and *Gazella subgutturoza* occasionally may compete with it during droughts. Snowstorms of several days cause mass migrations, and, not infrequently, the death of a great number of animals (Lavrovsky, 1950; Dal *et al.*, 1956). Ice-crust formations also may bring about the death of saigas (Sludsky, 1955). Early droughts sometimes cause the death of young animals and of nursing females (Lavrovsky, 1950; Adolf, 1950). The high mobility of saiga results in the escape from natural calamities of a large part of the population and accounts for the insignificant drops in population numbers, usually no more than 50 to 70%. Owing to high fertility and the early onset of sexual maturity of females, numbers are readily restored. In the winter after the rut, the exhausted adult males perish in large numbers and by spring they constitute only 10 to 15%, and, occasionally as few as 3 to 5% of the total population (Sludsky, 1955; Rakov, 1956). However, due to polygamy this does not appear to considerably affect saiga populations. Saiga usually roam and it is only during rut that a male along with his "harem" usually stays within a comparatively small area of 3 to 10 square kilometers. In May when new-born are yet unable to walk with their mothers, the females remain within 2 to 3 kilometers of the places where the young lie. Commonly, saiga cover a few dozen kilometers a day, the distance depending on the state of the pasture and herd numbers. The larger the herd and the poorer the pasture, the greater the distance covered. During the migratory period, the herd covers 80 to 120 and more kilometers per day.

Saiga migrations are not characteristic of the total population and do not occur every year. No seasonal migrations are observed in Mongolia. In years with average precipitation, some saiga on the right bank of the Volga are sedentary, but the greatest part of the population there has areas of seasonal concentrations where the migration routes are directed in winter, spring, and autumn. Winter assemblages are formed in localities with the least snow cover. With respect to the right bank of the Volga, this area is situated southward of the line from Astrakhan through Khalkhuta and Elista. Usually, the gradual migration to winter assemblage areas occurs in late September or October, but it often occurs as late as December or January. Summer assemblages depend on the amount and distribution of summer precipitation and coincide with the season of scorching of the grass and drying of bodies of water. Periods of these assemblages vary in different years. Normally, when drought extends over large areas, relatively large groups

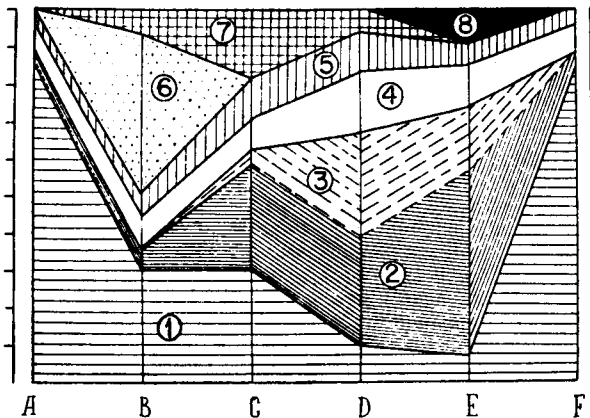


FIGURE 4. Seasonal variability of saiga diet: A, early spring pattern; B, spring pattern; C, summer pattern; D, late autumn pattern; E, winter pattern; and F, early spring pattern. 1, Graminae; 2, *Kochia prostrata*; 3, *Salsola*; 4, *Ephedra distachya*; 5, *Artemisia*; 6, *Ephemerals*; 7, various herbs; 8, lichens.

of saigas are observed near rivers and lakes. Spring assemblages usually occur in the calving period, the localities of these assemblages being more regular than groupings in summer and winter.

Saiga populations have increased considerably over the last few decades. By about 1930, the total population throughout the whole range was not more than 1000 head. In the 1930's, and especially in the 1940's, a sharp rise occurred, and the total population reached about 2 million head in an area of about 2.5 million square kilometers by 1958, or a mean density of 0.8 per square kilometer. By that time, the saiga population in the Asian part of the USSR amounted to 1.5 million head, with an additional 500,000 head on the right bank of the Volga (Bannikov, 1958). Further changes in saiga numbers in the Western Precaspian region are shown below. At present, saiga inhabit dry steppes and semideserts. The animals keep to the plains, avoiding rugged country. It is only in winter, during snow storms, that saigas can be found among sand ridges or in hilly steppe.

Saiga diet includes about 100 plant species. The most important items are grasses (*Agropyrum*, *Bromus*, *Festuca*, *Stipa*, *Eragrostis*); then (listed according to their importance) come members of Chenopodiaceae (especially *Kochia prostrata*, *Anabasis aphylla*, and *Camphorosma monospeliacum*), various herbs (more than 27 species), ephemerals (*Allysum*, *Irisaphylla*, *Gagea*, *Tulipa*, and others), *Ephedra distachya*, *Artemisia*, and members of the Parmeliaceae. The importance of various species consumed by saiga depends on the season (figure 4).

Watering places are used by saiga in summer when the diet contains the least amount of moisture. Under favorable conditions, waterholes are visited daily or twice a day—in the morning and in the evening. In captivity, a saiga consumes 2 to 4 liters of water daily.

Saiga hunting dates back to early times. Silantiev (1898) claimed that in the early 19th Century hundreds of thousands of head were taken annually. Saiga horns were highly valued and were exported to China in large numbers. Overhunting caused an almost complete extermination of saiga, and a ban on hunting was imposed in 1919. Conservation measures resulted in restoration of the saiga population. Therefore, on the right bank of the Volga in 1951, and in Kazakhstan in 1954, license hunting was permitted. A total of 72,700 head was taken in 1965, 75,000 in 1966, 61,000 in 1967, 85,000 in 1968, and 33,000 in 1969. Since 1968, saiga hunting in the Western Precaspian region has been stopped. The numbers in parentheses in Table 1 are the numbers of saigas in autumn before the hunting season.

In average years about 30 to 50% of 1-year-old males and up to 10 to 20% of the females in the population censused in autumn can be taken without affecting the total population. Saiga yields high quality meat, hides to produce box-calf, and horns, which are exported for manufacture of tonic medical preparations. In some years, saiga may affect agricultural plants to some extent trampling them or feeding on them in the fields. The damage by saiga, however, is not great. Saigas do not appear to compete significantly with sheep at natural

TABLE 1. Population numbers and numbers taken (both in thousands) in the Western Precaspian region from 1957 to 1968 (Zhirnov, 1969).

Year	Saiga populations (thousand head)	Numbers taken (thousand head)
1957	450	100
1958	540	173
1959	348	180
1960	186	39
1961	340	121
1962	267	131
1963	125	41
1964	115	40
1965	75 (120)	ban on hunting
1966	105 (215)	22
1967	130 (230)	30
1968	80-100 (116)	ban on hunting

pastures. Eight saigas were brought to the island of Barsa-Kelmes in the Aral Sea in 1929. Prior to that time the natural population of the island had been only five females, but by 1957 the population amounted to more than 1000 head.

BEHAVIOR. Saigas are gregarious animals and in summer keep in herds of 30 to 40 head. Occasionally, there are gatherings of as many as 1000, but herds of five to 50 head can be distinguished within these large groups (if the animals are on the move). There are no dominant animals or leaders except for during the rut period. In December, an adult male becomes the leader of a harem of five to 15 females. In this period, young males usually form herds of from a few dozens or hundreds. After the rut, adult males occur in small groups of five to 10, whereas the rest of the animals form large herds again. In the reproductive period, pregnant females and those giving birth form separate groups. In winter, early spring, and late autumn, saigas are active throughout the day. On hot summer days, from the hours 0800 or 0900 to 2000 or 2100, they are mostly inactive, feeding at dawn and in the evening. In winter and spring they select low places for resting areas, frequently among dense grass or low shrubs. In summer they rest in shaded places, preferring hillocks near souslik lairs. Saigas scratch the earth with their hooves, sniff at the earth, and wait a short period before lying down to rest. In winter, holes in which to lie are made in the snow.

Usually, saigas pace at a rate of up to 70 to 80 km/hr. When escaping from danger, they take to a gallop, making so-called "observation jumps" to see the persecutor. At watering places saigas usually get belly-deep in the water and drink for 3 to 5 minutes with nose wrinkled and nostrils dilated. They always keep the nostrils above the surface of the water. Ferocious fights between males occur in the rut period, which occasionally result in the death of one of the fighters. During the rut, the animals rarely graze, but often eat snow. They become careless and dangerous, and may even attack a man. Breeding occurs at night, males lying for long periods during the day. New-born saigas lie most of the time and get up only when they get hungry. Normally, this occurs twice a day, early in the morning and in the evening. At this time, young saigas may run from place to place and call out for the mothers. Each female appears to feed only its own young.

LITERATURE CITED

Items with titles in brackets were published in Russian.

- Adolf, T. A. 1950. [Saiga in the Astrakhan steppes of the right Volga bank.] *Okchraha Prirody*, Moscow 10:73-87.
 — 1959. [On saiga pelage.] *Uchenye Zapiski Moskovskogo Gosudarstvennogo Pedagogicheskogo Instituta imeni V. P. Potemkina*, Moscow, 104, *Zoologija* 8:81-85.
 Bannikov A. G. 1946. [A new saiga species from Mongolia.] *Doklady Akad. Nauk* 51:397-399.
 — 1958. *Distribution géographique actuelle et biologique de la Saiga en Europe.* *Mammalia* 22:208-225.
 Bannikov, A. G., L. V. Zhirnov, L. S. Lebedeva, and A. A. Fandeev. 1961. [Biology of saiga.] *Selskokhozyajstvennaya Literatura Publ.*, Moscow, 336 pp.
 Bezukladnikova, N. A. 1957. [On lice fauna of Kazakhstan wildlife.] *Trudy Instituta Zoologii Akad. Nauk Kazakhskoi SSR*, Alma-Ata 7:289-290.
 Dal, S. K., V. M. Gusev, and S. N. Bedny. 1956. [The effect

- of the winter of 1953-1954 on the condition, numbers and distribution of saiga in the Western Precaspian Region.] Trudy Nauchno-issledovatel'skogo Protivochnmogo Instituta Kavkaza i Zakavkazya 1:430-441.
- 1958. [On ecology and reproduction of saiga.] Zoologicheskyy Zhurnal 37:447-456.
- Ellerman, J. R., and T. C. S. Morrison-Scott. 1966. Checklist of Palaearctic and Indian Mammals. . . . British Museum, London, 2nd ed., 810 pp.
- Fandeev, A. A. [Saiga calving on the Volga right bank.] Zoologicheskyy Zhurnal 39:906-911.
- Geptner, V. G., A. A. Nasimovich, and A. G. Bannikov. 1961. [Mammals of the Soviet Union. Artiodactyla and Perissodactyla, 457-485] Vyshaya Shkola Publishers, Moscow, vol. 1, 776 pp.
- Kchusainov, A. 1959. [Determination of age in saiga according to the structural changes in the teeth.] Trudy Inst. Zoologii Akad. Nauk Kazakhskoi SSR, Alma-Ata 10: 186-205.
- Kondrashkina, K. I., V. M. Kukin, and M. M. Kozin. 1955. [Parasitism of some Ixoidoidea mites on some wild and domestic mammals of the Western-Kazakhstan Region.] Vosmoje Soveschanije po Parazitologicheskim Problemam. Tezisy Dokladov, p. 80, Izdatel'stvo Akademii Nauk SSSR, Moscow.
- Lavrovsky, A. A. [On the effect of summer drought and hard winter on the numbers and distribution of saigas.] Okchirana Prirody, Moscow 10:83-87.
- Linnaeus C. 1766. Systema naturae. . . . Editio duodecima. Holmiae inpensis, Direct Laurintii Salvii, vol. 1, 532 pp.
- Lodyzhenskaya, V. I. 1952. [On morphology of the upper respiratory paths in saiga (*Saiga tatarica*).] Uchenye Zapiski Karelo-Finskogo Universiteta, Petrazavodsk 4:17-41.
- Rakov, N. 1955. [On the role of wolf and other predators in the reduction of saiga numbers.] Trudy Instituta Zoologii Akad. Nauk Kazakhskoi SSR, Alma-Ata 4:56-66.
- Silantiev, A. A. 1898. [A Review of Commercial Hunting in Russia.] V. Kirschbaum, St. Petersburg, 619 pp.
- Sludsky, A. A. 1955. [Saiga in Kazakhstan.] Trudy Inst. Zoologii Akad. Nauk Kazakhskoi SSR, Alma-Ata 4:18-55.
- Sokolov V. E. 1961. [Saiga skin.] Pp. 27-31, in [Biology of Saiga], A. G. Bannikov *et al.*, Selskokhozyajstvennaya Literature Publ., Moscow, 336 pp.
- Sokolov, I. I. 1958. [On the Barsa-Kelmes Preserve.] Okchota i Okchotnychie Khozyaistvo, Moscow 9:21-24.
- 1959. [Ungulates. (Orders Perissodactyla and Artiodactyla.)] Pp. 345-374, in USSR Fauna, Mammals, 1(3), Izdatel'stvo Akad. Nauk SSSR, Moscow-Leningrad, 640 pp.
- Zhirnov, L. V. 1969. [Resources and hunting of saiga in the Western Precaspian Region.] Pp. 138-148, in A. G. Bannikov (ed.), Voprosy Povysheniya Productivnosti Okchotnichikh Ugodij. Kolos Publ., Moscow, 229 pp.

The editor for this account was S. ANDERSON. The synonymy was adapted from Ellerman and Morrison-Scott (1966). Original manuscript was written in English.

V. E. SOKOLOV, INSTITUTE OF EVOLUTIONARY ANIMAL MORPHOLOGY AND ECOLOGY, USSR ACADEMY OF SCIENCES, 33 LENINSKY PROSPEKT, MOSCOW, USSR.