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A basal archosauriform from the Early Triassic of Poland

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Basal Archosauriformes had a wide geographic distribution through the Lower to Middle Triassic. *Osmolskina czatkowiensis* gen. et sp. nov. from Early Olenekian karst deposits at Czatkowice, west of Cracow, provides the first record from Poland. The reconstructed skull and attributed postcranial elements show a morphology closely resembling that of the Early Anisian African genus *Euparkeria* Broom, 1913, while differing at generic level. Both genera display the same mosaic of plesiomorphic and apomorphic character states, but share no unique apomorphic character state. They might thus be combined in the family Euparkeriidae Huene, 1920, but could also constitute two plesions of the same grade lying just below the Archosauria + Proterochampsidae node. Currently, Euparkeriidae remains monotypic because no other genus can be assigned to it with confidence. Until this problem is resolved, the term "euparkeriid" essentially denotes a grade of Lower to Middle Triassic non-archosaurian archosauriforms that are more derived than proterosuchid grade taxa, but lack the specializations of either erythrosuchids or proterochampsids. They were probably Pangaean in their distribution.

Introduction

The bones of a new basal archosauriform, *Osmolskina czatkowicensis* gen. et sp. nov., were recovered from a single karst fissure (Czatkowice 1) in Czatkowice quarry near Cracow, Southern Poland (Paszkowski and Wieczorek 1982). Using biostratigraphic data, Czatkowice 1 has been dated as Early Triassic, most probably Early Olenekian in age (Borsuk-Białynicka et al. 2003). Apart from *Osmolskina,* the assemblage (Borsuk-Białynicka et al. 1999) includes several small diapsids (lepidosauromorphs, a "prolacertiform", and a second larger, but much rarer, archosauriform), procolophonians, rare small temnospondyls, a stem salientian, *Czatkobatrachus polonicus* (Evans and Borsuk-Białynicka 1998), and several fish, among them the dipnoan *Gnathorhiza* sp. (Borsuk-Białynicka et al. 2003).

The archosaur material consists of several thousands of dissociated, fragmented, but finely preserved three-dimensional bones. A detailed element-by-element description is in preparation and will be published in a monographic volume on the Czatkowice assemblage. This paper provides a summary of the principle conclusions.

As currently understood, basal Archosauriformes (*sensu* Gauthier 1986) include four possible clades. Beginning from the most basal group and progressing crownward (Sereno 1991; Juul 1994; Fig. 1) these are: Proterosuchidae, Erythrosuchidae, *Euparkeria* and Proterochampsidae. Proterosuchidae and Erythrosuchidae have been recorded from both Laurasian (Russia) and Gondwanan (Africa and China) parts of Pangaea, with proterosuchid grade taxa known from the Late Permian through to the Middle Triassic (Gower and Sennikov 2000), and erythrosuchids recorded from the Late Olenekian into the Ladinian. Proterochampsids, currently considered the sister-group to Archosauria (Juul 1994), are a South American clade. They were the last group to appear (earliest Ladinian) and went extinct as late as the Carnian.

Proterosuchids were small to large reptiles (body length 1–3 m, Sennikov 1995) with an overhanging premaxilla, primitive limb girdles, and, primitively at least, long cervicals. Erythrosuchids were large predators (body length 3–6 m, Sennikov 1995) with a heavy skull and an extremely shortened neck. Proterochampsids were small to large animals (body length 1.5–3 m, Sennikov 1995) with crocodile-like skulls. *Euparkeria* from the Early Anisian of South Africa (Hancox et al. 1995) is the type genus of the Euparkeriidae Huene, 1920. This small animal (body length less than 1 m) had an elongated pubis and ischium and a distinct fourth trochanter on the femur which, according to Ewer (1965), suggest an agile facultative biped.

Archosauromorpha Huene, 1946
Archosauriformes Gauthier, 1986
Family indet.
Genus *Osmolskina* nov.

Type species: *Osmolskina czatkowicensis* sp. nov.

Derivation of name: In honour of the eminent Polish dinosaur worker Halszka Osmólska.

Diagnosis.—As for type and only species (see below).

Osmolskina czatkowicensis gen. et sp. nov.

Derivation of the name: From the type locality.

Holotype: ZPAL R-I/77, anterior part of the maxilla with the nasal process preserved (Fig. 2A).

Catalogued material: 200 skull bones, including braincase and mandibles; 30 vertebrae from all regions of the column; 5 complete ilia, 30 limb bones. Additional material: several hundred partial bones, and teeth. All the materials are housed in the Institute of Palaeobiology Polish Academy of Sciences, Warsaw, abbreviated ZPAL.

Type locality: Czatkowice near Cracow, Southern Poland.

Type horizon: ?Early Olenekian.

Diagnosis.—A small basal archosauriform of euparkeriid grade having a typical skull length of 60 mm. Differs from *Euparkeria* in having a slightly overhanging premaxilla (but less so than in proterosuchids) that is weakly attached to the maxilla, and is separated from it by a slit-like additional antorbital space; in having a subquadrangular nasal process of the maxilla; and in having a barely recessed antorbital fenestra. *Osmolskina* also differs from *Euparkeria* in having a more rounded orbit, a shorter maxilla, a shorter antorbital fenestra, and a longer premaxilla.

Comparative description.—Based on the average size of the bones in the Czatkowice 1 assemblage, the skull of *Osmolskina* was around 60 mm long, although rare elements suggest some individuals were larger than this (up to 120 mm skull length). The skull is typical of archosauriforms in having antorbital and mandibular fenestrae, a tall columnar quadrate (Fig. 2K), a small prefrontal (Fig. 2G), and fully thecodont teeth that are laterally compressed, have serrated margins, and are separated from one another by interdental plates (Fig. 2C).

Osmolskina shares with *Euparkeria* a unique mosaic of character states (see below), some of which are considered plesiomorphic while others are synapomorphic for a more inclusive clade (Juul 1994; Gower and Sennikov 1996). Both genera differ from *Proterosuchus* (Charig and Sues 1976) in three apomorphic characters: a subvertical basisphenoid, with ventrolaterally oriented basipterygoid processes, and with the entry foramina for the cerebral branches of the internal carotid arteries lying in a posteroventral position (Fig. 2F); the absence of teeth on the transverse flange of the pterygoid; and the development of a small anterior process on the ilium (Fig. 2I, J). They also differ in having rather short cervicals (Fig. 2H) and well-developed dorsal osteoderms.

As compared to erythrosuchids, *Osmolskina* and *Euparkeria* represent a totally different habitus. With the Erythrosuchidae, they share neither the heavy proportions of the skull, nor the extremely short cervical centra. They also differ in a mosaic of braincase character states (Borsuk-Białynicka and Evans, in preparation), and in having a more lightly built locomotory apparatus. Although the polarity of these characters is not clear, the differences suggest that *Osmolskina* and *Euparkeria* should both be placed outside Erythrosuchidae.

In contrast to most Archosauria (excluding phytosaurs, but not rauisuchians, Gower 2002: 69), *Osmolskina* and *Euparkeria* lack an ossified medial wall of the otic capsule, and show poor ossification of the fenestra ovalis. Furthermore, they have a posteroventral, rather than lateral, position of the entry foramina for the cerebral branches of the internal carotid arteries (Fig. 2F), and retain teeth on the palatine plate of the pterygoid. *Osmolskina* is thus an archosauriform of a grade above that of *Proterosuchus* but outside either the erythrosuchids or the crown-group. Its position in the cladogram (Fig. 1) corresponds to that of *Euparkeria*.

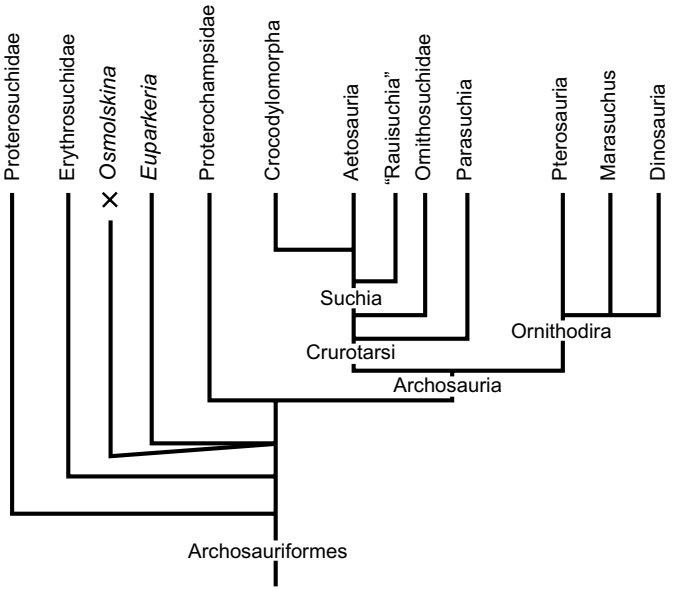

Fig. 1. Cladogram of Archosauriformes based on Sereno (1991). Crurotarsi according to Gower and Walker (2002).

For stratigraphic reasons, it is important to compare *Osmolskina* with rauisuchians, the only archosaurian group currently recorded from the Lower Triassic (Late Olenekian of Russia; Gower and Sennikov 2000). Apart from the above listed braincase characters, both *Osmolskina* and *Euparkeria* differ from rauisuchians in the subvertical life position of the ilium, a weak flexion of its anterior process, and in the absence of a protruding tuber above the anterior part of the acetabulum. They differ from erythrosuchids, rauisuchians, and ornithosuchids in having a flat lateral surface to the maxilla and a straight ventral margin (instead of a convex one).

With the skull length of 60 mm *Osmolskina czatkowicensis* would be among the smallest basal archosauriforms known, although, allowing for variability, *Euparkeria capensis* (skull length 80 mm) probably lies within the same range. Several archosauriforms have been attributed to euparkeriids, but

Table 1. Taxa tentatively assigned to Euparkeriidae Huene, 1920.

	Age	Formation or deposits	Provenance	Estimated skull length	"Euparkeriid" assignment
Osmolskina czatkoviensis gen. et sp. nov.	early Olenekian	Karst deposits	Czatkowice, Southern Poland	60–?120 mm	probable
Euparkeria capensis Broom, 1913	Anisian	Karoo Middle *Cynognathus* Zone	South Africa	80 mm	type genus
Halazhaisuchus qiaoensis Wu, 1982	Olenekian or Anisian	Lower Ermaying	Shan-Gan-Ning Basin, China	150 mm	possible
Dorosuchus neoetus Sennikov, 1989	Anisian	Donguz	Southern Urals, Russia	120 mm	possible

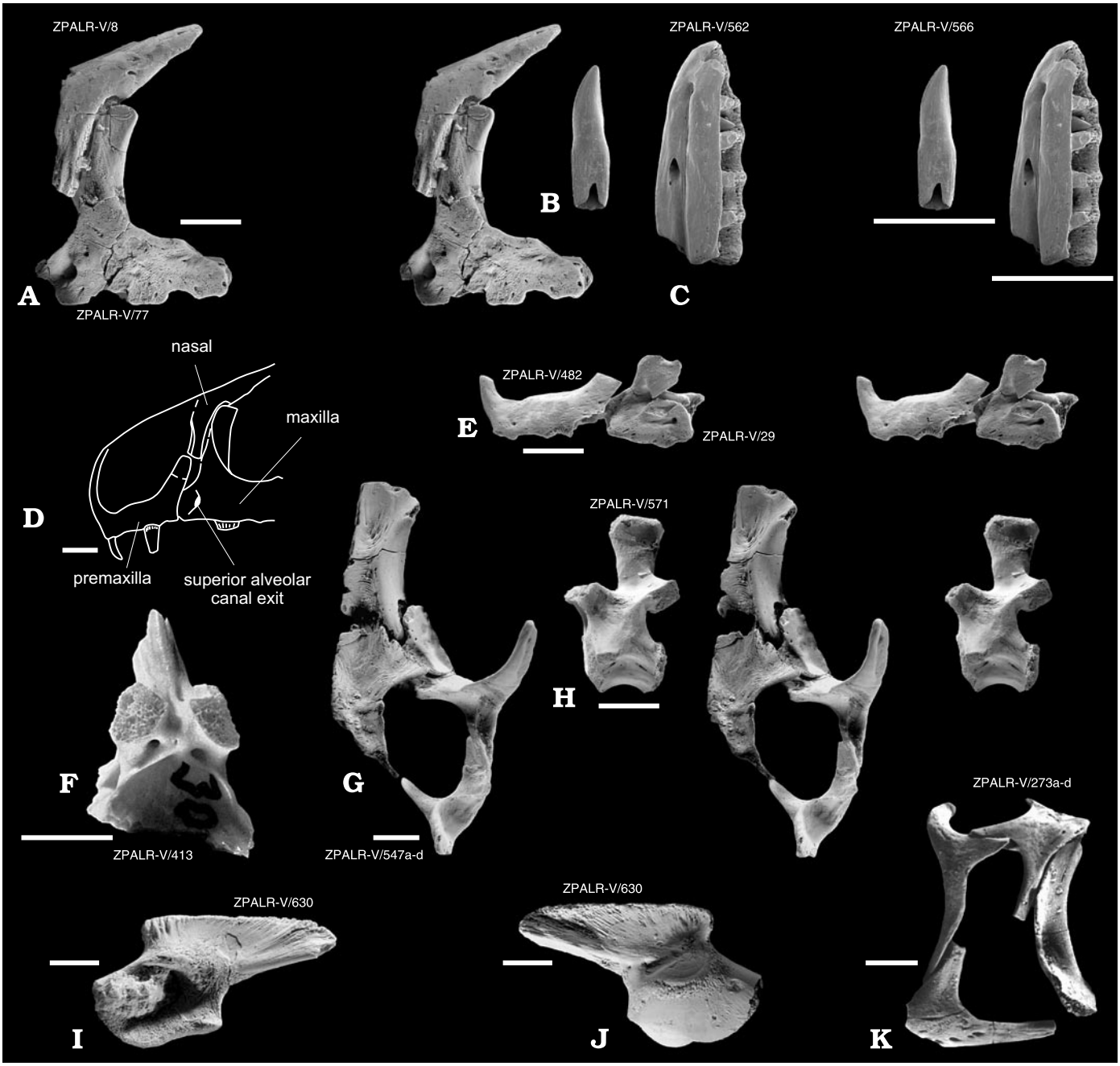

Fig. 2. *Osmolskina czatkoviensis* gen. et sp. nov. **A**. The holotype left maxilla combined with the nasal. **B**. Isolated tooth. **C**. Right dentrary fragment. **D**. Reconstruction of the snout region. **E**. Premaxilla combined with maxilla fragment. **F**. Parabasisphenoid. **G**. Cervical. **H**. Frontal, parietal, postfrontal, postorbital squamosal. **I**, **J**. Left ilium. **K**. Postorbital, jugal, squamosal, quadrate. **A**, **E**, **H**, **K**. Combined bones of different individuals. **A**, **D**, **E**, **G**, **I**, **K**. Left side view. **B**, **C**, **J**. Medial view. **F**, **H**. Ventral view. All, except D, SEM micrographs; A–C, E, G, H, stereopairs. Scale bars 5 mm.

Gower and Sennikov (2000) regarded the attribution of *Turfanosuchus dabanensis* (Wu and Russell 2001), *Wangisuchus tzeyii* (Young 1964), and *Xilousuchus sapingensis* (Wu 1981) as unlikely. The possible presence of a rotary crocodilian-like ankle type in *Turfanosuchus* (Gower and Sennikov 2000) suggests crown-group relationships, and the same is true of *Wangisuchus*. Among other, more plausible, euparkeriids (Table 1) *Dorosuchus neoetus* had a skull of about 120 mm (based on the postcranial dimensions, Sennikov 1995: fig. 20). It differs from *Osmolskina* in having more sigmoid femur suggesting a slightly more derived locomotory organization. *Halazhaisuchus*, another proposed euparkeriid (Wu 1982) is larger than *Osmolskina* but fragmentary.

If *Osmolskina* is really a close relative of *Euparkeria*, it would be the second element of the Czatkowice 1 assemblage (the first being the stem frog *Czatkobatrachus* Evans and Borsuk-Białynicka, 1998) showing an affinity with genera from the Triassic of Gondwana.

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