THE ATLAS-AXIS COMPLEX OF THE LATE PALEOZOIC DIADECTOMORPHA AND BASAL AMNIOTES: DEFINING THE PRIMITIVE CONDITION OF THE ATLAS-AXIS COMPLEX OF AMNIOTES.

SUMIDA*, Stuart S., Dept. Organismal Biology and Anatomy, The Univ. of Chicago, 1025 E. 57th St., Chicago, IL 60637 U.S.A.; LOMBARD, R. Eric. Dept. Organismal Biology and Anatomy, The Univ. of Chicago, 1025 E. 57th St., Chicago, IL 60637 U.S.A.; BERMAN, David S, Section of Vertebrate Paleontology, Carnegie Museum of Natural History, 4400 Forbes Ave., Pittsburgh, PA 15213 U.S.A.

During the past decade, phylogenetic analyses of Late Paleozoic tetrapods have consistently demonstrated that the Permo-Pennsylvanian tetrapod suborder Diadectomorpha is closely related to more traditionally defined amniotes. Recent analyses provide two competing hypotheses of relationship: 1) the Diadectomoropha is the sister group of all amniotes, or 2) the Diadectomorpha and Synapsida comprise the most primitive clade within the Amniota. Subsequently more derived groups within the Amniota are: the reptilian family Captorhinidae, and the Protorothyrididae plus the Diapsida. The availability of well preserved atlas-axis complexes for all of the better known genera of diadectomorphs now allow a determination of the primitive condition of the atlas-axis complex for the Amniota. Further, accepted hypotheses of phylogenetic relationships among Late Paleozoic tetrapods allow mapping of features of the atlas-axis complex onto predefined topologies so that the transformations of the complex may be analyzed.

The diadectomorph atlas-axis complex may be characterized in the following manner: paired, well developed proatlases and atlantal neural arches; lack of proatlantal and atlantal neural spines with only posteriorly directed epipophyses present; an extremely robust atlantal intercentrum; tight articulation of the atlantal pleurocentrum with the dorsal aspect of the axial intercentrum preventing exposure of the former on the ventral surface of the vertebral column; a large, anteriorly directed midline projection of the axial intercentrum; a tall and well-developed axial neural spine, presumably for attachment of strong occipital muscles and ligaments. Except for the anterior projection of the axial intercentrum (which is an autapomorphic feature of diadectomorphs), basal amniotes share all of these features with diadectomorphs. Shared, derived features of the atlas-axis complex of diadectomorphs plus other basal amniotes include: 1) fusion of the axial centrum and neural arch, 2) small epipophyses of the atlantal neural arch and, with the exception of *Tseajaia*, 3) fusion of the atlantal pleurocentrum to the dorsal surface of the axial intercentrum.

The morphology of the atlas-axis complex alone is not sufficient to generate hypotheses of relationship between diadectomorphs and other basal amniotes. However, the atlas-axis complexes of diadectomorphs and other basal amniotes are clearly more similar to one-another than to those of other taxa.

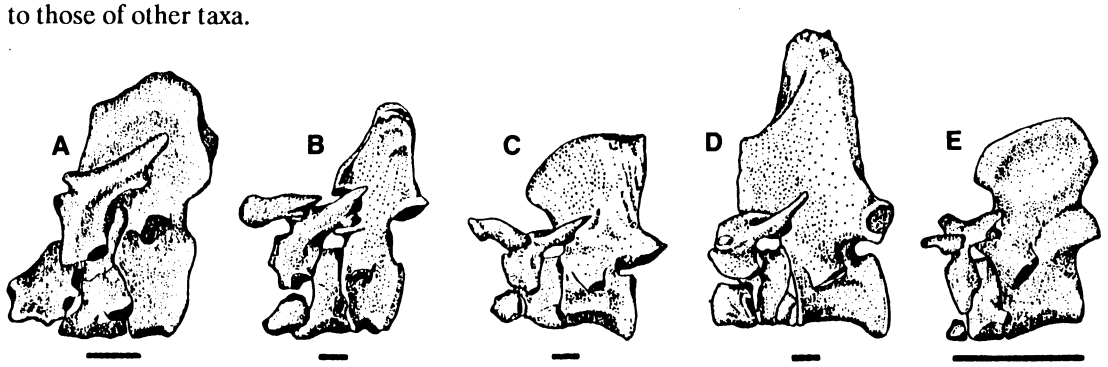

Figure 1. Atlas-axis complexes of representative Late Paleozoic tetrapod genera. A, *Limnoscelis*. B, *Diadectes*. C, *Ophiacodon*. D, *Dimetrodon*. E, *Captorhinus*. All illustrations are in left lateral view. Bar scales equal one centimeter.

https://doi.org/10.1017/S2475262200008431 Published online by Cambridge University Press