

A NEW *PALEORHINUS* FAUNA IN THE EARLY LATE TRIASSIC OF POLAND

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A new locality in the middle Keuper marly clays with excellently preserved tetrapod skeletons was discovered at Krasiejów near Opole, southern Poland (Dzik et al., 2000). It has yielded abundant cranial and postcranial material of metoposaur and capitosauroid labyrinthodonts, phytosaurs, aetosaurs, and undetermined archosaurs.

Based on the position of the Krasiejów fossiliferous horizon in the lithostratigraphic column, it seems to be coeval to the Lehrberg beds in Germany, which probably terminate the Carnian sedimentary cycle. The initial part of the cycle in Germany is the Schilfsandstein, a local rock equivalent of which is represented about 80 m below in boreholes drilled in the area. The labyrinthodont *Metoposaurus* found at Krasiejów (Dzik et al., 2000) is conspecific with, or at least closely related to, *M. diagnosticus*, occurring in these strata in Germany. The phytosaurs from Krasiejów (Fig. 1) confirm such age determination. They belong to a species of *Paleorhinus*, geologically the oldest and anatomically the least derived of phytosaurs (Buffetaut, 1993; Long and Murry, 1995). In all phytosaurs the snout is strongly elongated but the Krasiejów species is relatively short-snouted. In fact, it shows the shortest snout of known phytosaurs, except for *Paleorhinus sawini*, based on a single skull from the Colorado City Member of the Dockum Group of Texas and associated with numerous other specimens with longer snouts (Long and Murry, 1995). Although it was widely assumed (e.g., Gregory, 1969; Gregory and Westphal, 1969; Chatterjee, 1978) that the degree of its elongation in *Paleorhinus* expresses an evolutionary advancement of particular species, this character seems to vary in the genus. Anyway, the co-occurrence of *Paleorhinus* with *Metoposaurus* indicates that the Krasiejów fauna chronologically belongs to the Late Carnian part of the *Paleorhinus* biochron of Hunt and Lucas (1991; Lucas, 1998). The basis of the age correlation of that part of the biochron (defined on the range of the nominal genus) is a finding of a species indeterminable specimen of *Paleorhinus* in marine strata of Late Carnian age in the Alps, supported by other tetrapod records and by palynological evidence (Lucas, 1998). The oldest specifically identifiable German phytosaur, the long-snouted *Paleorhinus broili*, represented by several skulls (Kuhn, 1933, 1936), comes from the Blasensandstein of Franconia. Strata presumably corresponding to that horizon terminate the Krasiejów section.

Paleorhinus is represented in the material from Krasiejów by several skulls, more or less fragmentary articulated postcranial skeletons and numerous isolated bones. Individuals of various ontogenetic stages are represented, forming an ontogenetic series. This may help in evaluating the diagnostic importance of those skull structures which grew allometrically. Thus, the most complete skeleton is a juvenile (skull length 40 cm) with still unfused centra and neural arches of the trunk vertebrae. Its antorbital fenestra and orbits are larger than in adult specimens (the best preserved skull is 64 cm long, some incomplete specimens are

much larger). This may mean that the large size of orbits in the very small skull (27.5 cm long) of *Arganarhinus magnoculus* from the Irohalene Member of the Timesgadiouine Formation (Argana Group) of Morocco (Dutuit, 1977; Long and Murry, 1995) is not necessarily of phylogenetic importance but may indicate an early ontogenetic stage. The extraordinary preservation of the *Paleorhinus* specimens from Krasiejów supports the interpretation of the palate proposed in the classic works of Lees (1907) and Kuhn (1933, 1936). The palate is completely preserved in at least two skulls from Krasiejów (Dzik et al., 2000:figs. 5, 6). The choanae are somewhat displaced backward in respect to the external nares in the Krasiejów species of *Paleorhinus*, and a short secondary palate is present (Fig. 1A). This is not significantly different from the palate structure of *P. bransoni* from Texas (Lees, 1907) or the German *Paleorhinus broili* (see Kuhn, 1936), but not similar to that restored for the Indian Maleri Formation species classified as *Parasuchus hislopi* by Chatterjee (1978).

The Krasiejów fossil assemblage is dominated by skeletons of semi-aquatic amphibians and reptiles, but less numerous bones of strictly terrestrial reptiles are also represented. Among them there is an aetosaur species with isolated scutes that are closely similar to those of *Stagonolepis* (Walker, 1961). An incomplete ilium and two fragmentary dentaries have also been identified. Both dentaries show a toothless rostral part of the jaw (Fig. 2C, D). The teeth are serrated, compressed sideways, and show constriction at the base of the crown (Fig. 2E, F). The species had thus the basic aetosaur adaptations to herbivory fully developed.

A few archosaurian bones of undetermined affinities (some of relatively large size) have been found at Krasiejów. Among them a small second sacral vertebra with a flat anterior surface of the centrum is of special interest (Fig. 2A, B). Unlike sacra of the associated phytosaurs and aetosaurs, as well as *Ornithosuchus* (Walker, 1964), it bears very short and deep ribs. This indicates a rather narrow pelvic girdle, unusually narrow as for early archosaurs. Such sacra are known among the herrerasaurid dinosaurs (Novas, 1993). The second sacral vertebra of *Staurikosaurus* (Galton, 1977, 1999:fig. 8D, F) and *Chindesaurus* (Long and Murry, 1995:fig. 177M, P; Hunt et al., 1998) resemble the Krasiejów specimen especially close in their short ribs with vertically extended bases. Whether this is truly a member of the herrerasaurid lineage remains unknown until more complete material is found. Excavations are in progress.

The occurrence of a diverse tetrapod assemblage with *Paleorhinus* and *Metoposaurus* in Silesia extends much eastward its known distribution within the Germanic Basin and improves the Late Triassic age correlation in this part of Europe. Early dinosaurs may be represented in the assemblage which makes it of special importance.

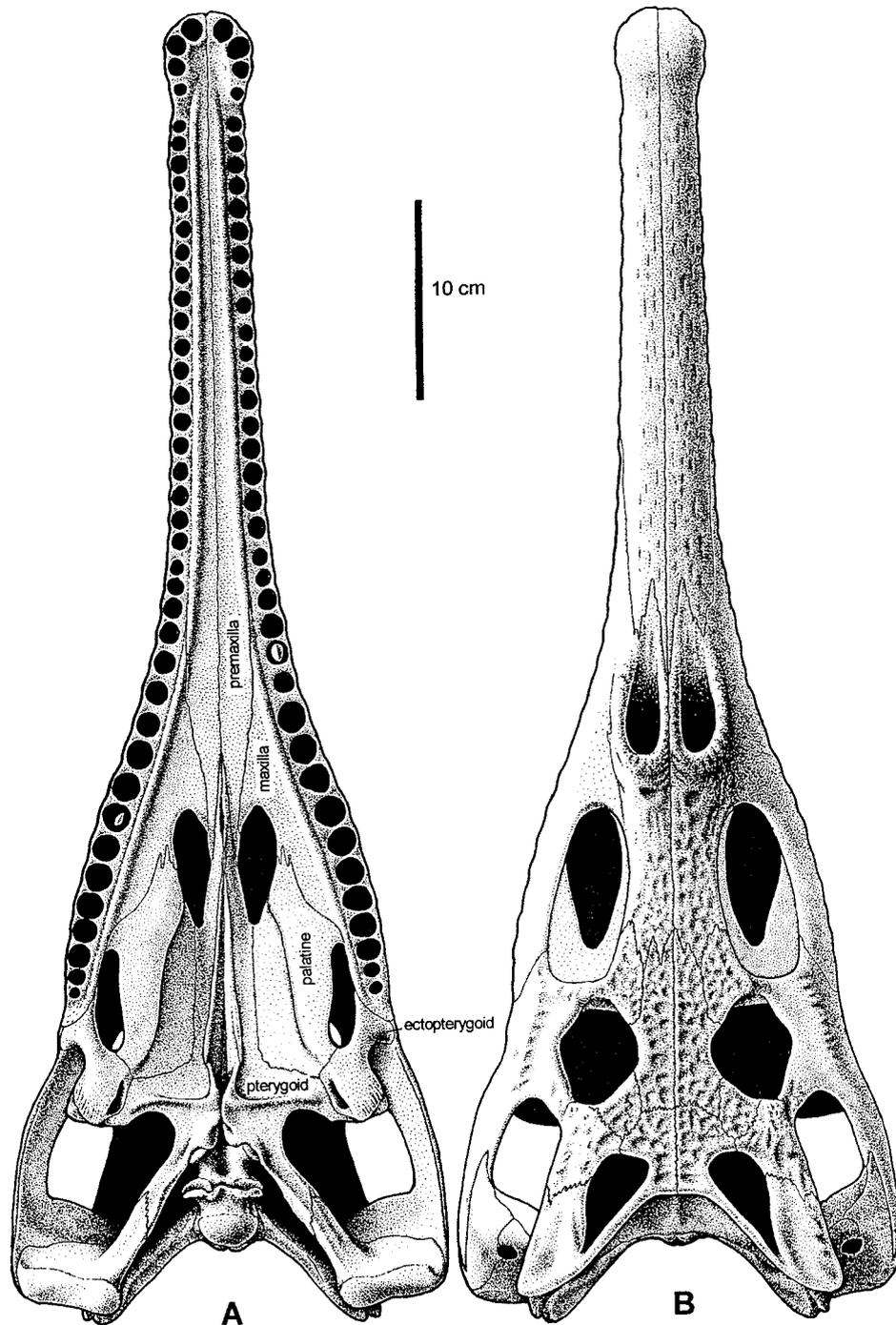


FIGURE 1. Skull of the phytosaur *Paleorhinus* sp. from the early Late Triassic of Krasiejów near Opole, southern Poland, restoration based on 64.5 cm long skull ZPAL AbIII/200 (see Dzik et al., 2000); palatal (A) (bones of the palate are labelled except for vomer, sutures of which are not traceable in available specimens) and dorsal (B) views.

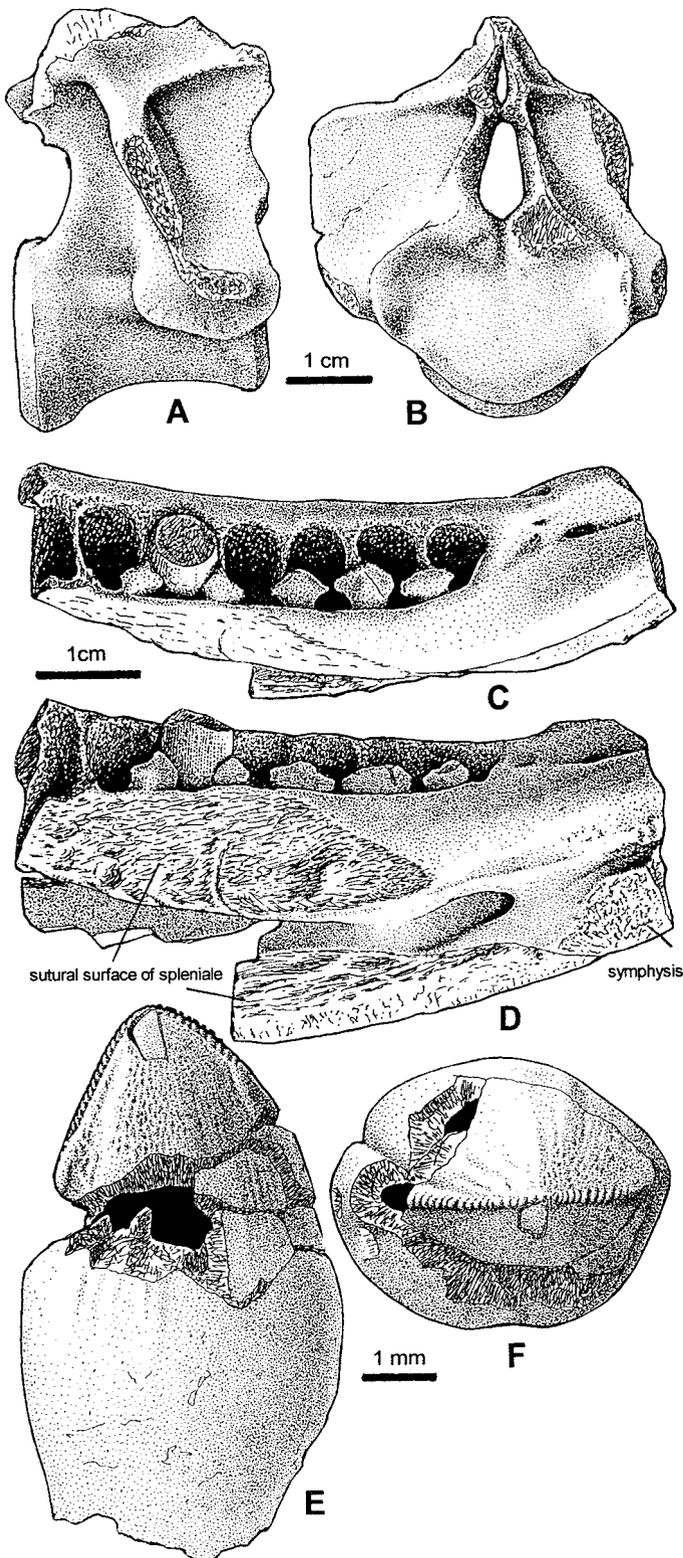


FIGURE 2. Fragmentary archosaur bones from Krasiejów near Opole, Poland. **A, B**, second sacral vertebra ZPAL AbIII/284 of an archosaur of possible herrerasaurid affinities, in right lateral, and anterior views. **C, D**, aetosaur dentary ZPAL AbIII/281 in occlusal and mesial views. **E, F**, tooth from conspecific dentary ZPAL AbIII/282 in occlusal and lateral views.

Acknowledgments—I am very thankful to Halszka Osmólska and Magdalena Borsuk-Biaynicka for their advice while studying these fossils and especially to Peter M. Galton for making me aware of the aetosaur affinities of the dentaries from Krasiejów. Reviews by Spencer G. Lucas and Sankar Chatterjee are appreciated.

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Received 15 June 2000; accepted 2 January 2001.