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NEW RECORDS OF HOMINOID RESEARCH AT RUDABÁNYA

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Abstract

Rudabánya is a 10 million-year-old Hungarian locality, which has yielded abundant remains of eucatarrhine primates (*Dryopithecus, Anapithecus*), and is rich in plant remains, molluscs and a wide range of vertebrates. The fossiliferous layers were discovered more than 50 years ago, and the first Primates were found in 1967. During the past 5 years, an international multidisciplinary research team has studied different aspects of the site and collected fossils. The short article is a brief summary of the latest results of the team work.

Key words: Primates, Hominoidea, *Dryopithecus, Anapithecus*, Upper Miocene, Hungary, Rudabánya

Primates from Rudabánya

Over a period of 30 years, intermittent collection combined with intensive excavation has led to the recovery of 150 accessioned fossil primate specimens from the late Miocene locality of Rudabánya (Hungary), the vast majority from locality II. This sample, attributed to the great ape *Dryopithecus brancoi* (= *Rudapithecus hungaricus* KRETZOI) and a primitive catarrhine *Anapithecus hernyaki* KRETZOI, includes 3 partial crania, four additional maxilla, six mandibular specimens, 205 isolated or associated loose teeth, and 36 postcranial specimens, representing one of the richest samples of fossil catarrhines in the world (BEGUN and KORDOS, 1996).

As concerns the systematic determination of the Rudabánya primate fossils, of course, several different opinions have been published. In the early 1970s, KRETZOI thought that *Rudapithecus* belongs with *Ramapithecus* described from India, and thus is a direct ancestor of the *Homo* that emerged in Asia (KRETZOI, 1975). Today, most experts agree that *Rudapithecus* was a member of the *Dryopithecus* genus. Determination of the species, however, is quite uncertain. In some opinions, *Rudapithecus hungaricus* is in fact identical with *Dryopithecus brancoi* found in a similar age layer at Salmendingen in Germany during the past century (BEGUN and KORDOS, 1993). Others used the name *Dryopithecus carinthiacus* (ANDREWS, 1996). Naturally, only hypotheses are available on the question of what *Rudapithecus* really was. Comparisons performed by applying earlier and modern methods suggest that

Rudapithecus and the present chimpanzee must have been in close relation. *Dryopithecus* is the northern-most great ape, and represents, together with *Ouranopithecus*, a vicariant ecological pair to the later occurring African apes and humans (BEGUN, 1994).

In contrast with this theory is the experience that, throughout Europe, the links are missing that would indicate that successors of the whole *Dryopithecus* group could have survived. They probably formed an extinct line of evolution.

The most recent results of the *Dryopithecus* research from Rudabánya reveal that the cranial capacity of the female ape was 300-340 cm^3, the IQ was 2.9, the body size was 26.5 kg, and the height was 120-130 cm (KORDOS and BEGUN, 1996). The endocast of RUD-77 (female *Dryopithecus*) includes the complete frontal lobe, a large part of the right parietal lobe and some parts of the occipital lobe. The sulcal pattern is well preserved, and the endocast of RUD-77 exhibits a basically cercopithecoid pattern (KORDOS, 1993). *Dryopithecus* is a relatively generalized suspensory arboreal quadruped (BEGUN, 1993; KORDOS and BEGUN, 1996.). The bony labyrinth of *Dryopithecus* from Rudabánya (RUD-77) is similar to that of extant apes (SPOOR, 1996). Both the microwear and the shearing crest development of *Dryopithecus* dental remains suggest a more generalized frugivorous diet (UNGAR, 1996).

The enigmatic Rudabánya primate *Anapithecus hernyaki* was initially described by KRETZOI in 1974 as a new member of the family Pliopithecidae. Forty items, probably from 15 individuals, including one skull fragment and 176 teeth of this species, have been discovered up to the latest, 1994 field season at Rudabánya. The Rudabánya *Anapithecus* is a large catarrhine primate with a short and broad face and a highly vaulted neurocranium. The upper cheek teeth are characterized by premolars and molars not mesiodistally compressed. The lower dentition is characterized by elongated premolars; first and second molars with an asymmetric rhomboid or trapezoid shape; and an extremely elongated third molar with a very complicated stucture. *Anapithecus* differs in many respects from the genera *Pliopithecus, Epipliopithecus*, *Plesiopliopithecus*, *Laccopithecus* and *Crouzelia*. The origin of the genus is still unknown. Some other European localities are currently recognized as containing Anapithecus: Götzendorf (Austria), Salmendingen (Germany), Priay (France) and probably Eppelsheim (Germany) and Felsőtárkány (Hungary) (KORDOS, 1996).

Taphonomy, paleoecology and age of Rudabánya sites

The results of taphonomic investigations (ANDREWS et al., 1996a) indicate several modes of accumulation of animal bones at Rudabánya. Tree trunks and roots are present in growth positions in lignites, black muds and massive marls, and the fossil animal bones present show a lack of disturbance. Water transport is indicated for re-worked marls, with the animal bones affording evidence of preferred orientation in the direction of water flow. The accumulation of shelly layers and small mammal assemblages is associated with pond deposits accumulated on lake-shore flats. Little evidence of

predation has been found in any level, but there is extensive post-depositional modification of the fossils from most levels, due to highly acid environments. The exception to this is the assemblage from the pond deposits, which, although heavily blackened, shows little other evidence of post-depositional modification.

The environment at Rudabánya has been reconstructed on the basis of community ecology theory (ANDREWS et al. 1996b). This compares the pattern of niche distribution in the fossil fauna with the range of patterns observed in mammalian faunas from present-day environments. Three morphological aspects of terrestrial ecosystems can be identified in mammalian fossils: the spatial niche is identified from a combination of locomotor adaptations and body sizes; the trophic niche is identified from dental and masticatory adaptations, again with a size element, although body size is less important than in the spatial niche; and body size alone is a major component of the multi-dimensional niche.

The taphonomic profile of the Rudabánya II fauna is complex, and palaeoecological reconstruction is not possible for all levels. In general, the mammalian fauna is most similar to subtropical forest faunas of the present-day, with complex tree canopies in a wet environment. There are similarities both with monsoon forest faunas present today in India and Burma, and with more seasonal tropical forest faunas of Africa. An equable climate may be indicated, but the sedimentological evidence indicating the presence of an abundant water supply may be due to edaphic or topographic circumstances, since the fossil deposits accumulated in a periodically flooded valley in which swamp, riverine and lake deposits alternated through time. The flora and fauna may be representative of this local environment, but the climate and vegetation outside the area of accumulation are difficult to reconstruct.

The sequence of fossiliferous sediments at the Rudabánya locality represent depositional environments associated with the Pannonian lake margin. These environments include deep lake sedimentation of marl, delta deposits, swamps, riparian alluvial systems and terrestrial soil development. The carbon isotope patterns of paleosol carbonates at Rudabánya are similar to those of modern soils developing under moderately continental climates (EKART and THEOBALD, 1996).

Paleomagnetic analysis of the Rudabánya sediments reveals very weak magnetizations with relatively low unblocking temperatures, suggesting pervasive overprinting by Fe-hydroxides, which precludes delineation of primary magnetic polarities. Laser-fusion 40Ar/39Ar dating of individual angular K-feldspar crystals separated from claystone immediately underlying the uppermost horizon yields a dominant mode at 11.4 Ma (RENNÉ et al., 1996).

Biochronologic assessments of the mammalian fauna are consistent with an MN9, early Vallesian age. The rodent fauna suggests a possible upper MN9 correlation. The hipparionine horses are advanced as compared to Pannonian D-E hipparions and the Hövwenegg (Germany) hipparion dated 10.3 Ma (BERNOR et al., 1993). Biochronologic considerations suggest a younger age which is constrained between 10.3 Ma and the MN9/10 boundary estimate (9.5 Ma). The age of the Rudabánya hominoid site is estimated to be ca. 10 Ma.

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