

## **Fossil Vertebrates in Stratigraphy**



## **Stratigraphic distribution of large flightless birds in the Paleogene of Europe**

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Three main groups of large flightless birds are known from the Paleogene of Europe: Gastornithidae, Ratitae and Phorusrhacidae. Gastornithids have the longest and most complete record (Selandian to middle Lutetian). Ratites have a patchy record (Thanetian and Lutetian). Phorusrhacids are known only from the late Lutetian. Gastornithids probably originated in Europe, whereas phorusrhacids probably reached Europe from Africa.

**Keywords:** Aves, Gastornithidae, Phorusrhacidae, Ratites, Europe, Paleogene.

## **Neogene terrestrial chronostratigraphic sequence of China**

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Seven terrestrial chronostratigraphic units, the Xiejian, Shanwangian, Tunggurian, Bahean, Baodean, Gaozhuangian, and Mazegouan stages, are recognized for the Chinese Neogene based on updated large and small mammal faunas. In the past, the positions of the Chinese mammalian faunas in the chronological chart and their correlations to the European faunas were determined mainly by evolutionary levels of mammals for lack of accurate absolute ages. During the last three decades, great progress has also been made in Chinese Neogene terrestrial stratigraphic studies. Most of the classic regions have been revisited, such as the Yushe and Baode areas in Shanxi, the Lantian area in Shaanxi, and the Tunggur area in Inner Mongolia, and so on. New discoveries are made in well-exposed fossiliferous regions, such as Tongxin in Ningxia, central Inner Mongolia, the northern Junggar Basin in Xinjiang, the Linxia Basin in Gansu, the Qaidam Basin in Qinghai, and so on. Magnetostratigraphic work was also undertaken in several classic regions. Great gaps, however, still exist between China and its European and North American counterparts in terms of accumulation of fossils as well as such basic tasks as documentation of fossil occurrences and their biostratigraphic contexts. Nowadays, the land mammal ages have been strongly broadened by data from new localities and new taxa in China. The significance of these new data is that they are beneficial toward our understanding of mammal turnovers and boundary calibrations. The faunal components are thought to be stable throughout each chronostratigraphic unit, without large changes occurring. For each unit, a series of species or genera are regarded as characteristic forms on the basis of the correlation to the European taxa. Usually, the chronostratigraphic units deal with the first appearance datum (FAD) of mammals at the generic level. Some of these genera are immigrants, and their entry into China often marks the beginning of a unit. The precise correlations between the Chinese and European mammalian ages based on more accurate dating will increase our ability to recognize mammal migrations between China and Europe. Asia acted as a faunal dispersal center for Europe during the Neogene, and the great majority of the exchanges were migrations from Asia into Europe. China was one of the main dispersal centers of the Neogene. In recent years, the Chinese Neogene mammal ages have become more accurate with the introduction of magnetostratigraphy, which has enabled ages to be calibrated and well-dated at their boundaries. Increasingly abundant paleomagnetic measurements make a good calibration for the correlation of the Chinese Neogene mammalian faunas with their European and North American counterparts. A new Neogene chronostratigraphic framework is proposed, and it is more consistent with the reality of the state of research and conditions in China. This will provide a foundation for the establishment of a formal Chinese Neogene terrestrial chronostratigraphic system. Given that China possesses well-developed Neogene terrestrial strata that are richly endowed with fossil

mammals, such a system should play a role in the establishment of an Asian Neogene terrestrial scheme in the future.

**Keywords:** chronostratigraphic unit, stage, mammal age, magnetostratigraphy, Neogene, China.

## **Triassic timescale based on Tetrapod biostratigraphy and biochronology**

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The biochronology based on the global biostratigraphy of tetrapod fossils allows division of the Triassic System into eight land-vertebrate faunachrons based mainly on the first appearance datums of tetrapod genera. Temporal resolution may be improved by subdivision of these faunochrons. We note, however, that this biochronology is undermined by the use of cladotaxonomy. The Triassic tetrapod footprint biochronology has less resolution, dividing the entire system into five footprint-based biochrons. The temporal resolution of this biochronology also may be improved through subdivision based on ichnotaxon range zones.

**Keywords:** Triassic, tetrapods, footprints, biochronology, land-vertebrate faunachrons.

## **New early Middle Pleistocene locality of small mammals (Lower Dniester) and its position in early Middle Pleistocene sequence**

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New important Eastern European locality of small mammals was discovered near Levada station, Dniester basin, 30 km east of Tiraspol town, Moldova. Small mammals found in the Levada locality include *Spermophilus* sp., *Lagurus transiens* Yanosy, *Eolagurus* sp., *Microtus (Terricola) arvalidens* Kretzoi, *Microtus (Stenocranius) gregaloides* Hinton and others. The species composition of this fauna indicates its close similarity to that of the fauna from stratotype of Tiraspolian Faunistic Complex described from the Kolkotova Balka locality (V terrace of the Dniester, Kolkotova terrace, Moldova). These faunas could be correlated with Ilinka Interglacial III and possibly with the Interglacial III of Cromer.

**Keywords:** Middle Pleistocene, small mammals, Eastern Europe.