

PROVISIONAL FIELD GUIDE TO THE

# SQUIRRELS OF

# MONGOLIA

WITH NOTES ON PIKA'S AND  
OTHER RODENTS



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## Introduction

Squirrels are a characteristic element of the Mongolian fauna. They can be conspicuous, cute, beautiful, enigmatic or all of the above. Identifying them is not always easy, and that is why this field guide has been made. It is part of a series of identification tools I will publish, and eventually I hope to adapt and compile them to form a continental or worldwide squirrel book, or perhaps an app. In contrast to for example West-African squirrels, the squirrels of Mongolia are relatively well studied. Using the Field Guide to the Mammals of Mongolia (Batsaikhan et al. 2022), squirrels of Mongolia can be identified visually. However, this book is only available in Mongolia itself, and it is not possible to order it online. This present provisional field guide here can therefore be used by visiting naturalists in preparation of their journey. I hope that this provisional field guide can also be of use for Mongolian naturalists, as certain characters are noted here that are not (yet) taken up in Batsaikhan et al. (2022). Additionally, this is the first time that squirrel calls and sounds are used as potential identification tools in a Mongolian field guide.

The study of squirrel sounds is complicated and still in its infancy. I've recorded several species of squirrel, but it is known that each species produces more than one type of sound, and many sounds are still not available online. For some species, it is not even known how any of their calls sound.

As you can see in the title, this field guide is provisional. It will probably take me many more years to complete it, and I should visit other East- and Central-Asian countries to gather more sound recordings, photographs and field observations. If you come across a mistake in this work, or if you have additional information, photographs or sound recordings, please do not hesitate to contact me. In the last chapter (p. 18) I've compiled a list with open questions.

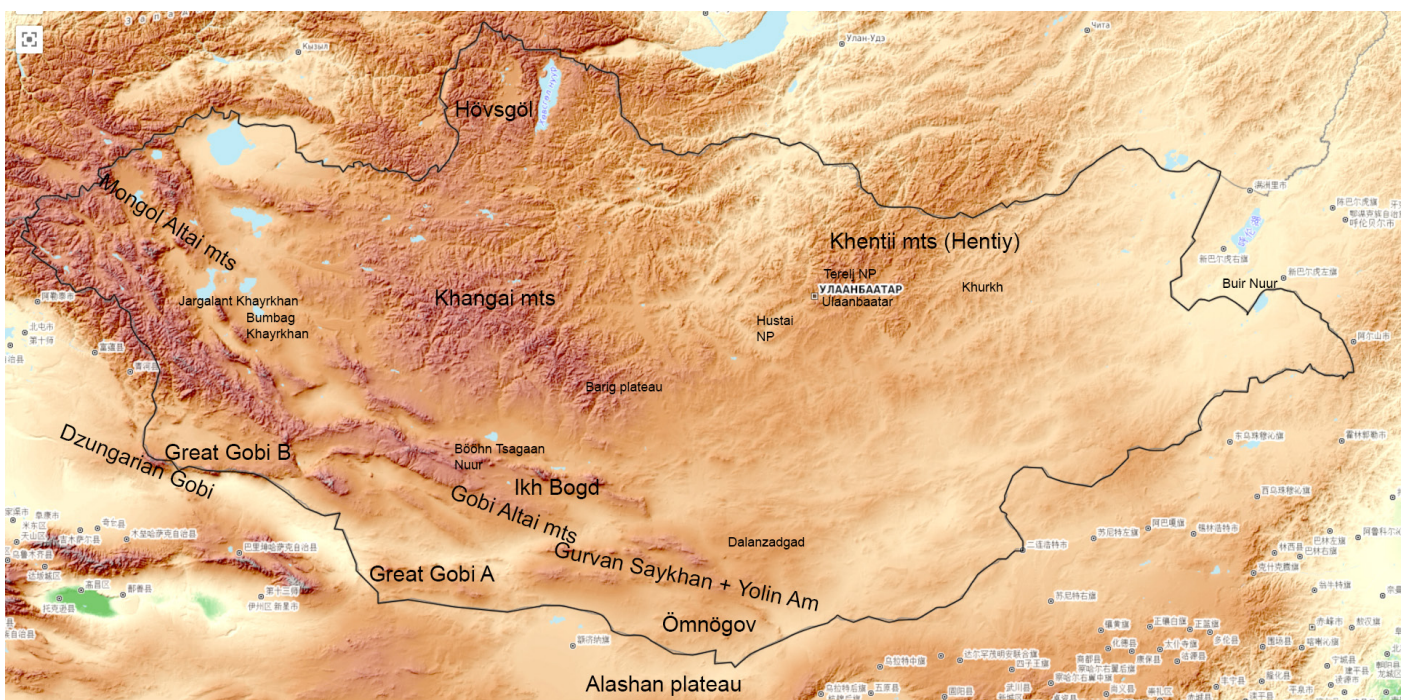
## Acknowledgements

A big thank you goes out to my friends and travel mates who enthusiastically helped me with my squirrel quest. They were almost just as fanatic as I was searching and photographing them, and they have provided great photographs along the way. Cheers to Jacob, Jurriën, Chantal, Ruben and Lotte!

I owe many thanks to the observers, photographers and recordists on the Observation.org and iNaturalist.org platforms, and especially those who sent me their work: Benny Voorn, Dmitry Kukalov, Dovchindorj G., Griha Hasanov, Jacob Lotz, Jurriën van Deijk, Marc and Peggy Faucher, Marina Gubernova, Ruben Vermeer, Atilla Steiner, Svetlana Meshcheryagina, and Tatyana Kolesnikova. Additional thanks goes out to Andrey Lissovsky, who helped me with the identification of sounds.

## Area

This field guide covers the land within the borders of Mongolia. In the future I hope to be able to expand the availability of squirrel identification knowledge to the whole of Central-Asia and even the entire Palearctic, but at first I'd like to restrict myself to Mongolia. No less than nine species of squirrels occur in Mongolia, thanks to the diversity of landscapes and mountain ranges in this vast landlocked country. In the first map you will find the names of the areas and regions that are mentioned in this book. In the species descriptions you'll find the species' name in Mongolian Cyrillic and a transcription of what these names sound like. In the chapter "Language" on p. 18 you will find the most important names even with a reference to one of the soundtracks so you can hear it in Mongolian as well.



Map of Mongolia with location names used in this book.

## Species list

When no subspecies is given the species is either monotypic or only the nominate subspecies occurs in Mongolia.

Family: Sciuridae

Subfamily: Xerinae

Tribe: Marmotini

1. Tarbagan marmot *Marmota sibirica* (Radde, 1862)  
Alt. Siberian marmot, Mongolian marmot  
Ssp. *M. sibirica sibirica* (steppe habitats in eastern part of its range)  
Ssp. *M. sibirica caliginosus* (mountain habitats in the western part of its range)
2. Gray marmot *Marmota baibacina* (Kastschenko, 1899)  
Alt. Altai marmot, Grey marmot  
Ssp. *M. baibacina baibacina*  
Ssp. *M. baibacina centralis* (probably extralimital)
3. Long-tailed ground squirrel *Urocitellus undulatus* (Pallas, 1778)  
Ssp. *U. undulatus evermanni* (Altai and probably Mongolian steppes)  
Ssp. *U. undulatus stramineus* (Western Mongolia, pale subspecies)
4. Alashan ground squirrel *Spermophilus alashanicus* Büchner, 1888
5. Daurian ground squirrel *Spermophilus dauricus* Brandt, 1843
6. Pallid ground squirrel *Spermophilus pallidicauda* (Satunin, 1903)  
Brandt's ground squirrel *Spermophilus brevicauda* (Brandt, 1843)
7. Siberian chipmunk *Eutamias sibiricus* (Laxmann, 1769)

Subfamily Sciurinae

Tribe: Pteromyini

8. Siberian flying squirrel *Pteromys volans* (Linnaeus, 1758)

Tribe: Sciurini

9. Eurasian red squirrel *Sciurus vulgaris* (Linnaeus, 1758)  
Ssp. *S. vulgaris altaicus* (Altai mountains)  
Ssp. *S. vulgaris fusconigricans* (Northeastern Mongolia)

## How to observe squirrels

Most Mongolian squirrels live in open habitat and make extensive burrows. These species require patience to observe, and this is best done in protected reserves where there is less hunting pressure. Listen carefully to calls in order to locate them, or scan around with binoculars or telescopes. Sometimes you will see ground squirrels or marmots from a car. They will often quickly dive into their burrow if you brake too abruptly, so best is to stop at an appropriate distance and carefully approach when you want to get closer. Once a marmot or ground squirrel has fled into its burrow, it will often come out and look one more time. If you make any abrupt movement, it dives back in and from that moment it will take a very long time for it to come out again. In such cases it is best to retreat to a safer distance.

Marmot poachers in Mongolia put on a pair of “bunny-ears” and swing around a little toy. This apparently arouses interest in mainly the young and playful marmots, and according to scientists working in Hustai NP this actually still works.

The more arboreal squirrels of the taiga require a different approach to observe. You can find Siberian chipmunks and Eurasian red squirrels by just walking around in the forest and paying attention, but this is not the case for Eurasian flying squirrel. This species is nocturnal, and therefore you either need to know a nesting cavity and wait at dusk until they appear, or search for them with a spotlight and/or thermal scope at night.

Squirrels and marmots, like many other mammals of the steppe, are vocal. They have quite some repertoire of calls, of which the alarm calls are the most frequently used. These calls are species-specific, so they can be used to identify the species of squirrel. To the naked and untrained human ear, the alarm calls of many species will sound more or less the same, but with some practice you will be able to hear the differences. Keep in mind that a species can have multiple types of alarm calls. When you make a recording, for example with your phone, you can now compare it to the recordings in the tracks here. Using the sonogram (which can be made in the free program Raven Lite of the Cornell lab), you will be able to see the differences. There is still a lot unknown about sounds of squirrels, so if you are able to record something and take photos of the individual too, I would be very interested. Feel free to e-mail them to me, or submit them on Observation.org.

I have compiled my recordings of squirrels and some other Mongolian rodents for this field guide and other recordists have generously sent me extra recordings. It is still not complete and especially the calls of the red-cheeked ground squirrel complex (*Spermophilus erythrogenys/pallidicauda/brevicauda*) are insufficiently known. However, this might be a very good start. You can download the tracks that belong with this field guide via the Download Buttons on p. 4 and 6.

**Track 1:** Tarbagan marmot *Marmota sibirica*, alarm call. Daan Drukker, 11-08-2022, Hustai Nuruu, Mongolia

**Track 2:** Tarbagan marmot *Marmota sibirica*, alarm call. Daan Drukker, 12-08-2022, Hustai NP, Mongolia

**Track 3:** Gray marmot *Marmota baibacina*, alarm call. Dmitry Kulakov, 08-08-2016, Lake Alakol, Kyrgyzstan

**Track 4:** Long-tailed ground squirrel *Urocitellus undulatus*, alarm call. Dmitry Kulakov, 14-08-2014, долина реки Ярлы, Rep. Altai, Russia.

**Track 5:** Long-tailed ground squirrel *Urocitellus undulatus*, alarm call. Marina Gubernova, 22-07-2021, Улаганский, Rep. Altai, Russia.

**Track 6:** Alashan ground squirrel *Spermophilus alashanicus*, alarm call. Daan Drukker, 19-08-2022, Yolín Am, Mongolia.

**Track 7:** Alashan ground squirrel *Spermophilus alashanicus*, social call. Daan Drukker, 20-08-2022, Gurvan Saykhan, Mongolia.

**Track 8:** Siberian chipmunk *Eutamias sibiricus*, high intensity alarm call. Daan Drukker, 23-07-2020, Tilburg, The Netherlands.

**Track 9:** Siberian chipmunk *Eutamias sibiricus*, alarm call. Svetlana Meshcheryagina, 18-05-2022, Таштыпский, Rep. Khakassia, Russia.

**Track 10:** Siberian chipmunk *Eutamias sibiricus*, low intensity alarm call. Svetlana Meshcheryagina, 15-05-2021, Таштыпский, Rep. Khakassia, Russia.

**Track 11:** Eurasian red squirrel *Sciurus vulgaris*, alarm call. Daan Drukker, 17-10-2022, Awenne, Belgium.

**Track 12:** Eurasian red squirrel *Sciurus vulgaris fusconigricans*, alarm call. Daan Drukker, 14-08-2022, Terej river, Mongolia.

**Track 13:** Pallas's pika *Ochotona pallasi*, alarm call. Daan Drukker, 19-08-2022, Yolín Am, Mongolia.

**Track 14:** Alpine pika *Ochotona alpina*, alarm call. Daan Drukker, 04-09-2022, Barig Plateau, Mongolia.

**Track 15:** Daurian pika *Ochotona daurica*, alarm call. Daan Drukker, 16-08-2022, Khurkh, Mongolia.

**Track 16:** Daurian pika *Ochotona daurica*, song. Daan Drukker, 17-08-2022, Khurkh, Mongolia.

**Track 17:** Brandt's vole *Lasiopodomys brandtii*. Daan Drukker, 05-09-2022, Steppe near Nessuelas, Mongolia.

**Track 18:** Pronunciation of the Mongolian word for Ground squirrel. Shepherd on Ikh Bogd and interpretation of Daan Drukker.

**Track 19:** Pronunciation of the Mongolian word for Pika. Interpretation of Daan Drukker.

**Track 20:** Pronunciation of the Mongolian word for Snow leopard. Interpretation of Daan Drukker.

## Literature

This work has made use of several very important books and papers. First of all there is *The Squirrels of the World* (2012), where all squirrel species are described with references to scientific literature and photographs of quite many (but not all) species alive.

*Thorington Jr, R.W., Koprowski, J. L., Steele, M. A., & Whatton, J. F. (2012). Squirrels of the world. John Hopkins University Pres, Baltimore.*

Additionally, the descriptions, references and especially the drawings of the *Handbook of the Mammals of the World* volume 6 (2016) are very useful. The squirrel part is written by some of the same authors as *The Squirrels of the World*, so there is quite some overlap. There are some beautiful photos in the introductory chapter and all species are depicted with a drawing too. These drawings are often, but not always, very good, which can cause identification issues (e.g. the marmots).

*Wilson, D.E., Lacher Jr., T.E. & Mittermeier, R.A. eds. (2016). Handbook of the Mammals of the World. Vol. 6. Lagomorphs and Rodents I. Lynx Edicions, Barcelona.*

For the Mongolian situation, the most important book is – as mentioned in the introduction – the *Field guide to the Mammals of Mongolia* (Batsaikhan et al. 2022), of which the third edition has appeared in 2022. This book is only available in Mongolia itself. It can be bought in the bookshop on the airport of Ulaanbaatar, but there is a very big problem: this bookshop is in the departure hall near the gates, so you cannot reach it upon arrival. Luckily you can also buy it at the giftshop/giftger of Hustai National Park. This gift shop is often closed, but if you ask around at the visitor centre/restaurant, they might be willing to open it for you.

*Batsaikhan, H., Shar, S., Lkhagvasuren, D., King, S.R.B. & Samiya, R. (2022). A Field Guide to the Mammals of Mongolia (third edition). National University of Mongolia.*

A monograph on the taxonomy of Palearctic squirrels is written by Kryštufek and Vohralík (2012 & 2013) and was very useful in the compilation of this guide.

*Kryštufek, B. & Vohralík, V. (2012). Taxonomic revision of*

*the Palearctic rodents (Rodentia). Sciuridae: Xerinae 1 (Eutamias and Spermophilus). Lynx, n. s. (Praha), 43(1–2): 17–111*

*Kryštufek, B. & Vohralík, V. (2013). Taxonomic revision of the Palearctic rodents (Rodentia). Part 2. Sciuridae: Urocitellus, Marmota and Sciurotamias. Lynx, n. s. (Praha), 44: 27–138*

For the distribution maps, I have checked all observations on Observation.org and Inaturalist.org. I've also downloaded the data from GBIF and put on an extra check on those data.

*GBIF.org (16 September 2022) GBIF Occurrence Download <https://doi.org/10.15468/dl.8hqzje>*

For sounds: *Nikol'skii A. A. & Rumyantsev V. Yu, 2004: Izmenčivost' zvukovogo signala suslikov gruppy major (Rodentia, Sciuridae, Spermophilus) kak model' geografičeskogo vidoobrazovaniâ [Variability of alarm call in sousliks of the major group (Rodentia, Sciuridae, Spermophilus) as a model of geographic species formation]. Zoologičeskij Žurnal, 82: 1008–1017 (in Russian, with a summary in English).*

*Nikolskii A. A. 1979. Vidovaâ specifika predupreždaûšego ob opasnosti signala suslikov (Citellus, Scuridae) Evrazii [Species specificity of the alarm signal in ground squirrels (Citellus, Sciuridae) of Eurasia]. Zoologičeskij Žurnal, 58: 1183–1194 (in Russian, with a summary in English).*

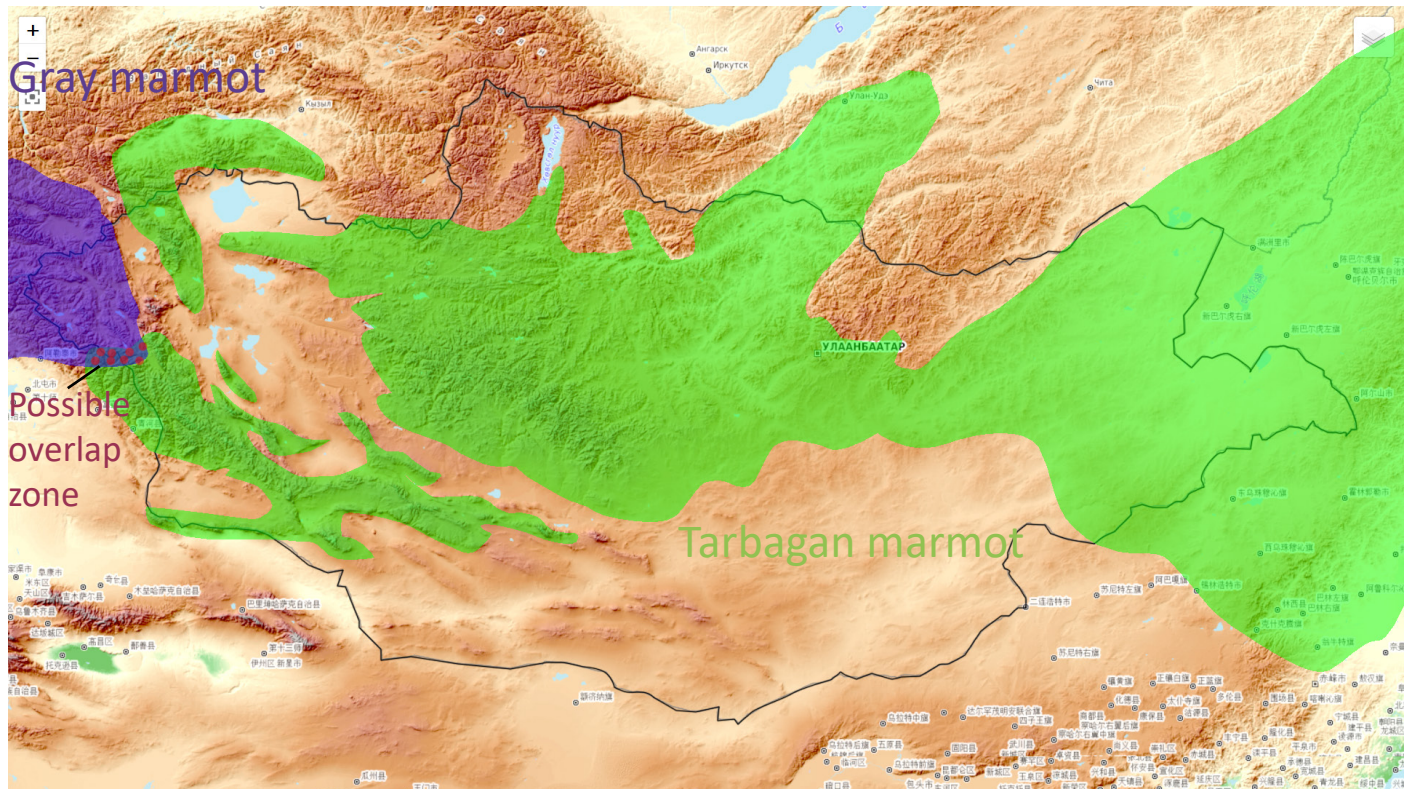
*Nikolskii, A. A. 1996. Species specificity and interspecies parallelisms of alarm call in Eurasian marmots. Biodiversity in Marmots, 187-192.*

*Airapetyants, A. E. & I. M. Fokin. 2003. Biology of European flying squirrel Pteromys volans L. (Rodentia: Pteromyidae) in the North-west of Russia. Russian Journal of Theriology 2:105–113.*

*Lisovsky, A. A., E. V. Obolenskaya & L. G. Emelyanova. 2006. The structure of voice signals of Siberian chipmunk (Tamias sibiricus Laxmann 1976; Rodentia:Sciuridae). Russian Journal of Theriology 5:93–98.*

See also [our trip report](#) with some tips and identification help for other rodents.

# MARMOTS

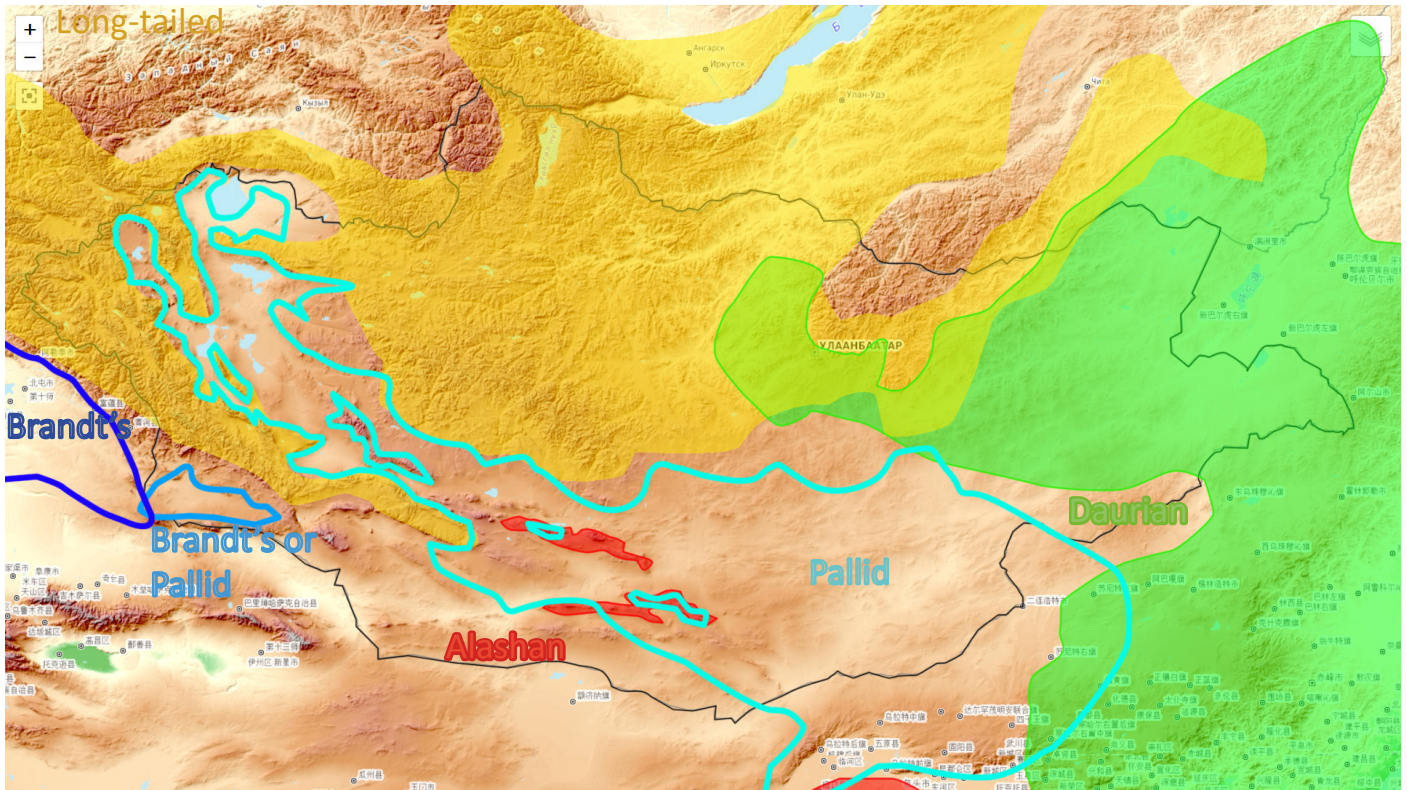


Distribution of Tarbagan marmot (green) and Gray marmot (blue). Red dots represent the zone where hybridisation can occur

Middle left: Tarbagan marmot © Daan Drukker. Middle right: Tarbagan marmot © Ruben Vermeer, both at Khustai, Mongolia.

Bottom left: Gray marmot © Marc and Peggy Faucher, Khar Nuur, Mongolia. Bottom right: Gray marmot © Benny Voorn, Almaty, Kazakhstan

# GROUND SQUIRRELS



Distribution of Long-tailed ground squirrel (yellow), Daurian ground squirrel (green), Alashan ground squirrel (red), Pallid ground squirrel (light blue), Brandt's ground squirrel (dark blue) and probable Brandt's ground squirrel in Dzungarian Gobi (middle blue).

Middle left to right: Long-tailed ground squirrel © Jacob Lotz, Khustai, Mongolia. Daurian ground squirrel © Ruben Vermeer, Dornod, Mongolia. Alashan ground squirrel © Jacob Lotz, Gurvan Saykhan, Mongolia. Pallid ground squirrel © Attila Steiner, Bumbag, Mongolia.

Bottom left to right: Long-tailed ground squirrel © Daan Drukker, Terelj, Mongolia. Alashan ground squirrel © Daan Drukker, Yolyn Am, Mongolia.





Pale forms of Long-tailed ground squirrel



Alashan ground squirrel with reddish cheek

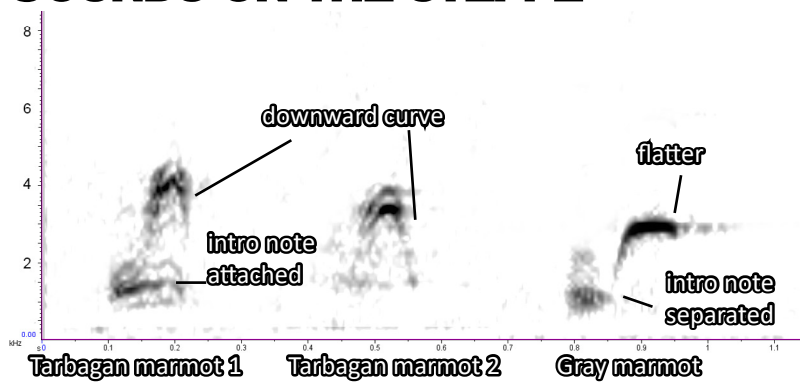


Long-tailed ground squirrel with short tail

Upper left: pale Long-tailed ground squirrel © Jurriën van Deijk, Barig plateau, Mongolia. Upper right: pale Long-tailed ground squirrel © Jurriën van Deijk, Khustai, Mongolia.

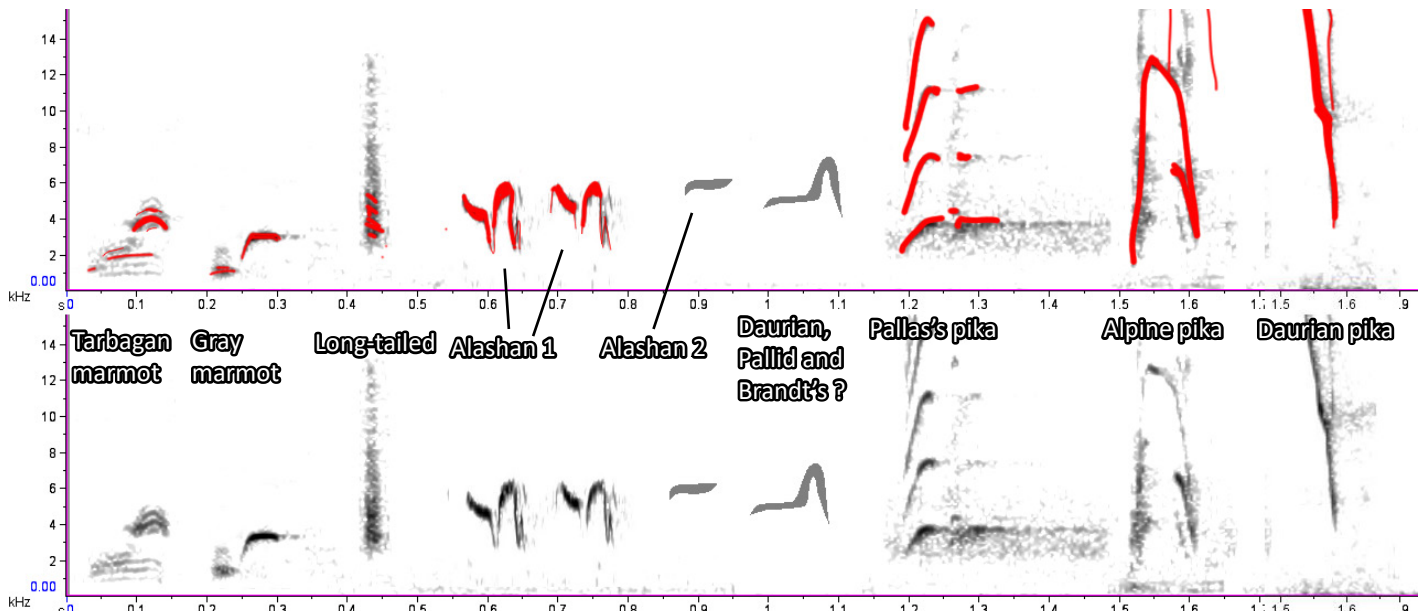
Middle left: reddish-cheeked Alashan ground squirrel © Jurriën van Deijk, Ikh Bogd, Mongolia. Middle right: short-tailed Long-tailed ground squirrel © Jurriën van Deijk, Jargalant Khayrkhan, Mongolia.

## SOUNDS ON THE STEPPE



Sonograms of alarm calls left to right: Tarbagan marmot, variant 1 (© Daan Drukker, track 1), Tarbagan marmot, variant 2 (© Daan Drukker, track 2), Gray marmot, nominate subspecies (© Dmitry Kukulov, track 3)

Below: sonograms of alarm calls of Tarbagan marmot (© Daan Drukker, track 1), Gray marmot, Long-tailed ground squirrel (both © Dmitry Kukulov, track 3 and 4), Alashan ground squirrel 1 (© Daan Drukker, track 6), Alashan ground squirrel 2 according to Nikolskii (1976), Daurian and Pallid ground squirrel according to Nikolskii (1976), Pallas's pika, Alpine pika, Daurian pika (© Daan Drukker tracks 13, 14, 15).





Tarbagan marmot © Daan Drukker, Tsogt, Gobi Altai, Mongolia

### **Tarbagan marmot** *Marmota sibirica*

**Alt.** Mongolian marmot, Siberian marmot. **Mongolian:** тапвара (pronunciation: Tarvag)

The most famous of all Mongolian squirrels is the Tarbagan marmot. Loved for its meat, every Mongolian knows what you mean when you say “tarvag”. Even though there is a hunting ban, this is only enforced in strictly protected nature reserves. Outside these reserves the marmots are extremely shy and sometime locally extirpated. The hunting ban was imposed to protect the species from extinction, as well as to protect the Mongolians from the bubonic plague, a flea-carried disease. Sick or dead marmots should therefore always be avoided. Tarbagan marmots are diurnal and live in colonies with extensive burrows. The family groups number usually 3 to 15 individuals. Hibernates from October to March/April. The Tarbagan marmot is a near-endemic of Mongolia and occurs in the colder parts of the country, on grassy mountains and hilly steppes. Outside Mongolia, it is only found in adjacent Daurian and Manchurian steppes of Russia and China. In the far west of Mongolia, it is replaced by the Gray marmot, and there might be some hybridisation. See further under Gray marmot.

**Identification** Unmistakable throughout most of its range, but northwest of Khovd it can be confused with Gray marmot. The tail of Tarbagan marmot is black on more than the distal half and contrasts with its rump and dorsum. The tail of Gray marmot can be black at the tip, but at least more than half of the tail is the same colour as the dorsum. Tarbagan marmot usually has a yellow/ochre chest, pale in Gray marmot. The amount of black on the head of Tarbagan marmot is variable, but usually does not extend below the eye on the cheek. The identification of the two subspecies is impossible in the field, but *caliginosus* from the western mountains is said to be larger and with a darker back compared to the nominate in the eastern steppes.

**Sounds** The sound of Tarbagan marmots is a characteristic in the Mongolian mountains and steppes. It is mainly produced in response to birds of prey, although I’ve also heard it in apparent response to humans. They produce it mainly from their burrow’s entrance, so they are not always visible. Listen to two variations on **Track 1** and **Track 2**. The calls are short and hoarse and produced in a series with a 3-5 second interval. For comparison with pika sounds, see **Tracks 13-15**.





Gray marmot © Benny Voorn, Almaty, Kazakhstan

### Gray marmot *Marmota baibacina*

**Alt.** Altai marmot, Grey marmot. **Mongolian:** алтай тарвара (pronunciation: Altai tarvag)

In the far west of the Mongolian Altai mountains the Gray marmot can be found. They are only known from the mountains west of the cities of Khovd and Ölgii. Outside of Mongolia, this species has a scattered distribution in the Altai and Tian Shan mountains of Kazakhstan, Russia, China and Kyrgyzstan. It is a colonial species that makes extensive burrows, in which it also hibernates. Hybrids have been reported near the place called Dalun.

**Identification** This marmot is variable in pelage colour, but still well separable from the Tarbagan marmot, with which it shares a narrow contact zone. The Gray marmot is slightly larger, but the most important feature is the tail. The upper side is light and the same colour as the rump in at least the basal half of the tail. Usually the entire tail is the same light colour as the rump, except for the tip. The tail of a Tarbagan marmot is at least for the distal half of the upperside black, sharply contrasting with the rest of the body. A possible pitfall is that the underside of the tail of Gray marmot might be dark. Gray marmots are usually light and have a dark upper side of the head. This is similar to Tarbagan marmots, but in Grey marmots the black often continues below the eye on the cheek. The head of Tarbagan is variable, but adults often only have a black “cap”.



Tarbagan marmots © Daan Drukker, Khustai, Mongolia. Note that the juvenile on the right is paler and has more blond hairs in the tail, causing possible confusion with Gray marmot.

**Sound** The alarm call of the Gray marmot (**Track 3**) is more clear and less hoarse than those of Tarbagan marmot. The loudest part of the call is “flatter” than the equivalent of Tarbagan marmot. There is also an introductory note separated before the loud part. If present, these intro-notes are connected in Tarbagan marmots (Nikolskii 1996). The intro-notes are not audible from a distance.



**Long-tailed ground squirrel *Urocitellus undulatus***

**Mongolian:** урт сүүлт зурам (pronunciation: urt soolt zouram)

A characteristic ground squirrel of green steppes and mountains. In Mongolia it occurs in the northern steppes on hills and in the Hentiy, Khangai and Mongol Altai mountains. It is absent from most of the Gobi Altai, where its range extends to the Gichigniy range. It is replaced by Alashan ground squirrel further west starting from Ikh Bogd. Outside Mongolia it is found in the Altai of China, Russia and Kazakhstan and its range extends to northeast Siberia until it is replaced by Arctic ground squirrel *U. parryi* in Kamtchatka. It often shares its habitat with Tarbagan marmots. It lives in small family groups or alone. Herbivorous and insectivorous. Hibernates from the end of September to the end of April.

**Identification** Typical individuals are unmistakable. They have a relatively very long tail, longer than any other ground squirrel. When they run around they almost look like a tree squirrel. Their dorsum is gray with white speckles. Their flanks are orange/ochre that continues

Long-tailed ground squirrels. Top left © Daan Drukker, Khurkh, Mongolia. Top right © Jurriën van Deijk, Barig plateau, Mongolia. Below © Jurriën van Deijk, Khustai, Mongolia.

onto the throat and parts of the head. Their head is light with a gray cap and orange or ochre tints in the face. A light eyering is usually present. There are individuals that are harder to identify, for example when the tail is hidden or damaged. Some individuals, especially of the western subspecies *eversmanni*, are remarkably pale, and the orange to ochre tones can be almost absent, and the speckled gray back can be confusingly uniform. In cases like this, the species can be confused with Daurian or Pallid ground squirrel.

**Sound** The alarm call is said to be given by females mostly, and consists of a single chuck repeated every few seconds (**Track 4**). The related Arctic ground squirrel *U. parryi* has a similar alarm call for terrestrial predators, but a whistle for aerial predators. It is unknown if Long-tailed ground squirrel has a similar whistle. They do have a relatively more pure and higher call that was noted in response to approaching humans (**Track 5**).



**Alashan ground squirrel *Spermophilus alashanicus***

**Mongolian:** розоорой зурам (pronunciation: gozooroj zouram)

This range restricted species only occurs in the mountains bordering the Alashan plateau. That includes the Gurvan Saykhan range in the Gobi Altai. In Mongolia it occurs in the mountains south of Bööhn Tsagaan nuur – the Ikh Bogd mountain - in the west to Yolin Am in the east. Outside Mongolia it has a disjunct population in China on the southern side of the Alashan plateau north and west of the Yellow river. It can be found in the grassy vegetations of mountain slopes, where they burrow in loose colonies. They feed on insects and vegetation.

**Identification** Very similar to Daurian ground squirrel, but their ranges do not overlap in Mongolia. Their tail is slightly longer compared to Daurian ground squirrel. Its range does not overlap with the very different Long-tailed ground squirrel either, as that species replaces Alashan ground squirrel west of the Gurvan Saykhan range. Alashan ground squirrel gets mostly confused with Pallid ground squirrel, that occupies the steppes and des-

Alashan ground squirrels. Above © Daan Drukker, Ikh Bogd, Mongolia. Below © Daan Drukker, Yolin Am, Mongolia.

ert steppes surrounding the Gurvan Saykhan range. This species has a much shorter tail and an orange cap and cheek. The cap of Alashan ground squirrel is darker than the rest of its head, but not orange. A white stripe extends from the ear to the eye and connects to the white eye ring.

**Sounds** Alashan ground squirrels are vocal and produce a set of high pitched calls. When disturbed I heard them make a double squeak when two specimens had fled together to their burrow. This call can be heard in **Track 6**. I also observed their social behaviour, where two adults were interacting. The call, a series of 4-6 squeaks repeated every 10 seconds, was very typical. Listen to it on **Track 7**. It was the individual that was following or chasing the other one that was producing the call. According to Nikolskii (1975), they can produce a more flat call similar to the *erythrogeomys*-group. This calls for the need to check more calls, also of the disjunct Chinese population.



Daurian ground squirrel © Ruben Vermeer, Dzornod, Mongolia.

### **Daurian ground squirrel *Spermophilus dauricus***

**Mongolian:** дагуур зурам

This is a species of northeastern green steppes, where it occurs in river valleys, mountain steppe and hills. Females live in groups while males are more solitary. They make burrows and feed on grasses, forbs and insects. Especially the adult males start their hibernation early, in the beginning of August. Adult females start their hibernation at the beginning of September and subadults can make it to late September. Hibernation lasts to mid-April. Found from Hustai NP in the west along Ulaanbaatar towards the east, where its distribution continues in northeastern China, until the Yellow river separates it from the Chinese population of Alashan ground squirrel. Is replaced in the dry steppes by Pallid ground squirrel.

**Identification** Does not overlap in range with the very similar looking Alashan ground squirrel within Mongolia, but shares its range with the distinctive Long-tailed ground squirrel. That species is usually easily distinguished, but be wary of pale Long-tailed ground squirrels with damaged or hidden tails. In the south, Daurian ground squirrel is replaced in the drier steppes by Pallid ground squirrel, that has an orange cap and orange cheek spot.

**Sounds** Alarm call is similar to Pallid ground squirrel ac-

ording to Nikolskii (1975), with a sonogram similar to Pallid ground squirrel, but very different from Alashan and Long-tailed ground squirrel. However, no recordings are available to listen to at the moment.

### **Pallid ground squirrel *Spermophilus pallidicauda***

**Mongolian:** бозлог зурам

Pallid ground squirrels occur in desert steppes. They are absent from steep mountainous areas, where they are replaced by Alashan ground squirrel, and wetter steppes in the North, where they are replaced by Daurian and Long-tailed ground squirrel. They feed on forbs and grasses and live in loose colonies. They hibernate in their burrows from the end of September to the end of March.

**Taxonomy** The Red-cheeked ground squirrels are easily recognised as a group, but their taxonomy has been under debate. At the moment, three former subspecies are recognised as species of their own: the Red-cheeked ground squirrel *S. erythrognys* of the steppes of northern Kazakhstan and adjacent Russia, the Brandt's ground squirrel *S. brevicauda* of southeastern Kazakhstan and the Xinjiang region of China (might cross the Mongolian border in the Dzungarian Gobi) and the isolated Pallid



Above: Pallid ground squirrel © Jacob Lotz, Ömnögov, Mongolia.



Below: Presumed Brandt's ground squirrel © Dovchindorj G., Great Gobi B, Mongolia.

ground squirrel *S. pallidicauda* of the Mongolian dry steppe and adjacent Inner Mongolia in China. Exact species delimitations are still unknown. The Mongolian situation is that there is only Pallid ground squirrel *S. pallidicauda* is known, but more research is needed in the Dzungarian basin near the Chinese border. In the Great Gobi B for example, Batsaikhan et al. (2022) note the distribution of Pallid ground squirrel in the Dzungarian Gobi, isolated from the main distribution in the rest of the region. Thorington et al. (2012) draw the distribution map of Brandt's ground squirrel *S. brevicauda* up to this region. Photos of a specimen in the Great Gobi B by Dovchindorj G. show a compact ground squirrel with some grey grizzling on the back. More research should be done in the Dzungarian Gobi to check if Mongolia isn't one mammal species richer than it already is.

**Identification** Pallid ground squirrels are pale overall, with a short tail. Their dorsum is very lightly speckled with white and an orange tint might be present on the shoulders. They have a light eye ring that contrasts with the orange cap on the head and the orange spot on the

cheek. This makes them very well identifiable among Mongolian squirrels, but some specimens are less well saturated, and the orange parts are not always well visible. The difference between Pallid ground squirrel and Brandt's ground squirrel is very small and not well known.

**Sounds** The alarm calls of the Red-cheeked ground squirrel-complex have been studied by Nikolskii (1979) and Nikolskii & Rumyantsev (2004). Their recordings from what we now call Pallid ground squirrel were very similar to alarm calls of Brandt's ground squirrel, and Nikolskii & Rumantsyev (2004) treated those taxa as the same species. These calls are very similar to what Daurian ground squirrel should sound like, but they are different from the actual Red-cheeked ground squirrel and from Alashan ground squirrel. It seems like the alarm call can be of good help identifying Pallid ground squirrel from Alashan ground squirrel, which is good, as these are frequently confused. However, these recordings have not yet been digitised, and I only managed to record Alashan ground squirrels, so more research is needed.



**Siberian chipmunk *Eutamias sibiricus***

**Mongolian:** жирх (pronunciation: dzjirkh)

Siberian chipmunks live in forests in mountains and taiga. They live mostly on the ground, but can climb very well and do so regularly. Often seen gathering and storing food like seeds and berries in shrubs and trees. Hibernates from October to April.

**Identification** Unmistakable. No other chipmunks occur in Asia. The size, stripes on the back side and long tail are typical.

**Sounds** Produce a variety of calls that can help you localise them. Females have a mating call (**Track 8**) that starts with a very high pitched squeak repeated every half a second, slowly lowering a little bit in pitch, but still very high (this call should be investigated in their native range too, as so far it is only known from introduced populations and in captivity). Their alarm call is a single high pitched squeak (**Track 9**), which is slightly reminiscent to the alarm call of Alpine pika (**Track 14**). A second alarm call variation is a more “tjoup”-like sound (**Track 10**). The variability and meaning of these calls are described by Lissovsky et al. (2006).



Siberian chipmunks. Above © Jacob Lotz, Terelj, Mongolia. Below © Jurriën van Deijk, Terelj river, Mongolia.



**Siberian flying squirrel *Pteromys volans***

**Mongolian:** хөхвөр олби (pronunciation: khökhvör olbi)

In the north of the Hentyi, Hovsgol and Mongol Altai taiga forests, the enigmatic Siberian flying squirrel occurs. This is the only nocturnal squirrel of Mongolia and the only one that can glide from tree to tree. They make their nests in hollow trees, for example in old woodpecker holes, where they prefer poplar and birch. They come out in the evening and feed high up in the trees. No hibernation, but does store food.

**Identification** Unmistakable due to large black eyes, greyish fur and of course the flight membrane between the limbs. Only squirrel active at night.

**Sounds** Not known to produce any calls, except for high buzzing calls during mating and begging of youngsters at the nest (Airapetyants & Fokin 2003).



Siberian flying squirrels. Above © Griha Hasanov, Ulaan Ude, Russia. Below © Tatyana Kolesnikova, Elanda, Russia.



**Eurasian red squirrel *Sciurus vulgaris***

**Mongolian:** (бараан) хэрэм (pronunciation: baraan kher-em)

Typical squirrel of forests. Shares most of its range with the Siberian chipmunk, but is more arboreal. Can climb and jump from tree to tree with great agility. Forages and stores food regularly on the ground as well. Does not hibernate.

**Identification** Unmistakable due to large size, huge tail, fur dark above and white below, without any stripes. Two subspecies are known from Mongolia, but their distributions are not very clear. It is thought that the subspecies *altaica* occurs in the mountainous areas. This subspecies is variable in colouration, from red to dark brown. The subspecies *fusconigricans* would occur in the lower taiga of northeastern Mongolia and is very dark brown on the dorsum.

**Sounds** Produces soft “chucks” when agitated or excited (**Track 11** and **12**). These sounds do not carry very far. In higher excitement, they produce an explosive and descending “woopwoopwoop”.



Eurasian red squirrel © Daan Drukker, Terelj river, Mongolia.



## Other sounds

With some experience you can quite easily pick out mammals sounds from bird sounds. The trick is to recognise the different mammal sounds from each other. Pika's are very vocal, but also voles, shrews and other small mammals can produce typical squeaks. The most typical sound on the steppes by day is the rhythmic peeping of Brandt's vole *Lasiopodomys brandtii*. This strictly diurnal colonial vole peeps en masse when you walk by or when a predator is nearby. Listen to it on **Track 17**. Another rodent with a remarkable call is the Great gerbil *Rhombomys opimus*, which I unfortunately was too late to record, but can be described as "wiewiewiewiew".

Pika's are very vocal and produce quite a number of different calls. The most well-known is the alarm call, a single shriek uttered in the colonies. Five species of pika occur in Mongolia and their alarm calls might be mistaken for (ground) squirrel alarm calls. I was not able to record the calls of Northern pika *Ochotona hyperborea* and the range-restricted Hoffmann's pika *O. hoffmanni*, but luckily I did record the alarm calls of Pallas's pika *O. pallasii* (**Track 13**), Alpine pika *O. alpina* (**Track 14**) and Daurian pika *O. daurica* (**Track 15**). These alarm calls can be confused with alarm calls of squirrels, but if you manage to make a recording (e.g. with your phone or on video), identification will almost certainly be possible. That being said, Siberian chipmunk might have a certain call that is quite similar to the alarm call of Alpine pika, but that is not certain. Remember that there are a lot more mammal sounds on the steppe. Some pikas have extremely cool songs for example (e.g. Daurian pika **Track 16**), but those cannot be confused with squirrels. Compare the sonograms of the alarm calls of all the squirrels of Mongolia and the three most common pikas on page 7 and 17.



Alpine pika © Jacob Lotz, Barig plateau, Mongolia.



Pallas's pika © Jurriën van Deijk, Yolín Am, Mongolia.



Brandt's vole © Jurriën van Deijk, Altai, Mongolia.



Great gerbil © Jurriën van Deijk, Great Gobi A, Mongolia.

## Language

In search of mammals it is always a good idea to ask the locals if they know a place. Here is a list of words that might come in handy when you want to ask something.

Ground squirrel = зурам = zouram = **Track 18** (local shepherd on Ikh Bogd and my own interpretation)

Pika = огдой = ogdoi = **Track 19** (my interpretation of a local shepherd on Ikh Bogd, sounding a bit different than the Mongolian name in the books)

Snow leopard = ирвэс = irves = **Track 20** (my interpretation)

Marmot = тарвага = tarvag

## Open questions

1. Does Long-tailed ground squirrel also have a whistle as alarm for aerial danger? If yes, what does this sound like?
2. What are the different call variations in Alashan ground squirrel?
3. How does Daurian ground squirrel sound like? And does it differ from Pallid and Brandt's ground squirrel? Nikolskii (1975) and Nikolskii & Rumantsyev (2004) found that their alarm calls are very similar in spectrogram, but the recordings are not available digitally.
4. Are there differences in alarm call between Pallid and Brandt's ground squirrel?
5. Does the Dzungarian Gobi population of red-cheeked ground squirrels belong to Pallid ground squirrel or Brandt's ground squirrel?
6. How do the disjunct populations of Alashan ground squirrel relate to each other and to Daurian ground squirrel genetically, vocally and morphologically?

Cover photo above: Alashan ground squirrel © Daan Drukker, Yolín Am, Mongolia

Cover photo below: Siberian chipmunk © Daan Drukker, Terelj, Mongolia.



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Cover photo back: Tarbagan marmot © Daan Drukker, Khustai, Mongolia.

