

NACO FORMATION

LATE CARBONIFEROUS PENNSYLVANIAN EPOCH (Desmoinesian to Virgilian), 310 to 304 Million Years Ago

LITHOLOGY:
Limestone, shale, sandstone; medium-gray

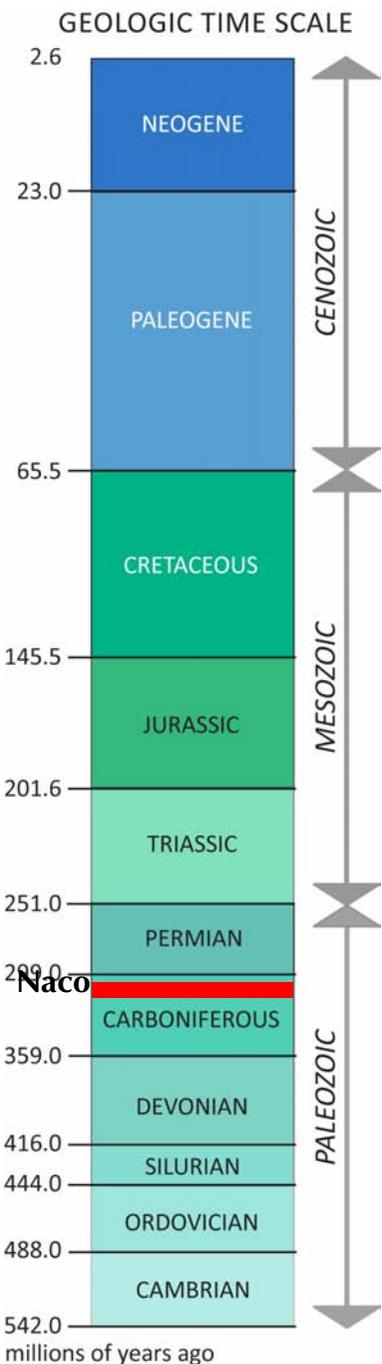
FOSSILS:
Corals, brachiopods, bryozoans, crinoids, fusulinids

SEDIMENTARY STRUCTURES:
Horizontal bedding

DEPOSITIONAL ENVIRONMENT:
Shallow marine shelf, near shoreline to east against Defiance-Zuni positive area

PALEOGEOGRAPHY/TECTONIC SETTING:
Continental shelf, platform; wedges out against Defiance-Zuni positive area to the east

MISCELLANEOUS:
Correlated with the Horquilla Limestone by Ross, 1973



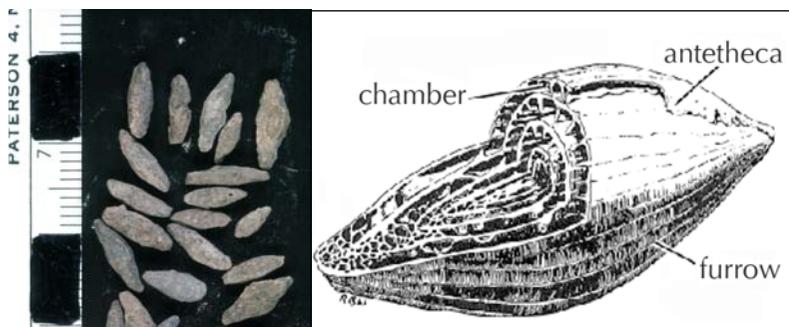
During the late Carboniferous Period (Pennsylvanian Epoch), the continents of the world began to collide into what would become the supercontinent, Pangaea. The period was marked by multiple cycles of rising and falling sea levels. These sea-level fluctuations were triggered, in turn, by glacial cycles in the Southern Hemisphere. The glaciers stored huge amounts of freshwater during periods of cooling—causing sea levels to drop—then released the water into the seas during warmer periods of melting, causing sea levels to rise. The shallow marine environments of this time, such as existed on the Colorado Plateau, featured an abundance of creatures such as crinoids, brachiopods, and fusulinids. At death, their calcium-rich shells were deposited in lime mud on the ocean floor, which eventually became limestone.

Fusulinids—Complexity at a Tiny Scale

Fusulinids were small single-celled marine organisms, typically about the size of a grain of wheat, although some forms were over two inches long. The earliest record of fusulinids occurs 320 million years ago. They evolved rapidly, changing into many forms, which make them excellent index fossils in Pennsylvanian rocks such as the Naco Formation. They became extinct during the mass extinction at the end of the Permian Period, about 251 million years ago.

Single-celled organisms rely on one cell to do all the essential life functions—movement, eating, digestion, reproduction, etc. In this way, they are different from multi-cellular life forms, which have various cells with specialized roles.

In order to accommodate all of these functions, the cell of organisms such as fusulinids is very complex. This can be seen in the hard calcium carbonate shells of fusulinids, which are internally divided into a series of chambers.



Fusulinid drawing courtesy of the Kansas Geological Society, www.kgs.ku.edu
Photos courtesy of Dale Nations. Information provided by WESTCARB at www.westcarb.org



Geologists examine a Naco Formation outcrop at Carrizo Creek, Arizona



Generalized environments across Arizona during the Pennsylvanian Epoch, the time of deposition of the Naco Formation (modified from Ross, 1991, Blakey and Knepp, 1989)