EXCEPTIONAL GENUS-RICHNESS AND MODERNITY IN THE LATE EOCENE FRESHWATER DIATOM FLORA FROM THE FLORISSANT PALEOLAKE DEPOSITS OF COLORADO, USA

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Paleolake deposits of the late Eocene Florissant Formation in south-central Colorado provide a record of the most genus-rich early freshwater diatom flora thus far described. Furthermore, all the diatom genera observed from this flora are extant, as are many of the species.

Diatoms were extracted from highly lithified shales and mudstones that formed from clay- and fine silt-sized particles that accumulated intermittently within the lake, alternating with volcanic ash and sand- to pebble-sized tuff. Radiometrically dated sanidine crystals within volcanic tuff beds provide an average $^{40}Ar/^{39}Ar$ age of 34.05 ± 0.08 Ma (million years old) for the formation.

An original floristics study in the Florissant lake beds at the Clare's Quarry site revealed 20 extant freshwater diatom genera, 8 of which are first occurrences in the geologic record. The results of this investigation combined with findings from earlier unpublished and published reports of diatoms from several Florissant sites show the presence of a cumulative total of 33 extant genera (14 of which are first recorded occurrences in the fossil record). These genera represent 13 families and are distributed among centric, araphid pennate, monoraphid pennate, and biraphid pennate morphological groups. Such richness at the genus level is uncommon among the 9 unambiguously non-marine fossil diatom floras reported for the period from late Cretaceous (~70 Ma) through Paleogene (~24 Ma). A comprehensive literature review and, in some cases, examination of archival material from published non-marine diatom floras from this pre-Neogene period revealed that the Florissant sites cumulatively contain 20 more genera than the next most genus-rich older flora, i.e., that of the middle Eocene Giraffe Pipe of the Northwest Territories, Canada.

While the conditions that contributed to the occurrence and preservation of this uniquely diverse Florissant fossil diatom flora remain uncertain, the establishment of such a large number of extant genera as early as 34 million years ago supports the view that the earliest ancestral forms of freshwater diatoms are likely to have originated much earlier in geologic history than is documented by the paleontological record of the past 70 million years.

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