Erforsch. biol. Ress. MVR, Halle (Saale) 1989 (6): S. 17–23
Wiss. Beitr. Univ. Halle-Wittenberg 1985/56 (P 23)

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On the origin and history of the Mongolian avifauna

As compared with efforts devoted to deciphering the origins of avifaunas of southern continents, much less attention has been given to the development of Holarctic avifaunas. The reasons for this are well understandable and can be summarized as follows: zoogeographic regions on southern continents are usually well marked and characterized by a high degree of endemism, while they are usually insufficiently marked in the Holarctic. This makes the history of the avifaunas of southern continents much easier to investigate; a fact which holds despite the still insufficient fossil evidence for the evolution of southern avifaunas.
In this paper I will try to investigate the origin and history of the Mongolian avifauna. The evidence is presented chronologically and only periods with available ornithological evidence are included.

Early Cretaceous

The oldest bird species found within the borders of the contemporary Mongolia is *Ambiortus dementjevi* KUROČKIN 1982c from the late Neocomian of Churilt-Ulan-Bulak in southcentral Mongolia (see also KUROČKIN 1985a). This is a piece of evidence that birds were widely distributed by early Cretaceous (see Elżanowski 1983, Tyrberg 1986); but the find itself does not allow any biogeographic conclusions.

Late Cretaceous

Gobipteryx minuta ELŻANOWSKI 1974 (see also ELŻANOWSKI 1976, 1977, 1981) is the only representative assigned to birds from the Mongolian late Cretaceous. Its systematic position was, however, challenged, and it has been claimed (Brodkorb 1976, 1978, Mlíkovský 1985) that *Gobipteryx* does not belong to birds at all. My reexamination of the holotype and referred material (Mlíkovský, unpubl. results, 1987) convinced me that *Gobipteryx* was no bird.

Paleocene

KUROČKIN (1974, 1976b) reported on 12 avian bones excavated in the Nemget basin in southern Gobi. The remains still wait for description and publication.

Eocene

The Eocene avifauna of Mongolia includes only one species: *Eogrus crudus* KUROČKIN 1981. Numerous other avian bones were excavated in the Mongolian Eocene (cf. KUROČKIN 1974, 1976b), but their description was not yet published. *Eogrus crudus* is, however, of some zoogeographic interest. It belongs among the oldest representatives of the extinct family Eogruidae (incl. Ergilornithidae – cf. MLÍKOVSKÝ 1985), known in Eocene only from Mongolia and adjacent areas of northern China (*Eogrus aeola* WETMORE 1934) and

eastern Kazakhstan (*Eogrus turanicus* BENDUKIDZE 1971). Because of the lack of any evidence for the occurence of the Eogruidae in Eocene (and Oligocene – see below) outside of this area (see KUROČKIN 1981), it is possible to hypothesize (CRACRAFT 1973, KUROČKIN 1981, 1982b; cf. also MLÍKOVSKÝ 1982) that Eogruidae originated in the steppe zone of central Asia and lived there as autochthonous endemics during the late Paleogene.

Oligocene

Among the finds of the Mongolian Oligocene birds the Eogruidae are again dominating. They are particularly represented by *Sonogrus regalis* KUROČKIN 1981, *Ergilornis rapidus* KOZLOVA 1960 and *Ergilornis minor* (KOZLOVA 1960). See KUROČKIN (1981) for their review and the „Eocene" chapter for the present discussion of the zoogeographic importance of these finds.

Few other birds were described from the Mongolian Oligocene thus far, although KUROČKIN (1974, 1976b) reported on numerous excavated remains. The described ones include three accipitrid raptors (*Buteo circoides* KUROČKIN 1968, *Gobihierax edax* KUROČKIN 1968 and *Tutor dementjevi* KUROČKIN 1968), the former two of which were based upon less diagnostic elements, and an alleged rail, *Palaeorallus alienus* KUROČKIN 1968, which was later relegated to the category of Aves incertae sedis (CRACRAFT 1973: 38). Hence, nothing positive can be said about the zoogeographic relationships of the Mongolian avifauna during the Oligocene, except that the Eogruidae still survived within the borders of their Eocene area.

Pliocene

A rich avifauna was described by KUROČKIN (1971, 1976a, 1980, 1982a, 1985b) from the middle Pliocene of the Ich Nuuryn Töchöm (Great Lakes Depression) in western Mongolia. It is not possible to present full discussion of species belonging to this avifauna, but a few comments are desirable.

Cygnus pristinus KUROČKIN 1971 proved inseparable from the modern *Cygnus olor* (GMELIN) (MLÍKOVSKÝ and ŠVEC 1986) which still locally occurs in the Ich Nuuryn Töchöm (PIECHOCKI 1968, PIECHOCKI et al. 1981), and was already years ago considered to be a Gobi relict (LÖNNBERG 1932). Numerous remains were referred to *Cygnus „pristinus"* by KUROČKIN (1971, 1976a), but some of them were described as being more similar to the modern *Olor cygnus* (LINNÉ) and may, hence, belong to the latter species which also still regularly breeds in the Ich Nuuryn Töchöm (PIECHOCKI 1968, PIECHOCKI et al. 1981). *Heterochen vicinus* KUROČKIN 1976a belongs to the modern genus *Anser* BRISSON, where it may represent a valid species (see MLÍKOVSKÝ and ŠVEC 1986). Thus, this find does not support Mongolian – North American zoogeographic relationships during the Pliocene, as believed by KUROČKIN (1976b) on the basis of that the genus *Heterochen* was known before only from the Pliocene of Nebraska (Short 1970).

On the other hand, *Anser liskunae* KUROČKIN 1976a does not belong to the genus *Anser* BRISSON, but to another modern genus *Olor* WAGLER, where it represents a valid, now extinct species (MLÍKOVSKÝ and ŠVEC 1986). It was probably widespread during the Pliocene and early Pleistocene, because *Anser subanser* JÁNOSSY 1983 from the early Pleistocene of Czechoslovakia appears to be synonymous with it (MLÍKOVSKY 1989).

Anas soporata KUROČKIN 1976a belongs to the modern genus *Dendrocygna* SWAINSON, where it represents a well defined, now extinct species (MLÍKOVSKÝ and ŠVEC 1986).

This is a zoogeographically interesting find, because the genus *Dendrocygna* sensu lato is presently absent from the Palearctic and inhabits only tropics and subtropics of the world (JOHNSGARD 1978, KOLBE 1984).

A specific problem is the ostriches (Struthionidae). *Struthio mongolicus* LOWE 1931 was described early Pliocene of (?) Olan Chorea in Mongolia (cf. BRODKORB 1963) on the basis of several egg fragments, but its systematic status remains uncertain, because it was synonymized with *Struthio wimani* LOWE 1931 by BRODKORB (1963) and with *Struthio asiaticus* MILNE-EDWARDS 1871 by KUROČKIN and LUNGU (1970). Evidently, a critical modern revision of late Cenozoic European and Asiatic ostriches is needed; too many

species were described from this period and area, apparently mostly without adequate comparisons with other ostrich species (cf. BRODKORB 1963, KUROČKIN and LUNGU 1970).
It should be noted here that during the late Miocene and Pliocene, the Eogruidae became widespread over the entire southern Asiatic steppe zone (KUROČKIN 1981, 1982b, see also HARRISON and WALKER 1982).

Pleistocene

No avifauna of the Mongolian Pleistocene was adequately described thus far. Few, insufficiently identified birds were mentioned only by SCHLOSSER (1924) and BATE (1931).

Recent

The composition of the contemporary Mongolian avifauna was reviewed especially by VAURIE (1964), PIECHOCKI (1968), PIECHOCKI and BOLOD (1972), and PIECHOCKI et al. (1981, 1982). Using the faunal lists provided by the above authors I analyzed the zoogeographic relationships of all bird species breeding in Mongolia. The identification of faunal types was made on the basis of VOOUS (1960); two faunal types were added, particularly the eastern Siberian and the Indian ones. The results are presented in Table 1.

Table 1.
Composition of the breeding avifauna of Mongolia. Faunal types mainly after VOOUS (1960). See text for explanation.

Faunal type	number of species		
	non-Passeriformes	Passeriformes	together
Arctic	4	–	4
Holarctic	20	8	28
Siberian-Canadian	2	2	4
Siberian	3	8	11
Eastern Siberian	5	19	24
Chinese-Manchurian	2	5	7
Palearctic	42	36	78
European	–	2	2
European-Turkestanian	2	12	14
Turkestanian-Mediterranean	6	1	7
Sarmatic	4	–	4
Turkestanian	3	6	9
Paleoxeric	3	4	7
Paleo-xeromontane	–	7	7
Paleomontane	1	10	11
Tibetan	3	2	5
Mongolian-Tibetan	5	7	12
Indian-African	1	–	1
Old World	11	3	14
Indian	3	1	4
Cosmopolitan	9	–	9
unknown	1	–	1
together	130	134	264

Twelwe species are identified here as belonging to the Mongolian-Tibetan faunal type and being hence autochthon to the Mongolian area. They include *Anser indicus* (LATHAM), *Aegypius monachus* (LINNÉ), *Buteo hemilasius* TEMMINCK and SCHLEGEL, *Falco cherrug* GRAY, *Charadrius veredus* GOULD, *Melanocorypha mongolica* (PALLAS), *Motacilla citreola* (PALLAS), *Anthus godlewskii* (TACZANOWSKI), *Phylloscopus griseolus* BLYTH, *Montifringilla davidiana* (VERREAUX), *Emberiza godlewskii* TACZANOWSKI, and *Podoces hendersoni* HUME. Of these species, faunal type of *Aegypius monachus, Falco cherrug* and *Motacilla citreola* was identified by VOOUS (1960), that of the other species by the present writer.

Table 2.
Composition of the breeding avifauna of Mongolia, according to groups of faunal types. See text for explanation and Table 1 for more detailed data.

Faunal group	number of species		
	non-Passeri-formes	Passeri-formes	together
Cosmopolitan	9	–	9
Old World	11	3	14
Holarctic*	26	10	36
Palearctic**	79	120	199
Oriental***	4	1	5
unknown	1	–	1

Summarizing the faunal types listed in Table 1 into groups we become a somewhat more synoptical survey (see Table 2). As follows from the latter table, a majority 75.4 % of bird species breeding in the contemporary Mongolia belong to the Palearctic faunal group, or they are even more widespread, i. e. they belong the Holarctic (13.6 %) or Old World (5.3 %) faunal groups, or are even cosmopolitan (3.4 %). One species *(Phasianus colchicus* LINNÉ) is of unknown geographic origin (VOOUS 1960). Only the remaining 5 species (1.9 % of the total) seem to represent allochthonous elements for the Palearctic and, hence, also for Mongolia. Of them, *Glareola maldivarum* FORSTER, *Caprimulgus indicus* LATHAM, *Apus pacificus* (LATHAM) and *Muscicapa latirostris* RAFFLES colonized Mongolia probably from the Oriental region. Less clear is the geographic origin of the Mongolian population of *Chlamydotis undulata* (JACQUIN). The species is now widely distributed over Africa and southern Asia. Another problematic species is *Larus argentatus* PONTOPPIDAN. This species was believed to belong to the Nearctic faunal type by VOOUS (1960), but is is presently distributed over all Holactic and I have classified it as belonging to the Holarctic faunal type in the present paper. Moreover, the Mongolian subspecies of this gull, *Larus argenatus mongolicus* SUŠKIN seems to belong to the Mongolian-Tibetan faunal type.
Otherwise I see little reason in discussing the origin of the Mongolian avifauna within the borders of the Palearctic until detailed ornithogeographic classification of this region is made, such as that of CROWE and CROWE (1982) for the Afrotropical region. There is too much subjectivity in VOOUS's (1960) method of identification and characterization of faunal types.
Finally, I will attempt to estimate the richness of the Mongolian avifauna. Applying the theory of island biogeography to continental (Palearctic) avifaunas, REICHHOLF (1980) calculated the relation between the area (A) and the number of breeding bird species (S) as follows: $S = 42.8\ A^{0.14}$. Because the area of Mongolia is approximately 1 535 000 km^2 (MURZAEV 1952), the expected number of breeding bird species is approximately 314.5. Recorded are (Table 1) 264 species, i. e. only approximately 83.9 %. Interestingly enough, low richness of fauna was recorded for the Mongolian region also for other taxa, e. g.

*) Includes Holactic, Arctic and Siberian-Canadian faunal types.
**) Includes Palearctic, Siberian, Eastern Siberian, Chinese-Manchurian, European, European-Turkestanian, Turkestanian-Mediterranean, Sarmatic, Turkestanian, Paleoxeric, Paleo-xeromontane, Paleomontane, Tibetan and Mongolian-Tibetan faunal types.
***) Includes Indian-African and Indian faunal types.

Lepidoptera (KOSTROWICKI 1965). Low avifaunal richness in contemporary Mongolia was probably caused by the forthcoming post-Pliocene extinction of bird species, which point of view is reinforced by KUROČKIN's (1985) description of the Pliocene avifauna of Mongolia which contains a number of species now lacking in the area. It deserves mentioning that Palearctic steppe zone avifaunas, to which those of Mongolia belong to a large degree, are still endangered by forthcoming environmental changes (cf. KIRIKOV 1959, VOINSTVENS'KIJ 1960).

Summary

The origin and history of the Mongolian avifauna were analyzed on the basis of paleontological and neontological data. Main results can be summarized as follows:

1. The oldest bird known from Mongolia is *Ambiortus dementjevi* from the early Cretaceous.
2. Neogene avifauna of Mongolia is characterised by a probably more rich avifauna that is the modern one.
3. Recent Mongolian avifauna is by approximately 16 % poorer (in species numbers) than can be expected on theoretical grounds.
4. Twelwe species are identified here as belonging to the Mongolian-Tibetan faunal type.
5. 98 % of species breeding in the contemporary Mongolia are either widespread through large parts of the world or belong to the Palearctic faunal group. Four species are of Oriental and two are of unknown origin.

Zusammenfassung

Die Entstehung und Geschichte der mongolischen Avifauna wurde aufgrund von paläontologischen sowie neontologischen Angaben und Befunden analysiert. Die wichtigsten Ergebnisse lassen sich wie folgt zusammenzufassen:

1. Die älteste Vogelart Mongoliens ist *Ambiortus dementjevi* aus der unteren Kreide.
2. Die neogene Avifauna Mongoliens ist durch eine offenbar größere Vielfalt der Vogelarten charakterisiert, als die heutige.
3. Die rezente Avifauna Mongoliens ist um etwa 16 % ärmer, als man theoretisch erwarten könnte.
4. Zwölf Arten wurden hier als mongolisch-tibetische Faunenelemente identifiziert.
5. 98 % der gegenwärtigen mongolischen Brutvogelarten sind entweder weit verbreitete Arten, oder solche, die der paläarktischen Faunengruppe angehören. Vier Arten sind einer orientalen und zwei einer unbekannten Herkunft.

Резюме

В работе на основе палеонтологических и неонтологических данных анализируется происхождение и история орнитофауны Монголии. Основные результаты анализа могут быть сформулированы следующим образом:

1. Самой древней птицей Монголии является *Ambiortus dementjevi* из нижнего мела.
2. Орнитофауна неогена Монголии вероятно характеризировалась наличием большого количества видов, чем современная.
3. Современная орнитофауна Монголии приблизительно на 16 % беднее, чем это можно было ожидать исходя из теоретических расчетов.
4. 12 видов идентифицировано как принадлежащие к Монголо-Тибетскому типу фауны.
5. 98 % видов гнездящихся в современной Монголии принадлежат к повсеместно распространенным или же входят в палеарктическую группу фаун. Четыре вида — ориентального и два неизвестного происхождения.

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