A Possible New Species of *Dimetrodon* (Eupelycosauria: Sphenacodontidae) from the Lower Permian Abo Formation, Socorro County, New Mexico

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We add to the growing record of *Dimetrodon* fossils from the Lower Permian Abo Formation in New Mexico with the addition of a potential new species from the Gallina Well locality in Socorro County that previously yielded other material of *Dimetrodon* in 2010. During a visit to the site in 2014, one of us (KLM Jr.) collected a large vertebra and associated fragments including a 15 cm long neural spine. The neural spine morphology of this specimen is of the more primitive round cross section, most similar to *Dimetrodon milleri*, the oldest known *Dimetrodon* from Texas. A significant difference is larger size being at least 50% larger than *D. milleri*. We also see a temporal difference with the Gallina Well *Dimetrodon* being late Asselian or early Sakmarian in age and *D. milleri* being younger in the Sakmarian. The Discovery of this specimen raises several important questions. The first relates to size of early *Dimetrodon* species. Until the discovery of this specimen all known early *Dimetrodon* were small. Indeed, all early species, cf. *D. milleri* from the middle Asselian of New Mexico, *D. occidentalis* from the upper Asselian of New Mexico, and *D. milleri* from the Sakmarian of Texas, are all small species. This was thought advantageous to life in an inland and upland habitat, and that larger size arose to take advantage of deltaic habitats. The new species from Gallina Well demonstrates that larger size arose much earlier than previous thought. The diversity of *Dimetrodon* is also in question with regard to how many species were there in New Mexico deposits. The new Gallina Well *Dimetrodon* suggest the presence of two contemporaneous species in the Abo Formation. Research since 2009 has revealed *Dimetrodon* to be a more common, though not the dominant predator, on the Abo floodplains of Permian New Mexico. Much more research is needed to fully understand *Dimetrodon* from the Lower Permian of New Mexico.

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