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兽类学报 1994, 14 (2): 86—99

*Acta Theriologica Sinica*

**SYSTEMATICS AND DISTRIBUTION OF THE ROCK  
VOLES OF THE SUBGENUS *ALTICOLA* S. STR.  
IN THE PEOPLE'S REPUBLIC OF CHINA  
(RODENTIA; ARVICOLINAE)**

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The subgenus of rock voles, *Alticola* s. str., is widely distributed over montane regions of Central Asia from the Himalayas and Hindu Kush through the Pamirs, Tien Shan and Tibet to Tuva, Khangai and Lake Baikal. Within its range, the subgenus displays a rather complicated pattern of morphological diversity, which makes it difficult to discriminate within-species variation from between-species differences. Apart from well-known faunistic and taxonomic reviews in which the systematics of *Alticola* was casually reviewed along with other taxa (*e. g. et al.*, Ellerman, 1941; Ellerman, 1951; Gromov *et al.*, 1977; Corbet, 1978; Honacki *et al.*, 1982; Pavlinov *et al.*, 1987), there have been few revisions based directly on a thorough analysis of original data (Hinton, 1926; Heptner *et al.*, 1968; Rossolimo *et al.*, 1992a; Heilscher *et al.*, 1992). Due to differences in opinions of their authors on species concept, materials available, and technical methods employed, these works suggested drastically different classifications at species and subspecies levels. For instance, the number of species in *Alticola* s. str. varied, according to the above revisions, from one to 12.

Questions of the systematic and distributional status of *Alticola* s. str. in the people's Republic of China also did not receive close attention from these specialists. Only large scale faunistic reviews which contain some relevant information are known to us (Allen, 1940; Wang, 1965; Wang *et al.*, 1983; Ma *et al.*, 1987). However, none of them represents an original taxonomic revision, having borrowed older views from other, principally faunistic sources. Thus, only two species of these voles are recorded for china in most recent reviews, *Alticola argentatus* Severtsov (sometimes under the name *Alticola roylei* Gray) and *A. stoliczkanus* Blanford. However, our attempt to clarify the situation with regard to species and subspecies composition of *Alticola* s. str. indicated

① Received 14 June 1993

that at least 3 more species should be anticipated in that country (see below). We believe the current knowledge of species diversity in the subgenus *Alticola* s. str., both their systematics and distribution, and all other aspects of their natural history in China, seems largely outdated.

In the present publication, we summarize the results of the senior author's recent taxonomic studies on *Alticola* s. str. (Rossolimo *et al.*, 1988; Rossolimo, 1989 a, b; Rossolimo *et al.* 1992a, b) dealing with Chinese representatives of this subgenus. Our principal concern here is to expose both new ideas and unsettled questions which await a thorough investigation of the extensive Chinese materials.

### General Account

Our study, based principally on standard morphological data and employing modern multivariate techniques, allowed us to recognize as many as eight species in the subgenus *Alticola* s. str., as delimited by Gromov *et al.* (1977) (who placed *A. macrotis* in a different subgenus *contra* Musser and Carleton, 1993). Some of them we consider well established by present data (*A. semicanus* Allen, *A. barakshin* Bannikov, *A. stoliczkanus* Blanford, *A. albicaudus* True) while others are still ill-defined, and their definitive status needs to be confirmed by future investigations (mainly long-tailed taxa close to *A. argentatus* Severtsov, including *A. montosus* True, *A. roylei* Gray, *A. tuvinicus* Ognev, and *A. olchonensis* Litvinov). Among them the most variable species is *A. argentatus*, which is distributed from the Hindu Kush to the Tarbagatai and Saur Mts. and contains as many as nine subspecies. Other species are more local, being monotypic or represented by 2—3 subspecies each.

The geographic distribution pattern of the subgenus is rather unusual (fig 1). Three local monotypic species are known from Jammu and Kashmir only; namely, *A. roylei*, *A. montosus*, and *A. albicaudus*. With them there co-occur two more widespread species, *A. argentatus* and *A. stoliczkanus*, for a total of five species in that region. Another circumscribed region of possibly sympatric co-occurrence of several species is northwestern Mongolia and southern Tuva, where three species have been reported (*A. tuvinicus*, *A. semicanus*, *A. barakshin*). In all other parts of the range, no single site is known where more than one species occurs, reflecting the principally allopatric distribution of *Alticola* s. str. species in most of the range of the subgenus.

Consideration of both the above patterns of distribution and of morphological resemblance makes it possible to draw a tentative phylogenetic hypothesis for the subgenus *Alticola* s. str. (Rossolimo *et al.* 1992a). The center of origin of this taxon seems to be the Hindu Kush, where present species richness reflects initial steps of the subgenus radiation. *A. roylei* (in our sense) is probably closest morphologically to a stem species, and may be characterized as possessing a rather smoothly outlined, medium-sized skull, moderately complex third upper molar, and moderately long tail. The initial diversification has produced the two local endemics (*albicaudus*, *montosus*) and gave

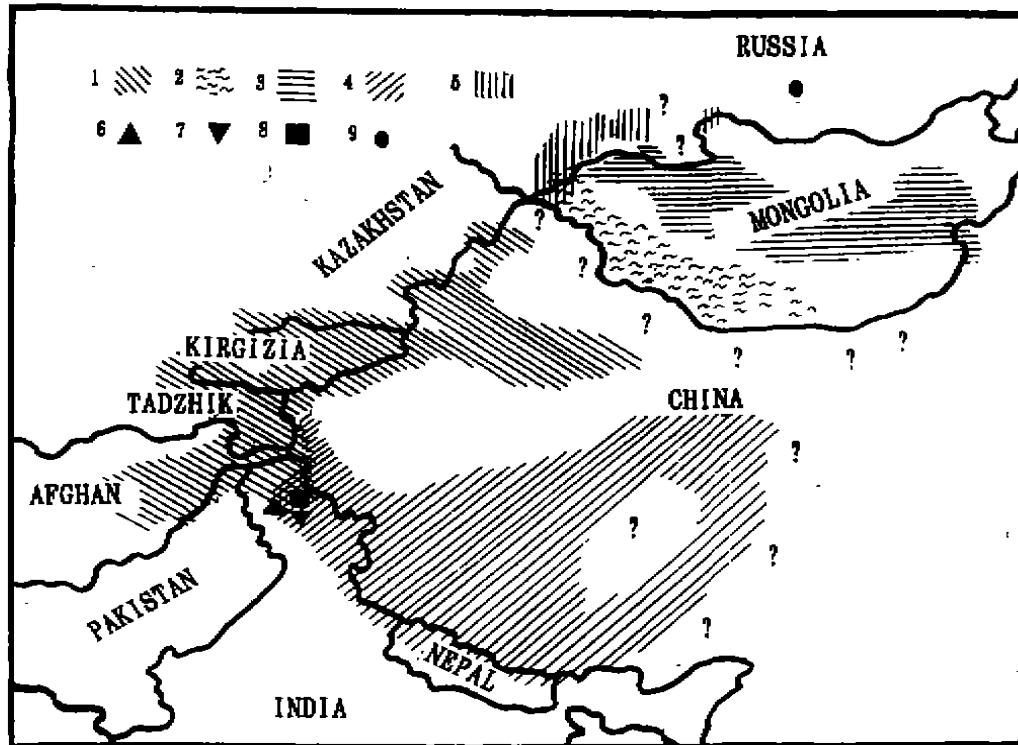


Fig. 1 Geographical distribution (schematic) of the species of *Alticola* s. str. 1—*argentatus*, 2—*barakshin*, 3—*semicanus*, 4—*stoliczkanus*, 5—*tuviniensis*, 6—*roylei*, 7—*mentosus*, 8—*albicaudus*, 9—*olchonensis*.

birth also to *A. argentatus*, which has dispersed northward to reach the Pamirs and Tien Shan Mts. Dispersion to even more northerly regions in southern Siberia gave rise there to *A. tuviniensis* which in turn may have given rise to *A. olchonensis* and *A. semicanus*. This line of evolutionary development has involved mainly formation of an enlarged, angled skull, greater dental complexity, and longer tail. However, *A. albicaudus* and *A. semicanus* deviated from this general trend in having somewhat simplified dentition and shortened tail.

The *stoliczkanus-barakshin* group displays a contrary evolutionary transformation toward noticeable simplification, in both dentition, and in tail shortening. Two mutually exclusive hypotheses may be suggested to explain this. First, it seems rather probable that *A. barakshin* is a developmental step within that derivative trend which has been initiated by *A. semicanus*. In such a case, *A. stoliczkanus* is its most advanced descendant, closing the entire "formenkreis" within *Alticola* s. str. On the other hand, one cannot rule out the possibility that *A. stoliczkanus* has evolved directly from the stem species, thus being primarily of Hindu Kush origin, with *A. barakshin* being its derivative form. Whatever the ultimate resolution of this (and other) unclear points, it is evident that evolution, systematics and distribution of *Alticola* s. str. is an attractive model of speciation under specific physical geographical conditions provided by a combination of high

montane, arid biotopes primarily occupied by its representatives.

In the People's Republic of China, the most widely distributed species is *A. stoliczkanus* (including *stracheyi*) (fig. 1). Of the other taxa, only *A. argentatus* (sometimes under the incorrect name *A. roylei*) was reported to occur in northern Xinjiang and in Inner Mongolia (Zhao *et al.* 1981; Ma *et al.* 1987). This reflects more a scarcity of published data on taxonomy of Chinese *Alticola* s. str. rather than the real situation. Thus, judging by distributional data available from adjacent territories in Mongolia and Russia, three more species should be anticipated; *A. tuvinicus*, *A. barakshin*, and *A. semicanus*. Therefore, future analysis of the taxonomic and distributional status of Chinese *Alticola* s. str. forms, first verifying their occurrence followed by detailed analysis of their altitudinal and ecological relations, seems a promising task.

The following strictly dichotomous identification key is provided to facilitate identification of the species of *Alticola* s. str. known, or anticipated to occur, in China:

1 (2) Auditory bulla nearly lacking tympanum accessorium, so that only manubrium mallei is visible externally through the auditory meatus (as in *Microtus*) ... *A. stoliczkanus*.

2 (1) Tympanum accessorium present; dorsal wall of auditory meatus membranous (as in *Clethrionomys*), most of malleus externally visible through it ... 3.

3 (6) Tail usually less than 30 percent length of head and body ... 4.

4 (5) Upper parts of body generally pale-brownish without noticeably expressed gray tones; tail slightly bicolored, color of its dorsal/surface not contrasting sharply with that of the back ... *A. barakshin*.

5 (4) Upper parts of body generally brownish-gray; tail white throughout, color of its dorsal surface and the back differ conspicuously ... *A. semicanus*.

6 (3) Tail usually more than 30 percent length of head body ... *A. argentatus*, *A. tuvinicus*.

No discrete characters unambiguously separating the last two species are known to us. Therefore, in addition to descriptions provided below, we give here a discriminant function produced by stepwise discriminant analysis (MANOVA). Although it has been obtained for samples coming from outside China, and should be used with caution, it may be provisionally employed to identify Chinese materials,

$$X = -23.09IW + 3.25BL + 3.72IA - 2.87IL + 5.84ML - 2.66MM.$$

In this equation, positive values of X correspond to *A. tuvinicus* and negative ones, to *A. argentatus*. The characters employed in the equations are: BL—braincase length from tip of postorbital protuberance to the posterior edge of the squamosal; IA—length of the third internal angle of M3; IL—incisive foramen length, IW—interorbital width, ML—M1 length at crown surface level, MM—distance between most external points of the right and left M1.

## Review of Chinese Forms

Below are given brief systematic descriptions (type localities, principal diagnostic characters, comments on relations and synonymy) and distributions for those nominal taxa of *Alticola* s. str. which have been or may be found within boundaries of the people's Republic of China. Measurements are given as sample mean values in millimeters.

**ALTICOLA (A.) ARGENTATUS** (Severtzov, 1879)

**TYPE LOCALITY** "Alichur (on the Pamir)" (Ognev, 1950) Tadzhikistan. Given as "Kazakhstan, Chimkentskaia Obl., karatau Mts., Mashat" by Musser and Carleton (1993), but this applies to *A. leucura* Severtzov 1873, a prior but preoccupied name.

**MORPHOLOGICAL CHARACTERS** Small to medium-sized species with head and body length 94.0—114.6 and occipitonasal skull length 25.35—28.17. Body color above is quite variable, usually a mixture of more or less fawn-brown and gray tones, the belly being grayish-to dirty-white, evenly demarcated from the sides. Tail is 32 to 51 percent of head and body length, sparsely haired, usually uniformly pale but sometimes inconspicuously bicolored. Skull is smooth in outline (except some large subspecies), relatively flat, with rather short orbit. Third upper molar is long and complex, rather narrow, usually more or less compressed anteriorly (second labial infold narrow) and with elongated posterior loop (41-55 percent of the total tooth length). Third lingual angle of this tooth is always developed and pointed.

The only other species of Chinese *Alticola* s. str. with which the present one could be confused is *A. tuvinicus*. The latter is generally darker, with an invariably bicolored, well haired, long tail, and more angled skull having relatively longer orbit. From *A. barakshin* and *A. stoliczkanus* it is readily separable by longer tail, flatter skull and complicated third upper molar, which is noticeably compressed anteriorly.

**DISTRIBUTION** This is the most widely distributed species in the subgenus *Alticola*, with a range limited by the Hindu Kush on the south, Saur Mts. (eastern Kazakhstan) in the north, and by the margins of the Pamirs and Tien Shan Mts. elsewhere. In China it should occur all over the Boro Khoro (Chinese Tien Shan), Dzhungarski Alatau, Tarbagatai (Ma *et al.*, 1987), and probably Saur Mts.; it might also be found on the southern slope of Kok Shaal Tau southward along Sarykol Ridge as far as the Karakorum Pass. Specimens from Inner Mongolia allocated to this species (Zhao *et al.* 1981) almost certainly are *A. semicanus* (see below).

**TAXONOMY** *A. argentatus* is the species of the subgenus *Alticola* s. str. most closely related to the Kashmir endemics, *A. montosus* and *A. roylei*, with which it is usually united under the latter name. It is also close to its northeastern neighbor, *A. tuvinicus*. For species distinctness, relations and characters, see Rossolimo and Pavlinov (1992a, b). Geographic variation is evident in many characters (being most responsible for unclear taxonomic boundaries). Nine subspecies were recognized by the senior author

over the entire species range (Rossolimo, 1989a), of which up to five may be expected in China. Subspecies accounts are arranged geographically from south to north.

*A. (A.) argentatus argentatus*

**TYPE LOCALITY** Same as for the species.

**DESCRIPTION** Size medium to large for the species. Body color is generally pale dull above, with sandy-fawn and sandy-grayish tones most developed. Tail moderately long, sparsely covered with hairs, slightly bicolored, not contrasting with back coloration. Skull well sculptured, with relatively long rostrum and as long and narrow interorbital region. Third upper molar is variable, bearing no peculiar morphological features.

Widely distributed over the Hindu Kush, and the entire Pamirs from Wakhan to the Alai Valley. In Chinese Turkestan it occupies the eastern slopes of Pamir plateau (specimens from Tash Kurgan allocated to this subspecies by us).

Superficially, most resembles *A. a. tarasovi*, from which it differs in cranial characters. Includes the nominal forms *argurus* Thomas, 1909 and *alaica* Rosanov, 1935 (= *rosanovi* Ognev, 1940).

*A. (A.) argentatus phasma* Miller, 1912

**TYPE locality** "Eastern side of Kara Korum Mts, Chinese Turkestan...between 9 000 and 10 000 feet." (no precise locality originally given), Xinjiang, China.

**DESCRIPTION** One of the smallest and most lightly colored of the subspecies. Body color is pallid above, generally grayolive on the back. Tail long, rather densely covered with pure white hairs. Skull is smooth in outline, long in both orbit and braincase, with wide interorbital constriction, and long, narrow auditory bulla (as in *A. a. worthingtoni*). Third upper molar is characteristic in being the longest for the entire subgenus because of its exceptionally elongated posterior loop.

Known from the type locality only.

Though represented by few specimens, this seems to be a well defined subspecies similar to the geographically quite distant *A. a. worthingtoni* in both external and cranial characters.

*A. (A.) argentatus tarasovi* Rossolimo and Pavlinov, 1992.

**TYPE LOCALITY.** "Banks of Inylchek River, system of Inylchek and Sary Dzhaz Ridges, E Kirghizia..."

**DESCRIPTION** Size rather large, body color as in nominate subspecies, but tail uniformly whitish. Skull rather angled, with relatively wide interorbital constriction but narrow braincase (a condition differentiating this subspecies from *argentatus* s. str.). Auditory bulla rather short and wide. Third upper molar typical for the species.

Distributed in the southwestern and southern Tien Shan, from the Ferghana Valley to Issyk Kul Lake. In China it might be found on the eastern slopes of Kok Shaal Tau.

This is a morphologically transitional form between *A. a. argentatus* and *A. a. subluteus*, its southern and northern counterparts respectively.

*A. (A.) argentatus worthingtoni* Miller, 1906

**TYPE LOCALITY** "Tian Shan Mountains (Kosksu) (River)" Tekes River basin, Khalyktau Ridge, Chinese Tien Shan Mts., Xinjiang, northwestern China.

**DESCRIPTION** The smallest and palest subspecies of *A. argentatus*. The back is uniformly grayish-fawn, practically without brownish tint in the specimens seen by us. Tail relatively long, well covered with whitish hairs. Skull very smooth (evidently because of its small size), with relatively very wide braincase, and long, very narrow auditory bulla. Third upper molar very long, bearing a long posterior loop.

Although distributional data on *A. argentatus* in the Chinese Tien Shan are rather complete (see Ma, *et al.* 1987), exact subspecies allocation of populations in that region is not clear. The subspecies under consideration most probably occupies these entire mountain system, though its geographic contacts with *A. a. tarasovi* should be clarified with more materials.

*A. (A.) argentatus subluteus* Thomas, 1914

**TYPE LOCALITY** "In die Schlucht Tischkan"; Dzharke (=Djarkent), Southern foothills of Dzhungarski Alatau, southeastern Kazakhstan.

**DESCRIPTION** The largest representative of *A. argentatus*. Dorsal color is rather dull fawn-brown, tail uniformly dirtywhitish or inconspicuously bicolored (especially in northern representatives from the Saur Mts.). Skull is well sculptured and angled with rather wide bulla, otherwise without peculiarities. Third upper molar typical for the species.

Occupies the northernmost parts of area, being known from the Saur, Tarbagatai and Dzhungarski Alatau ranges, and from the eastern portion of the Kungei Alatau, Tien Shan Mts. Although only Kazakhstan specimens of this subspecies were seen, there is no doubt it may be discovered in the Chinese parts of the above mountains, as well as in the Ketmen and Boro Khoro Ranges.

Differs from *A. a. worthingtoni* in darker coloration, proportions of auditory bulla and larger size. Most similar to *A. a. argentatus*, and then *A. a. tarasovi*, differing from the latter mainly by more robust skull. The nominal form *saurica* Afanasiev and Bazhanov, 1948 from the Saur Mts. is tentatively included here (Pavlinov *et al.* 1987; Rossolimo, 1989a), but it is rather distinct morphologically and deserves more detailed investigation, especially in light of systematic relations between northern subspecies of *A. argentatus* and the next species.

**ALTICOLA (A.) TUVINICUS** Ognev, 1950

**TYPE LOCALITY** "Tuvinsk Aut. Obl.....vic. Kyzr (sic; Kyzr)." Kyzyl Mozha-lyk, upper courses of Kemchik River, Tuva, Russia.

**MORPHOLOGICAL CHARACTERS** Size medium for the subgenus; head and body length 112.8-114.5, occipitonasal length of skull 27.43-28.41. Body color dark, back generally dull ash-gray with brown tones somewhat developed. Belly most often grayish-pale, border between dark above and light below is usually straight. Tail 32-46

percent of head and body length, always covered with long, dense (for the subgenus) hairs, sharply or gradually bicolored, its upper parts usually being of the same tone predominating on the back (in contrast to *A. semicanus* and most subspecies of *A. argentatus*). Skull, notwithstanding its large size, is usually smooth in outline with long, narrow rostrum and with longest orbit in the subgenus (similar to *A. semicanus*). Braincase is rather flattened, although not so much as in *A. semicanus*, from which it differs in being more narrow. Third upper molar is long, usually with long, fully developed posterior loop, but occasionally may be somewhat shortened. Its third lingual angle is always large and pointed, its second labial infold is usually wide (as in *A. semicanus*), but may be also narrow (as in *A. argentatus*).

The species under consideration, though not widely distributed, is rather variable in its diagnostic characters, some specimens being similar to *A. argentatus* from the Saur Mts. (see above) while others occasionally resemble *A. semicanus*. It differs from *argentatus* mainly in darker (usually more grayish) back and clearly bicolored tail. The latter character easily differentiates it from *A. semicanus* (see key), while long tail and more complex third upper molar unambiguously separates it from *A. barakshin*.

**DISTRIBUTION.** Found in Khakassia and Tuva (southern Siberia), in northernmost parts of Mongolian Altai Mts. and around north shore of Khovsgol (Hubsgul) Nuru (Lake), northern and northwestern Mongolia). This species has not been reported for China previously but, Judging by its known distribution, should be anticipated in the northernmost corner of Xinjiang, north of the Chernyi (Black) Irtysh River.

**TAXONOMY** This taxon was originally described as a separate species (Ognev, 1950), but subsequently was united with *A. argentatus* by most reviewers. Morphologically and perhaps phylogenetically, it occupies an intermediate position between that species and *A. semicanus* (Pavlinov *et al.* 1987; Rossolimo, *et al.* 1988; Rossolimo *et al.* 1992a, b). Relations of *A. tuvinicus* to *A. argentatus* remain quite uncertain, as a subspecies of the latter, *A. a. subluteus*, appears to be very close to *tuvinicus* both geographically and morphologically. Thus, it would be of crucial importance for clarification of this question to compare *Alticola* s. str. from both sides of the Chernyi Irtysh River.

The form *olchonensis* Litvinov, 1960 was formerly considered to belong here (Pavlinov *et al.* 1987; Rossolimo, *et al.* 1988) but our most recent results do not agree fully with such a treatment (Rossolimo *et al.* 1992b). Thus, *A. tuvinicus*, as it is understood here, contains one additional subspecies, *kosogol*, but it is the nominate one which we suppose to occur in China.

#### ALTICOLA (A.) SEMICANUS (Allen, 1924)

**TYPE LOCALITY** • "Sain Noin Khan, Mongolia." Restricted by Bannikov (1954) to "upper Ongyin-gol r. (river), (southeastern) Khangai (Mts.), Mongolia."

**MORPHOLOGICAL CHARACTERS** • On average, the most robust species in the subgenus, with head and body length 111.6-123.6 and occipitonasal skull length 28.05-



29.90. Coloration of upper parts of the body usually dark, with rather pronounced bright brownish-gray tone predominating, although some specimens (especially young ones) are clear mouse-gray above. Belly whitish; border between darker upper and lighter under parts is sharp, in many cases marked by distinct yellow-rusty or palerusty-band (as in most *A. barakshin*). Tail averages 23-29 percent of head and body length, somewhat longer than in typical short-tailed species of the *stoliczkanus-barakshin* group but shorter as compared to *tuvanicus*. Tail is well haired, nearly white throughout, contrasting sharply with the much darker back. Skull is angular and relatively flatter than in any other *Alticola* s. Str. species, and well sculptured. Its distinctive features are: relatively long orbital region, lowest and widest braincase in the subgenus, and rather long tympanic bulla. Third upper molar is also quite characteristic; in general, it is not especially long and complex, but its talon is very long relative to the anterior part of this tooth, and the second labial infold is very wide.

In China this species could be confused only with *A. barakshin* (see below), but differs from it mainly by the tail being conspicuously lighter than the dark back, by a relatively flat braincase, and by somewhat larger third upper molar with evidently more developed and pointed third lingual angle. However, neither of the latter characters are absolute, as some *A. barakshin* specimens may possess a rather complex talon, while younger specimens of both species are quite similar in skull proportions.

**DISTRIBUTION** This species is known to occur in southern Russian Tuva and in northern, northwestern, central and eastern Mongolia, to the border with Chinese Inner Mongolia. It is not reported as such from China; however, *A. argentatus* listed from Inner Mongolia by Zhao, *et al.* (1981) must be, judging from geographical considerations, *A. semicanus*, and the dental crown pattern figured does not contradict this interpretation. In Mongolia, this species and *A. barakshin* come close together in ranges lying between the Altai and Khangai Mts., although no cases of sympatry have been reported (Rossolimo, *et al.*, 1988). It would be of interest to trace how far *semicanus* extends through the Yin Shan and whether it meets *A. barakshin*.

**TAXONOMY** *A. semicanus* was usually considered conspecific (under various names) with *A. argentatus* (Bannikov, 1954; Stubbe *et al.* 1968; Heptner *et al.* 1968; Gromov *et al.* 1977; Sokolov *et al.* 1980), and occasionally was considered a subspecies of *A. macrotis* (Allen 1940). We now are inclined to consider it a full species (Rossolimo, *et al.* 1988; Rossolimo *et al.* 1992a). Recently it has been shown to be reproductively isolated from *A. barakshin* (Stubbe, *et al.* 1992). Trends in morphological variation and geographic distribution place this species between *A. tuvanicus* and *A. barakshin*, as reflected in our tentative phylogenetic hypothesis (see above).

Two forms, the nominate and *alleni* Argyropulo, 1933, are included here as separate western and eastern subspecies (Heptner *et al.* 1968; Rossolimo, *et al.* 1988). If *A. semicanus* occurs in China, it is most probably represented there by *alleni*, whose type locality was defined as 40 km E of Ulaanbaatar, eastern Mongolia. Distinctive features of this

subspecies are more brown-grayish rather than brownish color on the back and less developed rusty stripe on sides.

ALTICOLA (A.) BARAKSHIN Bannikov, 1948

TYPE LOCALITY "Dzun Saikhan, Gurban Saikhan [Uul] range, Gobi Altai [Mts.], [southern] Mongolia."

**MORPHOLOGICAL CHARACTERS** Size variable; head and body length 100.5—118.7, occipitonasal skull length 26.87—28.84. Body color is generally brownish-gray above, usually with dull rusty tone which is especially noticeable on the head and sides. Belly dirty-whitish, sometimes separated from darker coloration on the sides by conspicuous pale-reddish band or stripe. Tail only 18—23 percent of head and body length, always densely covered with short hairs which are whitish below and light sandy-brownish above, inconspicuously bicolored (in contrast to the long, unicolored tail of *A. semicanus*). The skull is moderately sculptured, with long, narrow orbital region. Its braincase is high and also relatively narrow. Auditory bulla one of the longest in the subgenus, although not very wide. Third upper molar is shorter than in all preceding species, possessing a shortened talon (34—44 percent of the tooth length), which is simple in usually bearing no third lingual angle, though more complex morphotypes occasionally occur. The second labial infold of this tooth is wide.

*A. barakshin* differs from *A. semicanus* principally by more brownish pelage coloration, shorter, slightly bicolored tail, less flattened skull, and simpler dentition. All these distinctive characters are, however, fully expressed only in adults. *A. barakshin* differs from *stoliczkanus* in morphology of the auditory meatus, and relatively narrow interorbital constriction and rostrum (see key).

**DISTRIBUTION** This species is common at low and middle elevations everywhere in the Gobi (Gobi) Altai and Mongol Altai Mts northward to the Kyzyl Valley in Tuva. In the south, it is distributed along small ridges and rocky outcrops over the entire trans-Altai Gobi Desert and Barun Khurai Valley to the southern boundaries of the Mongolian Republic. It has not been reported for China, nor does it appear to have been mentioned under another species name. However, we suspect that it may be found in the Bei Shan area and adjacent regions. If so, *A. barakshin* might contact *A. argentatus* along the easternmost foothills of the Chinese Tien Shan Mts.; *A. stoliczkanus* in southern Gansu; and *A. semicanus* in the Yin Shan in Inner Mongolia.

**TAXONOMY** Originally described as a full species (Bannikov, 1948), *A. barakshin* was subsequently included in *A. stoliczkanus* or even in *A. argentatus*, but has proved to be specifically distinct from both (Rossolimo *et al.* 1988; Rossolimo, 1989b; Rossolimo *et al.*, 1992a). According to our tentative phylogenetic scheme above, *barakshin* should be placed between *A. semicanus* and *A. stoliczkanus*, although phenetically it forms with the latter a separate group. This is a monotypic species; however materials from Chinese territories might shed new light in its variation and taxonomy.

ALTICOLA (A.) STOLICZKANUS (Blanford 1875)

**TYPE LOCALITY** "Nubra Valley, Ladak." Kunlun Mts., northern Ladak, India (see Rossolimo *et al.* 1992a).

**MORPHOLOGICAL CHARACTERS** One of the smallest species, with head and body length 101.5—112.8 and occipitonasal length of skull 25.62—27.38. Body color is the palest for the subgenus, being above rather dull and "dusty," mostly without brownish tone, except in Tibetan specimens where it is rather pronounced, thus making them more similar to *A. barakshin*. The skull, although small, is robust, bearing sharply defined ridges, especially in interorbital and parietal regions. It has a relatively long orbit and unique braincase configuration which is the shortest and highest, although relatively narrow, for the subgenus. Tympanic bulla short, its most distinctive feature being a reduced tympanum accessorium (the only instance known to us in the entire group of clethrionomyine voles). Third upper molar is the shortest and simplest among *Alticola*, with but two lingual angles. The second infold on labial side of this tooth is very wide.

On differences from *A. barakshin*, see above under that species. From *A. semicanus*, *stoliczkanus* is easily separable by smaller size, lighter body coloration, and unique skull morphology; this along with simple dentition and short tail makes it readily distinguishable from *A. argentatus* and *A. tuvinicus*.

**DISTRIBUTION** Although too few specimens are in collections to provide a comprehensive view of the species range of *A. stoliczkanus*, this species is anticipated to occur over large areas of the Indian side of the Himalaya, from Jammu and Kashmir to Nepal and Sikkim (Ellerman, 1961), and over all of Xinjiang, Xizang (Tibet) and the Kunlun Mts. of China. The northern limits of its range in China are not certain; we speculate this species does not go farther north than the Nan Shan and Qilian Shan. Questions of distribution of *A. stoliczkanus* in China, including its spatial relation with other *Alticola* species, depends largely on more extensive sampling.

**TAXONOMY** This well-defined species traditionally has included *stracheyi* Thomas, 1880 (Schwarz, 1939; Gromov *et al.* 1977; Lim *et al.* 1992). However, Feng *et al.* (1986) consider *stracheyi* to be a distinct species allopatric in distribution to *stoliczkanus*; the range of the former extends from eastern Kashmir through southern Tibet to northern Nepal and Sikkim, south of the range of *stoliczkanus*. Other subspecies allied with *stracheyi* are *cricketulus* and *bhatnagari*; and with *stoliczkanus s. s.* — *acrophilus*, *lama*, and *nanshanicus* (Musser *et al.* 1993). *A. s. lama* Barret-Hamilton, 1990 is endemic to the Tibetan Plateau. It was described originally from Aru Co Lake, western Tibet, and is characterized (relative to other subspecies of *A. stoliczkanus*) by larger size, longer tail, and somewhat brighter (more rusty) pelage. *A. s. nanshanicus* is restricted to the northern margin of the plateau. On relations with *A. barakshin*, see above; we stress again that our phylogenetic hypothesis implies *A. stoliczkanus* to be derived from the latter and one of the most evolved species in the subgenus. Uncertainty exists concerning subspecific differentiation because of scanty materials available.

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- Key words** Subgenus *Alticola*; Systematics and distribution; China

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高山鼯亚属. 分类, 分布, 中国

中文摘要

中国高山鼯亚属 (*Subgenus Alticola*) 的系统分类与分布

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Q95P.837

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高山鼯亚属 (*Alticola*) 广布于中亚山地, 即从喜马拉雅山、兴都库什经帕米尔、天山、西藏而至图瓦、抗爱山和贝加尔湖一带。中国过去仅记录2种: 银色高山鼯 (*Alticola argentatus* Severtsov; 有时定作劳氏高山鼯 *A. roylei* 的一亚种) 和斯氏高山鼯 (*A. stoliczkanus* Blanford)。本文主要依据形态学资料和采用判别函数分析的方法, 对该亚属进行了研究。我们认为中国高山鼯至少有3个以上的物种存在, 现概述于后。

1. 银色高山鼯 *Alticola argentatus* (Severtsov, 1879)

尾长超过体长30%。在亲缘上本种与本亚属的克什米尔高山鼯 (*A. montosus*) 和劳氏高山鼯非常紧密, 且与图瓦高山鼯 (*A. tuvinicus*) 也很接近。分化有9个亚种, 其中5个可能发现于中国。

(1) 指名亚种 *A. a. argentatus* (Severtsov, 1879) 中国新疆塔什库尔干地区以及国外见于兴都库什和帕米尔;

(2) 昆仑亚种 *A. a. phasma* Miller, 1912。目前仅记录于中国新疆喀喇昆仑山;

(3) 天山亚种 *A. a. taraxovi* Rossolimo et Pavlinov, 1912, 记载于吉尔吉斯共和国东部之天山地区, 与之毗邻的中国新疆天山可能有发现;

(4) 特克斯亚种 *A. a. worthingtoni* Miller, 1906, 分布于中国新疆天山的特克斯河盆地及哈尔克塔乌山;

(5) 哈萨克亚种 *A. a. subluteus* Thomas, 1914, 分布在哈萨克斯坦共和国东南部; 中国新疆与其接壤的山地有分布。

2. 图瓦高山鼯 *Alticola tuvinicus* Ognev, 1950

尾长通常超过体长30%; 尾部毛色淡白, 偶尔出现双色。它与银色高山鼯很象, 在形态上或许也在系统上, 可能介于银色高山鼯和灰色高山鼯 (*A. semicanus*) 之间。

分布于俄罗斯图瓦和西伯利亚南部; 中国新疆东北隅及蒙古阿尔泰山可能有分布。

3. 灰色高山鼯 *Alticola semicanus* (Allen, 1924)

尾长不及体长的30%, 尾部接近全白色。见于俄罗斯图瓦南部和蒙古西北部、中部与东部; 曾报道于中国内蒙古的银色高山鼯 (赵肯堂等, 1981) 可能系本种。

4. 阿尔泰山高山鼯 *Alticola barakshin* Bannikov, 1947

尾长少于体长的30%, 尾部明显双色。在俄罗斯图瓦、蒙古戈壁阿尔泰山有分布; 与蒙古毗连的中国新疆北部有可能发现。

5. 斯氏高山鼯 *Alticola stoliczkanus* (Blanford, 1875)

印度一侧的喜马拉雅山、尼泊尔及中国西藏和新疆等山地均有分布。

关键词 高山鼯亚属; 分类和分布; 中国