A right tabular horn (Carnegie Museum of Natural History 38011) from the lowermost Abo Formation (lower Wolfcampian) northeast of Socorro in the Joyita uplift of south-central New Mexico represents the oldest record of cranial material diagnostic of the nectridean genus *Diplocaulus*. Additional *Diplocaulus* material from this locality includes indeterminate, densely concreted cranial bones, as well as five isolated presacral vertebrae.

The most extensive records of *Diplocaulus* are from the Leonardian Clear Fork Group of Texas, whereas upper Wolfcampian-lower Leonardian strata of the Wichita Group and Wellington Formation of Texas and Oklahoma, respectively, yield moderately abundant material. However, only two localities outside of New Mexico produce *Diplocaulus* fossils older than early Wolfcampian, the Virgilian Upper Conemaugh Group site at Pitcairn near Pittsburgh, Pennsylvania and the early Missourian Mcleansboro Formation in the Lower Conemaugh Group near Danville, Illinois. Together, these Late Pennsylvanian localities have only yielded a small number of isolated vertebrae and an incomplete lower jaw.

In contrast, the combination of *Diplocaulus* fossils from the Joyita Hills and isolated vertebrae from three additional lower Abo localities (Jemez Springs, Caballo and Los Pinos mountains), as well as vertebral material from the Pecos River Valley in the Sangre de Cristo Formation, demonstrate a relative abundance of the genus *Diplocaulus* in the lower Wolfcampian red-bed vertebrate fossil assemblages of New Mexico. *Diplocaulus* body fossils are absent from upper Virgilian and lower Wolfcampian tetrapod assemblages of New Mexico deposited in mixed marine-nonmarine strata, indicative of a more coastal environment, where paleoniscoid material is abundant (Red Tanks and Laborcita members of the Bursum Formation). This pattern of distribution of *Diplocaulus* is consistent with the contention of previous workers that paleoniscoid fish and *Diplocaulus*, though not mutually exclusive, are characterized by an inverse relationship of abundance depending on paleoenvironmental conditions. Thus, in wetter, mesic conditions, paleoniscoid fish are more abundant, whereas *Diplocaulus* dominates in seasonal environments subject to brief periods of partial drying, during which it may have survived, not by aestivation in a strict sense, but in a state of torpor.