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Book review

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Ex oriente lux

Michael J. Benton, Mikhail A. Shishkin, David M. Unwin, & Evgenii N. Kurochkin (eds.) 2000. *The Age of Dinosaurs in Russia and Mongolia*. Cambridge University Press. xxxix + 696 pages (hardback). GBP 90.00, USD 140.00.

This valuable book covers the enormous record of Permian and Mesozoic tetrapods from a vast territories of Russia the former Soviet Asian republics, and Mongolia. Morphological and taxonomic information concerning the fossil tetrapod faunas of these regions is brought together for the first time. Up to now, this information has been scattered in numerous papers, many of them never published in any western language. As follows from the Preface and Introduction, the main aim of the book is to introduce the Russian-published results of research on tetrapods from Mongolia and the former Soviet Union to western knowledge. This almost 700-page volume comprises thirty chapters by a total of forty recognised palaeontological authorities. Most chapters present systematic surveys of various tetrapod groups, and usually also include comments on their phylogeny. A traditional, stratophenetic treatment of the groups prevails, cladistic methodology rarely being applied. A few chapters concentrate on historical, biostratigraphical or biogeographical subjects. The book starts with some introductory sections by Benton, generally concerning the Russian stratigraphic conventions and the Cyrillic-English transliteration system adopted in this volume. Of immense utility are the sections that propose uniform transliterations of Russian and Mongolian stratigraphic units and Mongolian place names.

Chapters 1–9 focus on the Permo-Triassic faunas of Russia. Chapter 1 (Ochev & Surkov) recapitulates the history of almost two centuries of Russian works on the Late Permian and Triassic tetrapods in more than a thousand sites over a vast territory of eastern European Russia. In Chapter 2, on the amniote faunas of the Russian Permian, Modesto & Rybczynski recognise eight amniote assemblages in the Late Permian of Russia [actually nine, because the youngest Late Tatarian (Vyatskian) horizon is here subdivided into two faunal complexes]. The second part of the chapter contains a cladistic-based analysis of interrelationships among basal anomodonts. Optimisation of the geographic distribution onto the resulting cladogram suggests that Venyukovioidea, the Russian basal anomodonts (Therapsida), are descendants of a single anomodont lineage that invaded Eastern Europe from Africa. This hypothesis is contrary to earlier opinions that therapsids dispersed freely between Eastern Europe and Africa throughout the Late Permian. Russian Permo-Triassic therapsids are also considered in chapter 6 (Battail & Surkov). This chapter is a well-illustrated overview of the group, which has an exquisite record on the Russian Platform.

Amphibians are the subject of three chapters (Chapter 3: Shishkin *et al.*; Chapter 4: Novikov *et al.*; Chapter 16: Shishkin). The essay of Shishkin *et al.* on the Permo-Triassic temnospondyls is informative, well organised, discusses important topics of amphibian evolution, is abundantly illustrated and includes a concise overview of the temnospondyl taxa of the region. Detailed discussion of temnospondyl relationships was beyond the scope of the chapter. However, inclusion of some pictorial representations, illustrating authors' opinion on amphibian relationships and a recent cladistic-based phylogenetic hypothesis would help to follow the reasoning

of the first part of the chapter, which touches this problem. The chapter by Novikov *et al.* is on another 'labyrinthodont' group – the anthracosaurs. Most of the systematic overview concerns the poorly understood and little studied 'Chroniosuchia', which are late anthracosaurian offshoots, known almost entirely from European Russia. Amphibians from Mongolia and the Asiatic republics of the former Soviet Union are surveyed in Chapter 16. They are represented by rare temnospondyls, numerous anurans, and somewhat less abundant Caudata. Most of the taxa were reported from the Cretaceous, predominantly from the Upper Cretaceous.

Chapter 5 (Lee) brings a competent cladistic-based revision of Russian pareiasaurs and discusses their phylogeny. Only two or three species (out of 15 earlier described from Russia) belonging to two genera (out of five) are considered valid. Chapter 7 (Shishkin *et al.*) is on the Triassic tetrapod biostratigraphy of the Cis-Uralian Russia. This chapter contains useful tables that show stratigraphic distribution of amphibians and reptiles throughout the Lower and Middle Triassic in Russia, and the tetrapod zonation of the Cis-Uralian Early – Middle Triassic. Chapter 8 (Gower & Sennikov) provides an overview of the Upper Permian – Middle Triassic archosaurs of Russia. Many taxa are problematic because of the incomplete nature of the early archosaurs of Russia. Nevertheless, the authors document an apparently high diversity in this fauna. The so far described Russian Permo-Triassic procolophonoids are briefly reviewed in Chapter 9 (Spencer & Benton). Only 13 species (out of 20 originally distinguished) assigned to six (out of 14) genera are considered as valid.

In Chapter 10 (Unwin *et al.*), *Sharovipteryx* and *Longisquama,* the enigmatic Triassic reptiles from Kirgizstan, are redescribed, and aspects of their functional morphology and phylogeny are discussed. The authors provide important corrections to the previous description of *Sharovipteryx*. Unfortunately, fig. 10.3, which potentially might have illustrated the new interpretation of the anatomy of this animal, is very poor and does not serve this purpose.

Chapter 11 (Storrs *et al.*) provides a revision of Mesozoic marine reptiles reported from the Middle Jurassic–Cretaceous deposits in the former Soviet Union. Among them, plesiosaurs and ichthyosaurs are relatively common, although often poorly preserved and/or fragmentary. Therefore, many original determinations are proved doubtful or invalid.

Chapters 12–15 include narratives of some expeditions to Mongolia (Colbert: Chapter 12; Kurochkin & Barsbold: Chapter 13), as well as two papers on the stratigraphy and lithostratigraphy of the Cretaceous vertebrate-bearing deposits of Mongolia (Shuvalov: Chapter 14; Jerzykiewicz: Chapter 15). Colbert's chapter is a slightly updated account of his 1968 book *Men and Dinosaurs*. Its inclusion in the present book seems disputable, especially insofar as the 'updating' section by Benton (pp. 232–233) apparently ends in 1996, and the more recent achievements of the AMNH and Mongolian-Japanese teams are not mentioned.

Concerning the geology of the Cretaceous vertebrate-bearing strata of Mongolia, it was an excellent editorial judgment to incorporate the two chapters that present opposing views concerning the depositional model that best describes the stratigraphic record. According to Shuvalov (Chapter 14), the majority of the Upper Cretaceous sediments are of lacustrine origin, whereas Jerzykiewicz (Chapter 15) interpretes the Okavango Delta and related ephemeral rivers and lakes/pans of the Kalahari Desert as the closest contemporary analogues of the Late Cretaceous environments of Mongolia.

The largest chapter (58 pages) in the volume is Sukhanov's paper (Chapter 17) on the Mesozoic turtles of Middle and Central Asia. The chapter extends beyond the scope suggested by the book title, because it covers also the Chinese turtles. The chapter also departs from most of the other systematic chapters in the volume. Special attention was given to traditional characteristics of the main groups of turtles rather than the documentation of the material recorded from the former Soviet Union and Mongolia. Although perhaps a bit out of place in this form in the present volume, Sukhanov's chapter is competent, informative, beautifully illustrated paper, with extensive list of references. If only a supplement listing valid species recorded from the region (with

their stratigraphic and geographic ranges) was added the text, this chapter might better serve the purpose announced by the volume title.

The taxonomic diversity and generally exquisite preservation of the Cretaceous Mongolian lizards is an exceptional phenomenon. An overview of the lizard families represented in Mongolia is given in Chapter 18 (Alifanov), mostly without information on morphology of the particular genera and/or species. Discussion of the lizard records includes some tables comparing their familial diversity in the Late Cretaceous of Mongolia, and illustrating changes of familial compositions on the Lower/Upper Cretaceous, Upper Cretaceous/Palaeogene boundaries, as well as throughout the Mongolian Palaeogene. However, conclusions concerning the extinction rates at these intervals seem premature. Among others, the fossil record may be affected by taphonomic factors, among others, and different environmental conditions may also be responsible for differences in composition of lizard complexes.

Chapter 19 is devoted to a rare and enigmatic group of diapsids – the choriostoderans of 'northern' Asia, meaning Mongolia (4 species) and Buryatia (1 species). Mongolia can hardly be considered a northern Asian region. Of the reviewed material, including five species of four genera, the validity of one species and one genus (*Irenosaurus*) is questioned. Chapter 20 (Storrs & Efimov) is devoted to the Mesozoic crocodyliforms of north-central Eurasia (meaning the middle Volga region, the Crimea, and the Middle Asian republics of the former Soviet Union and Mongolia). The systematic survey includes generic diagnoses and discussions on the status of the considered taxa. Twenty-five species have been described from this area ranging from the Middle Jurassic to the Maastrichtian, but only 19–20 are considered valid.

Pterosaurs (Chapter 21: Unwin & Bakhurina) are poorly represented in the territory of the former Soviet Union and Mongolia. In the systematic review of the pterosaur material, four named species have been considered, and three forms referred to in the review as: 'Bakhar anurognathid Bakhurina & Unwin, 1995a', 'Huren Dukh ornithocheirid Bakhurina & Unwin, 1995' and '*Ornithocheirus* (?) sp.' (although, in the end section of comments to the latter form the authors state: '...for the present, we refer it to cf. *Anhanguera*.'!).

Five chapters deal with dinosaurs, and they are rather disappointing. The theropod chapter (22: Currie) brings encyclopaedic characteristics of theropod families. Species known from Mongolia are briefly mentioned, together with some species that (according to the author) should be found in Mongolia, although they have thus far been reported only from China or Uzbekistan. The chapter includes a table (22.1), the first column of which 'lists the maximum number of species described from Central Asia', whereas the second column is 'the **most conservative** interpretation of the first column.' Apparently, in spite of its camouflaged heading, the second column presents the author's opinions as to the 'real' status of the relevant species. In a few cases these opinions are premature, or difficult to accept, e.g., that which considers *Anserimimus planinychus* as a synonym of *Gallimimus bullatus*, contrary to the author's statement on p. 446 referring to unique characters of *A. planinychus*. Sauropods, the subject of Chaper 23 (Maryańska), are rare finds on the territory of the former Soviet Union, and only three valid species have been described from Mongolia. Cretaceous ornithopods from Kazakhstan, Mongolia and Siberia are reviewed in Chapter 24 (Norman & Sues). Of the 15 species described from these regions, 10 are considered *nomina dubia* (sometimes without mention of any reason, compare: *Barsboldia sicinskii*) and two as of questionable or subjective validity. The first iguanodontid species reviewed in the chapter is *Iguanodon bernissartensis* (without information about its geographic occurrence). As this species apparently does not occur either in Russia or Mongolia (?), it is not clear why its description has been included in this volume.

Chapter 25 (Sereno) includes a cladistically based revision of the pachycephalosaurs and ceratopsians. However, only the first part of this chapter concerns the Asian (Mongolian and Chinese) material. The rest of the text extends beyond the limits set by the title of the book, and is essentially an expanded version the relevant portion of phylogenetic hypothesis presented in

an earlier paper by the author. The last of the 'dinosaur' chapters (26: Tumanova) concerns the Cretaceous Mongolian ankylosaurids. Descriptions of eight monotypic genera, ranging from the Aptian–Albian to Maastrichtian, are included, and the taxa are compared with the Chinese and North American ankylosaurids. However, one of the included genera, the monotypic *Amtosaurus*, seems to be of dubious validity. It is based on a fragmentary basicranium, and none of the characters listed in the description can be considered as an unequivocal apomorphy.

The review of Mesozoic birds from Mongolia and the former Soviet Union by Kurochkin (Chapter 27) shows that bird remains are relatively numerous, although usually very fragmentary. Kurochkin mentions 10 named Enantiornithes species in all: seven from the Coniacian deposits in Uzbekistan, and three from the Late Cretaceous of Mongolia. Eight named species represent Ornithurae. *Mononykus* is mentioned among non-avialan representatives of the Maniraptora. The avialan status of *Mononykus* has often been questioned, and its relationships remain unresolved. Unfortunately, Kurochkin's commentary does not provide new evidence that would conclusively override arguments of the adherents to the hypothesis of the avialan nature of *Mononykus*.

Chapter 28 (Mikhailov) overviews the eggs and eggshells of dinosaurs and birds from the Mongolian Cretaceous. Twenty dinosaur and four avian oospecies have been recognised in the territory of the Gobi Desert.

The two last chapters in the volume are devoted to Mesozoic mammals. It should be emphasised that in Chapter 29 by Kielan-Jaworowska *et al.*, all 34 Mongolian mammalian species described up to 1999 by the American, Mongolian, Polish and Russian palaeontologists have been gathered together in one paper for the first time. The chapter will be a valuable source of information on the Central Asian Mesozoic mammals for many years. Mesozoic mammals have also been recorded from 14 localities in Kazakhstan, Kirgizstan, Tadzhikistan, and Uzbekistan, and lately also from Russia (Chapter 30: Averianov). Contrary to the mostly perfect Mongolian specimens, these mammals are fragmentary, and only partly described. They predominantly represent placentals, whereas multituberculates dominate among the Mongolian Cretaceous mammals.

The reviewer's main criticism concerns some editorial matters. The title of this outstanding book seems rather unfortunate, as it does not correspond to the contents. It suggests that a reader will find not only chapters on the tetrapods, but also a more general characteristic of the 'dinosaur age' of the regions, i.e., something on the vegetation, coexisting animals, environments, palaeogeography, etc. The geographic component of the title is also misleading. Concerning the geography, there is some confusion throughout the book about the use of terms 'Middle' and 'Central' when referring to the former Soviet part of Asia. For the same regions, authors apply either of these terms to the same regions. Many chapters lack tables listing the reviewed taxa and their stratigraphic and geographic ranges. Such tables would be especially useful in larger chapters concerning multi-taxon groups. The systematic parts of the chapters are not uniform. Some authors provide diagnoses for all taxa considered – suprageneric, generic and specific ones (the ideal case, but applied only once – in the chapter on procolophonoids). Others diagnose only the genera (the most frequent case) or species (rare). Some authors provide only characteristics of suprageneric taxa, mentioning, or not, differences between genera or species. In a few instances, only the familial record is provided, without referring to the morphology of the infrafamilial taxa. The long production cycle of the volume is probably responsible for the fact that, in several chapters, papers published after 1996–1997 are not taken into account. Considering that the editing of such an immense and multi-authored volume was an extremely difficult task, the above criticism does not detract from the fact that *The Age of dinosaurs in Russia and Mongolia* will remain a useful reference book for many years to come.

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P@NMOEA. Vol. 44, No. 2, pp. 231.Â A review of the reptile and amphibian assemblages from the Stormberg of. South Africa, with special emphasis on the footprints and the age of the Stormberg. - Palaeontologia. Afrzcana (Haughton Memorial Volume). 25, 87. - 1 10. Olsen, P.E., Smith, J.B.