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THE POSTCRANIAL SKELETON OF *REVUELTOSAURUS CALLENDERI* (ARCHOSAURIA: CRUROTARSI) FROM THE UPPER TRIASSIC OF ARIZONA AND NEW MEXICO, USA

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Abstract—*Revueltosaurus callenderi* is an armored crurotarsan that is widely distributed in early Norian (Reveultian: Barrancan) vertebrate fossil assemblages in Arizona and New Mexico. It is a highly distinctive taxon that has apomoprhic postcranial features including: (1) rectangular paramedian osteoderms with an irregular pattern of deep pits with an anterior bar that extends onto the lateral margin: and (2) wide tarsus (because of wide astragalus) that has a small astragalar medial process and corresponding medial calcaneal concavity. *R. callenderi* is a crurotarsan that may be a sister taxon of Stagonolepididae.

Key words: *Revueltosaurus*, dinosaur, aetosaur, Late Triassic, Chinle Group, Arizona, New Mexico

INTRODUCTION

Hunt (1989) described *Revueltosaurus callenderi* for teeth from the Uper Triassic of eastern New Mexico which he interpreted as an ?ornithischian. Other teeth were subsequently referred to this taxon (e. g., Padian, 1990). *Revueltosaurus callenderi* teeth are associated with obviously non-dinosaurian cranial and postcranial material and it is clear that this taxon is not dinosaurian as previously supposed (Hunt and Lucas, 2005; Parker et al., 2005a,b). The purpose of this paper is to give a preliminary description of the postcranial anatomy of *Revueltosaurus callenderi* and to utilize this to initially assess its taxonomic relationships. NMMNH refers to New Mexico Museum of Natural History and Science, Albuquerque. PEFO refers to Petrified Forest National Park, Ariona.

HISTORY OF STUDY

In 1912, E. C. Case of the University of Michigan found vertebrate fossils five miles (8 km) west of San Jon, Quay County in eastern New Mexico (Case, 1914; Hunt, 1997). Case made a small collection here that he catalogued as UMMP (University of Michigan Museum of Paleontology) 7441. UMMP 7441 is a collection of fragmentary specimens that Case identified as "fragments, limb bones, vertebrae, etc. of small phytosaurs" but that actually encompasses at least seven taxa, including *Vancleavea* (Hunt et al., 2002). UMMP 7441 also includes the proximal left femur of a crurotarsan.

In 1986, field parties from the NMMNH began to collect an extensive vertebrate fossil assemblage from the Late Triassic (Revueltian land-vertebrate faunachron (lvf): early Norian) Bull Canyon Formation of east-central New Mexico (Hunt, 1994, 2001). These specimens included teeth from NMMNH locality 1 that Hunt (1989) named *Revueltosaurus callenderi* as an ?ornithischian dinosaur. NMMNH locality 1 is the locality from which Case collected UMMP 7441 (Hunt, 1997). Other localities that yielded *Revueltosaurus callenderi* also included diverse skeletal remains. These specimens include a partial skeleton (NMMNH P-16932), and numerous more incomplete remains, of an armored crurotarsan that Hunt (1994, 2001) assigned to an undescribed new genus.

Just a few months after the initial publication of *Revueltosaurus callenderi*, three teeth of this taxon were identified from a locality at Petrified Forest National Park (PEFO) in Arizona (Padian, 1990). These teeth derive from the Painted Desert Member of the Petrified Forest Formation. In 1996, APH started the "Dawn of the Dinosaurs" project at PEFO. This ongoing project greatly increased the number of localities that yielded small terrestrial tetrapods, including dinosaurs (Hunt and Wright, 1999). As part of the project, in January 2000, Jeremiah Wright found dentulous specimens of *Revueltosaurus callenderi* at two localities (Zuni Well Mound and *Revueltosaurus* site). The Zuni Well Mound specimen consists of a partial dentary (Fig. 4A-B). The *Revueltosaurus* site specimens encompass cranial and postcranial specimens, including osteoderms (Fig. 4C-I). In 2004, a new site (PFV 297) was found at PEFO that yielded fossils consisting almost entirely of skeletal and cranial material of *Revueltosaurus callenderi* (Stocker et al., 2004; Parker and Irmis, 2005; Parker et al., 2005a,b).

Heckert (2002) named a second species of *Revueltosaurus, R. hunti*, based on teeth collected in the 1980s by Phil Bircheff from the Los Esteros Member of the Santa Rosa Formation in Santa Fe County, New Mexico. In the 1930s, C. L. Camp of the University of California found about 30 teeth of this taxon in the Blue Hills, northeast of St. Johns, Arizona (Blue Mesa Member of Petrified Forest Formation). Subsequently, Heckert (2005) erected the new genus *Kzryzanowskisaurus* for this species.

The association of *Revueltosaurus callenderi* teeth with obviously non-dinosaurian cranial and postcranial material indicates that this taxon is not an ornithischian (Hunt and Lucas, 2005; Parker et al., 2005a,b) as previously supposed.

SKELETON OF *REVUELTOSAURUS*

Referred Material

The incisiform holotype tooth (NMMNH P-4957) and paratype teeth (NMMNH P-4958, dentary/maxillary tooth; NMMNH P-4959, premaxillary tooth) of *Revueltosaurus callenderi* are from NMMNH locality 1 in the Revuelto Creek badlands of east-central New Mexico (Hunt, 1994, 2001). This locality is part of a pedogenically-modified channel-fill deposit. This bed extends laterally and encompasses other NMMNH localities, including locality 467, which yields NMMNH P-16932, a partial skeleton of *R. callenderi* that was collected in 1986 (Figs. 1- 5). We thus consider NMMNH P-16932 to be a topotype of *Revueltosaurus callenderi*. The Bull Canyon Formation also yields numerous other specimens of *Revueltosaurus* (Table 1).

NMMNH P-16932 is the most complete specimen known of *Revueltosaurus callenderi* and consists of an articulated series of dorsal osteoderms with associated osteoderms and two ribs, many other elements of comparable size and a proximal femur and right astragalus and calcaneum of a larger individual. The