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Proglyptosaurus huerfanensis, New Genus, New Species: Glyptosaurine Lizard (Squamata: Anguidae) from the Early Eocene of Colorado

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ABSTRACT

Proglyptosaurus huerfanensis, n. gen., n. sp., is a taxon based on a nearly complete skull from the Huerfano Formation (Wasatch interval: early Eocene) of Colorado. The holotype specimen was previously referred to *Eoglyptosaurus donohoei* (White, 1952). *Eoglyptosaurus donohoei* (in part) and *Glyptosaurus donohoei* White, 1952, are junior subjective synonyms of *Glyptosaurus sylvestris* Marsh, 1871, making the genus *Eoglyptosaurus* invalid. However, characters of size and osteoderm shape suggest that AMNH 7431 cannot be referred to *Glyptosaurus sylvestris,* warranting the recognition of a new taxon. Pterygoid tooth morphology, a character previously used in diagnosing glyptosaurine lizards, is no longer considered reliable.

INTRODUCTION

White (1952) described *Glyptosaurus donohoei* (holotype USNM 18316, fig. 1) on the basis a specimen that consisted of an incomplete skull, partial left mandible, miscellaneous bone fragments, and osteoderms from the Wasatch Formation (Lost Cabin Member), Fremont County, Wyoming. A second disarticulated and incomplete specimen (USNM 18317) from the same locality, consisting of the right dentary, maxilla, jugal, cephalic, cheek and body osteoderms, and miscellaneous bone fragments, was designated the paratype of the species. In a revision of the genus *Glyptosaurus* I established a new taxon, *Eoglyptosaurus,* based on these two specimens previously referred to *G. donohoei* and a third, nearly complete skull (AMNH 7431, fig. 2) from the Huerfano Formation, Gardner, Colorado (Sullivan, 1979). I based the diagnosis of *Eoglyptosaurus* (Sullivan, 1979) largely upon this third specimen (AMNH 7431), believing it was distinct at the generic level from *Glyptosaurus* based on frontal morphology. At the time no complete skull of *Glyptosaurus* was known. In a subsequent paper I (Sullivan, 1986) described a newly discovered skull of *Glyptosaurus sylvestris* (Marsh, 1871), reassessed the taxo-

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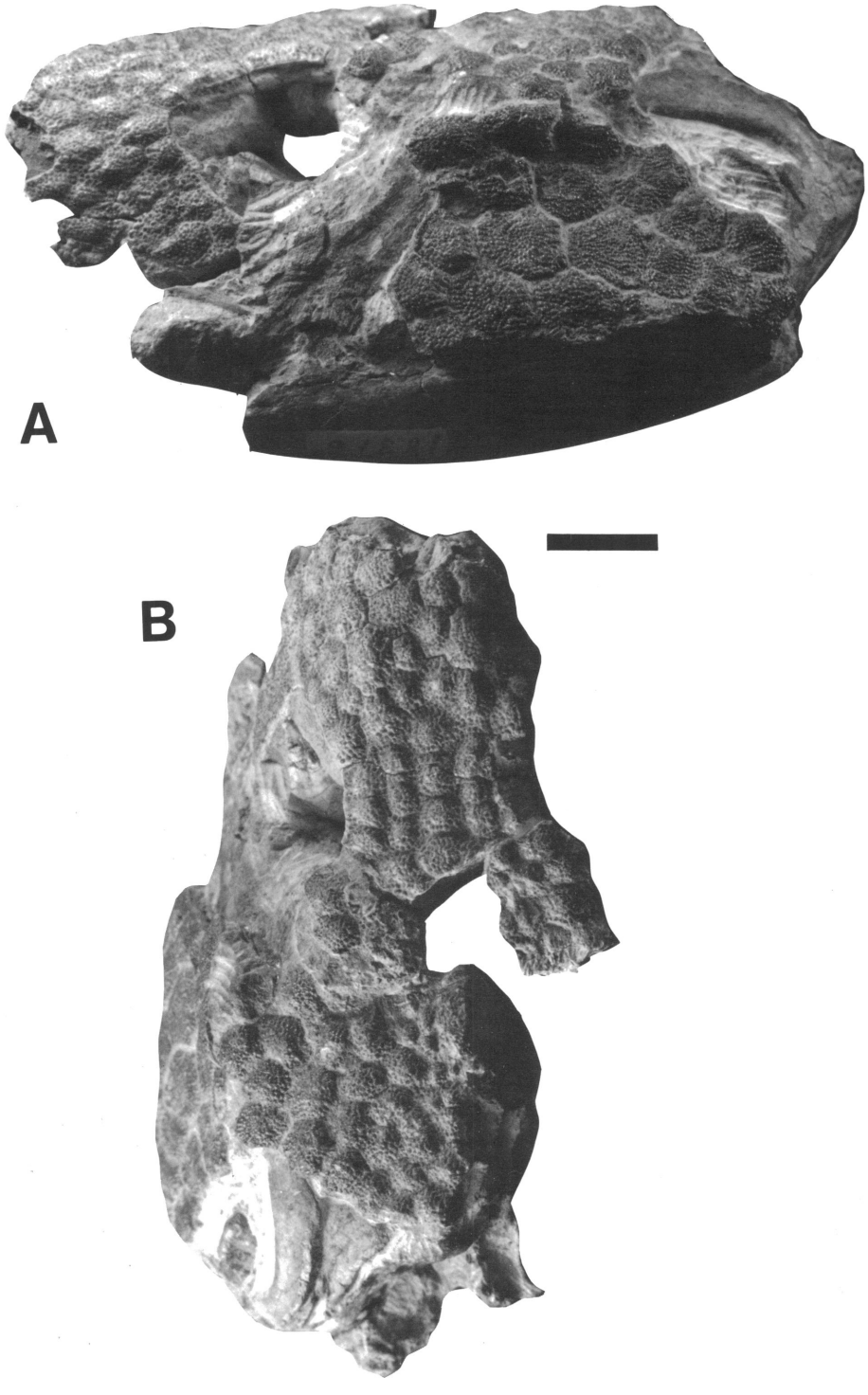

Fig. 1. *Glyptosaurus sylvestris* (holotype of *G. donohoei* and *Eoglyptosaurus donohoei,* USNM 18316). **A,** left lateral view; **B,** dorsal view of skull (anterior end is up). Scale bar = 1 cm.

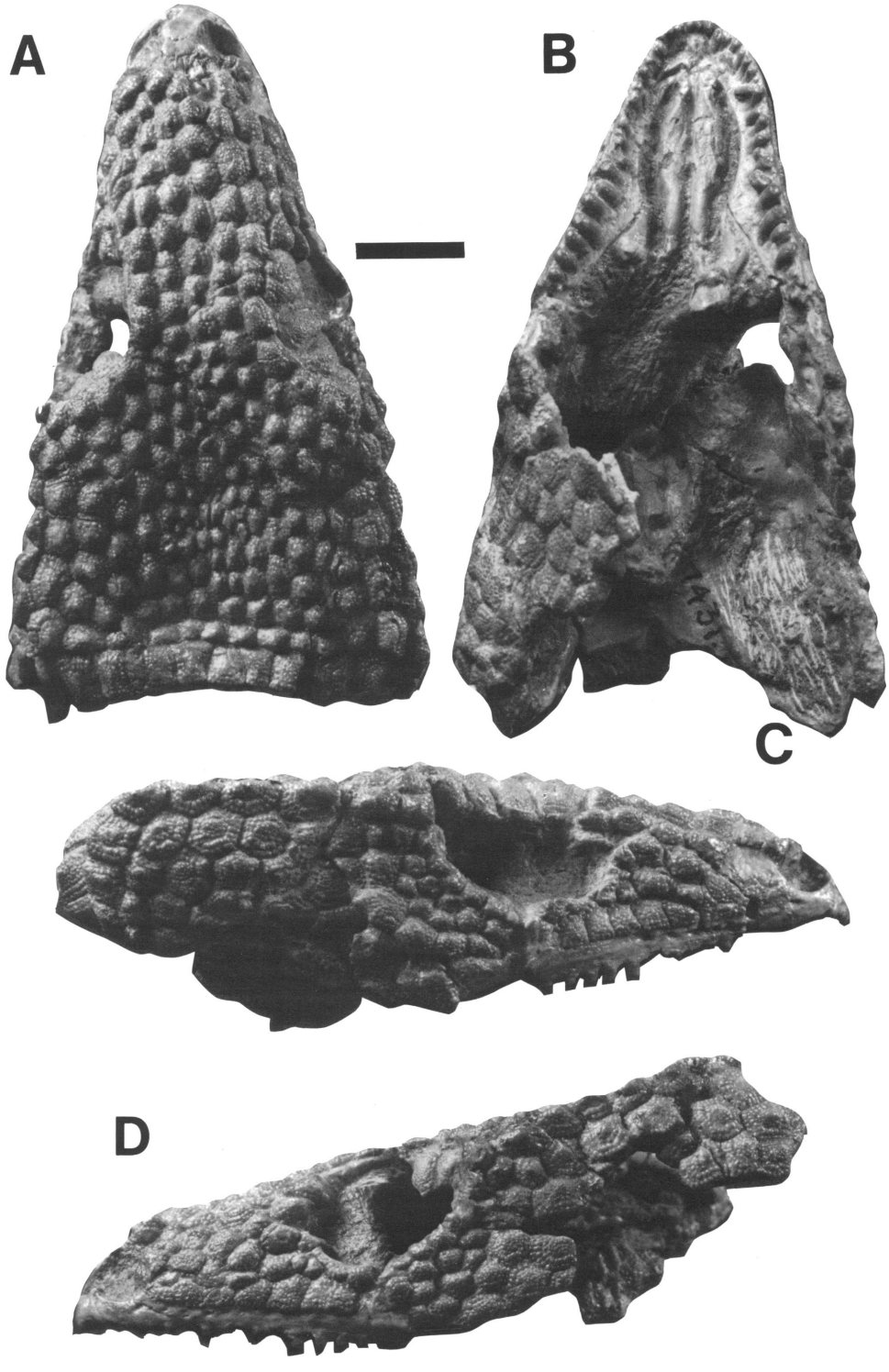

Fig. 2. *Proglyptosaurus huerfanensis* (holotype, AMNH 7431). **A,** dorsal view of skull; **B,** ventral view of same; **C,** right lateral view, and **D,** left lateral view. Scale bar = 1 cm.

nomic assignments of some of the glyptosaurs, and presented revised synonymies of glyptosaurine taxa. Recently, Hirsch et al. (1987) contended that *Eoglyptosaurus* is a junior synonym of *Glyptosaurus* based on the presence of a linear band of pterygoid teeth, a feature that is also seen in *Glyptosaurus*. Here, I reassess these characters and the taxonomic status of *Glyptosaurus sylvestris, G. donohoei,* and the genus *Eoglyptosaurus*.

The terms "glyptosaurinid" and "melanosaurinid" were first introduced by Sullivan (1979) as common names for any member of the Glyptosaurini and Melanosaurini, respectively. Because there exists the possibility of confusing these terms with traditional Linnaean familial rank, I recommend that these two names be abandoned. In their place, I propose to use the informal term "glyptosaur" for any member of the monophyletic group Glyptosaurini and "melanosaur" for any member of the questionably monophyletic group Melanosaurini. In this present usage "glyptosaur" becomes a more restrictive term than that previously used by McDowell and Bogert (1954), and more recently by Estes (1983), whose usage was equivalent, in part, to that of the term "glyptosaurine" (= Glyptosaurini + Melanosaurini).

Institutional Abbreviations

AMNH	American Museum of Natural History, New York
UCMP	University of California Museum of Paleontology, Berkeley
MNHN	Museum National d'Histoire Naturelle, Paris
USNM	United States National Museum, Washington, D.C.

SYSTEMATIC PALEONTOLOGY

SQUAMATA Merrem, 1825

ANGUIMORPHA Fürbringer, 1900

ANGUIDAE Gray, 1825

GLYPTOSAURINAE Marsh, 1872

GLYPTOSAURINI Sullivan, 1979

Proglyptosaurus, new genus

TYPE SPECIES: *Proglyptosaurus huerfanensis.*

ETYMOLOGY: From the greek *pro,* meaning "before"; *Glyptosaurus,* the sister taxon to which it is related.

DIAGNOSIS: A small glyptosaur that differs from *Glyptosaurus* in having subconical osteoderms, narrow skull, maxilla tooth count of 16; from *Helodermoides* (Douglass, 1903), in having subconical osteoderms, narrow, flattened skull, open supratemporal fenestrae; from *Paraglyptosaurus* (Sullivan, 1979), in having subconical osteoderms, obtuse homodont teeth, and narrow skull; from *Placosaurus* (Gervais, 1848–52), in having subconical osteoderms and flattened skull.

REMARKS: See below.

Proglyptosaurus huerfanensis, new species

Figure 2

Eoglyptosaurus donohoei Sullivan, 1979: 25–26 (in part).

HOLOTYPE: AMNH 7431, nearly complete skull.

HORIZON: Huerfano Formation (Wasatch interval: early Eocene).

LOCALITY: Castillo Pocket, Quarry 1, Gardner, Huerfano County, Colorado.

COLLECTOR: J. Nocera, 1953.

ETYMOLOGY: The specific name is taken from the Huerfano Formation from which the holotype came.

DIAGNOSIS: Same as for genus.

DESCRIPTION: The holotype skull (AMNH 7431) is slightly distorted. The posterior right inferior temporal region is represented by articulated osteoderms, and is folded inward toward the sagittal plane. The skull roof is flat. The skull itself is elongate, measuring 71 mm from tip of the premaxilla to the posterior nuchal osteoderms along the sagittal plane. The maxilla is slightly convex and bears (or has spaces for) 16 maxillary teeth. Premaxillary tooth count is 9. The teeth are obtuse, with blunt crowns and are essentially homodont along the length of the maxillae.

Dorsally, the cephalic osteoderms are subconical and bear a concentric ring pattern of tubercles around their periphery. Five longitudinal rows of osteoderms occur between the orbits. Five supraocular osteoderms are preserved in articulation in the right orbit. Three supraocular osteoderms (the two posteriormost and anteriormost) are preserved

in the left orbit. The osteoderms along the left and right supratemporal region are folded downward off the parietal table forming a parallel ridge. The parietal foramen region bears minute cephalic osteoderms that become larger outward. The labial surface of the maxilla above the alveolar margin, and the entire premaxilla, are devoid of osteoderms as in other glyptosaurines.

Ventrally, the paired vomers are preserved in articulation along with the premaxilla, both maxillae, and the extreme anterior ends of both pterygoids are present. The vomers are toothless, complete, and measure 22 mm in length. The ventral surface of the parietal and left postorbital, left supratemporal, left jugal, and posterior part of the left frontal are preserved in articulation (fig. 3). Seen in interior view, the descending jugal margin is curved as in other glyptosaurs and lacks the jugal process found in melanosaurs. In ventral view, the supratemporal fenestrae are open but covered dorsally by cephalic osteoderms.

DISCUSSION: The skull (AMNH 7431, fig. 2) of the holotype is distinct from the skulls of *Glyptosaurus, Helodermoides, Paraglyptosaurus,* and the frontal of the Old World glyptosaur *Placosaurus.* This specimen was previously described and referred to *Eoglyptosaurus donohoei* (Sullivan, 1979). Because *Glyptosaurus donohoei* is here considered a junior subjective synonym of *G. sylvestris* (see below), and with it *Eoglyptosaurus donohoei,* the genus *Eoglyptosaurus* is invalid. *Proglyptosaurus huerfanensis,* n. sp., is known solely by its holotype (AMNH 7431) and is known only from the early Eocene (Wasatch interval) of Huerfano Park, Gardner, Colorado.

Hirsch et al. (1987) in a recent report on a problematic, ?gekkonid lizard egg from the early Eocene of Wyoming, informally synonymized *Eoglyptosaurus* with *Glyptosaurus.* These authors retained as valid the species *G. donohoei* in the belief that it had linear pterygoid tooth bands, a feature previously used in part to characterize *G. sylvestris* (Sullivan, 1986). Their retention of this species was maintained despite the fact that no characters were offered to differentiate *G. donohoei* from *G. sylvestris.*

My reexamination of the holotype of *Glyptosaurus donohoei* reconfirms that the pterygoid teeth actually occur in an ovoid patch

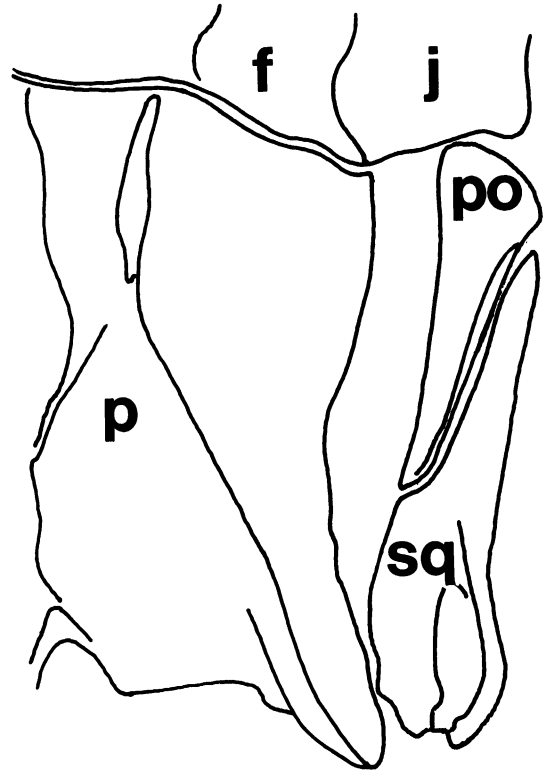

Fig. 3. *Proglyptosaurus huerfanensis* (holotype, AMNH 7431). Supratemporal region illustrating the ventral surface of the left side of the parietal table showing the articulation of the parietal (p) with the frontal (f), left jugal (j), left postorbital (po) and squamosal (sq), and the open supratemporal fenestra. Scale bar = 1 cm.

rather than a linear band as stated by Hirsch et al. (1987). This patch of teeth is somewhat reduced and tends to be intermediate between the extensive pterygoid tooth patches seen in *Melanosaurus* and the reduced band of *Glyptosaurus sylvestris* (fig. 4), but arguably more like the former. Previous outgroup analysis suggests that individual pterygoid teeth, tightly packed in an ovoid tooth patch, represent the plesiomorphic condition (Sullivan, 1986: 33). Hirsch et al. (1987) apparently thought that the ovoid pterygoid tooth patch in the holotype of *G. donohoei* (USNM 18316) represented a narrow tooth band, although this is not the case. However, because some Recent lizard species have pterygoid teeth which vary intraspecifically, from well-developed patches to absent (Estes et al. 1988;

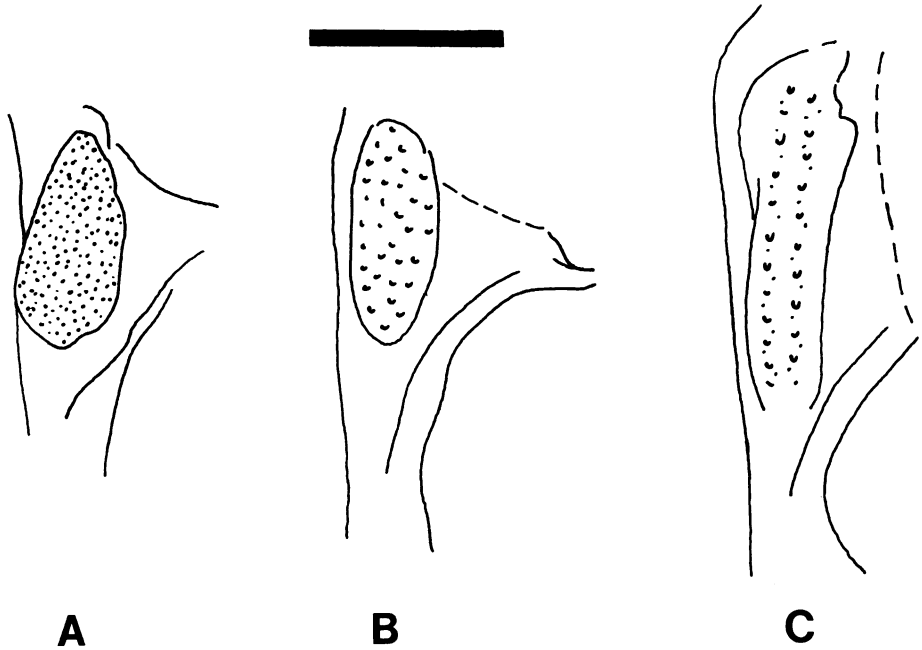

Fig. 4. Comparison of the left pterygoid and pterygoid teeth in: **A,** *Melanosaurus maximus* (holotype, AMNH 5168); **B,** *Glyptosaurus sylvestris* (holotype of *G. donohoei,* USNM 18316), and **C,** *Glyptosaurus sylvestris* (UCMP 126000). The teeth, represented by dots, are stylized, indicating the general distribution and density of pterygoid teeth. Anterior is up. Scale bar = 1 cm.

Etheridge, personal commun.), it may be best to avoid using this feature in diagnosing fossil lizard species. Furthermore, the holotype of *Glyptosaurus donohoei* is smaller than the skull of *Glyptosaurus sylvestris* (based on UCMP 126000, see table 1) and thus differences in pterygoid tooth patch morphology may, in part, be negligible owing to differences in size. Variability of pterygoid tooth morphology within *Glyptosaurus sylvestris* is not known with certainty because of the small sample size and because the morphology of the pterygoid teeth in *Proglyptosaurus huerfanensis* is unknown, making comparisons with this taxon presently impossible.

The holotype of *Glyptosaurus donohoei* is from strata of early Eocene age, whereas *Glyptosaurus sylvestris* is from younger rocks (middle Eocene). However, taxonomic distinctness cannot be based on a stratigraphic criterion alone. Aside from apparent differences in pterygoid tooth patch morphology, which are viewed here as being allometric, there are no characters that would warrant specific separation of these two taxa.

The issue of osteoderm variation is more difficult to assess. Variability in osteoderm morphology has been documented among glyptosaurine lizards (Sullivan, 1979) and allometric variation in osteoderm size is evident in different ontogenetic stages of the glyptosaur *Helodermoides tuberculatus* (personal obs.). In a previous paper, I presented a thorough discussion of osteoderm morphology among glyptosaur taxa and demonstrated a high degree of intra- and interspecific variability (Sullivan, 1979). The assertion of Hirsch et al. (1987) that the subconical dorsal cephalic osteoderms "vary allometrically in *G. donohoei*" is inferred to be based largely on the holotype of *G. donohoei* compared to unpublished referred material (Stucky, personal commun.). The holotype does not adequately preserve this feature and furthermore Hirsch et al. (1987) did not consider the distinct nature of the subconical osteoderms of AMNH 7431, the holotype of *Proglyptosaurus huerfanensis.* I therefore assume that this "allometric variation" cited by Hirsh et al. (1987) refers to size differences

TABLE 1
Estimated Skull Lengths of Key Glyptosaur Species (data, in part, from Estes, 1983, and Sullivan, 1979, 1986)

Taxon	Skull length, mm
Glyptosaurus sylvestris (UCMP 126000)	120
Glyptosaurus donohoei (holotype, USNM 18316)	100
Helodermoides tuberculatus (USNM 13869)	110
Paraglyptosaurus hillsi (holotype, USNM 6004)	125
Placosaurus rugosus (holotype, MNHN 1906–25)	75
Proglyptosaurus huerfanensis, n. gen., n. sp. (holotype, AMNH 7431)	71

rather than morphological differences among specimens that Stucky (personal commun.) believes are referable to *G. donohoei*. Based on my reexamination of the holotype, the dorsal cephalic osteoderms of *G. donohoei* appear only intermediate in size between the holotype of *Proglyptosaurus huerfanensis* (AMNH 7431) and that of *Glyptosaurus sylvestris* (UCMP 126000) and not intermediate in morphology. Because the dorsal cephalic osteoderms tend to be flattened and more platelike in the holotype of *G. donohoei*, I would argue that they more closely approach the morphology of *Glyptosaurus sylvestris* seen in UCMP 12600 (see Sullivan, 1986; and table 1) and therefore can be included within this species.

In conclusion, there are no characters that would serve to distinguish the holotype of *Glyptosaurus donohoei* from *G. sylvestris*. Therefore, *Glyptosaurus donohoei* is here considered a junior subjective synonym of *G. sylvestris*. However, AMNH 7431, originally referred to *Eoglyptosaurus donohoei*, is now thought to differ sufficiently from this taxon and from *Glyptosaurus sylvestris* to be recognized as a distinct genus and species. The following constitutes a revised synonymy of taxa for *Glyptosaurus sylvestris*:

Glyptosaurus sylvestris Marsh, 1871

Glyptosaurus nodosus Marsh, 1871: 458.
Glyptosaurus ocellatus Marsh, 1871: 458.
Glyptosaurus princeps Marsh, 1872: 302.
Glyptosaurus brevidens Marsh, 1872: 305.
Glyptosaurus rugosus Marsh, 1872: 305.
Glyptosaurus donohoei White, 1952: 186.
Paraglyptosaurus princeps: Sullivan, 1979: 21–25.
Eoglyptosaurus donohoei: Sullivan, 1979: 25–26.
NEW SYNONYMY.

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