

A SUMMARY OF THE BIOSTRATIGRAPHY OF THE NEWARK SUPERGROUP OF EASTERN
NORTH AMERICA
WITH COMMENTS ON EARLY MESOZOIC PROVINCIALITY

BRUCE CORNET

Superior Oil Company Geoscience Lab., 12401 Westheimer Rd. Houston,
Texas 77077 U.S.A.

PAUL E. OLSEN

Lamont-Dougherty Geological Observatory, Columbia University, Palisades,
New York 10964 U.S.A.

ABSTRACT

The Newark Supergroup of Eastern North America consists of rocks judged to range in age from early Middle Triassic through late Early Jurassic. Dating is principally based on the recognition of seven palynological zones correlated with the European standard stages and on correlation of vertebrates and megafossil plants. The basic floristic trends are a decrease in diversity into the Early Jurassic and the rise to strong dominance of the cheirolepidaceous conifers. Based on published radiometric scales, the Newark depositional episode lasted roughly 45 million years and was antecedent to the actual separation of the North American and African Plates. Correlation of other Early Mesozoic continental areas with the Newark allows the conclusions that there was a shift from Late Triassic floral and faunal provinciality to Early Jurassic homogeneity, and that this shift was synchronous with a widening of the equatorial arid zone.

RESUMEN

El Supergrupo Newark, del Oriente de América del Norte, consiste en rocas que a juicio de los autores tienen un margen de edad entre el Triásico Medio temprano y el Jurásico Temprano tardío. La asignación de edad se basa principalmente en el reconocimiento de siete zonas palinológicas que se correlacionan con los pisos estandar europeos y en la correlación mediante vertebrados y megafósiles vegetales. Las tendencias florísticas básicas son un decremento de la diversidad hacia el Jurásico Temprano y el surgimiento a una dominancia fuerte de las coníferas del tipo Cheirolepidiaceae. De acuerdo con escalas radiométricas publicadas, el episodio de depósito Newark duró unos 45 millones de años y precedió la separación de las placas de América del Norte y de África. La correlación de otras áreas continentales del Mesozoico temprano con el Newark permite las conclusiones de que en este lapso sucedió un cambio que a partir de la provincialidad de flora y fauna del Triásico Tardío llevó a la homogeneidad del Jurásico Temprano, y que este cambio fue contemporáneo con el ensanchamiento de la zona árida ecuatorial.

INTRODUCTION AND GEOLOGICAL CONTEXT

The Newark Supergroup (Figure 1) consists of a series of Early Mesozoic deposits of principally red non-marine clastics and minor tholeiitic igneous rocks exposed in a long series of discrete basins from Nova Scotia, Canada to South Carolina, U.S.A. (OLSEN, 1978; VAN HOUTEN, 1977; FROELICH and OLSEN, 1984). The long axes of these basins

parallel the fabric of the Appalachian Orogen and in most cases the basin sequences are preserved as internally faulted and tilted halfgrabens. A long series of closely related basins occur beneath the Atlantic Coastal Plain and on the Continental Shelf (OLSEN, 1978).

Most Newark Supergroup rocks were apparently deposited in asymmetrically subsid-

ing troughs formed along major Paleozoic thrust faults, which were reactivated in the Early Mesozoic as listric normal or normal-oblique faults (LINDHOLM, 1978; PETERSON, et al., 1984). There were at least several kilometers of dip-slip movement during the history of the basins. Whether these basins formed in a simple extensional system acting perpendicular to the axis of the basins or in a wrench system acting oblique to the fabric of the orogene is a matter of ongoing

debate (MANSPEIZER and OLSEN, 1981; MANSPEIZER, 1982); however, it is certain that these basins formed just before the onset of actual separation of the North American and African plates and the oldest formation of Atlantic oceanic crust in the Middle Jurassic (SUTTER and SMITH, 1979).

As much as 10 km of principally fluvial and lacustrine sediments filled these basins. Most sequences show a bulls-eye facies pat-

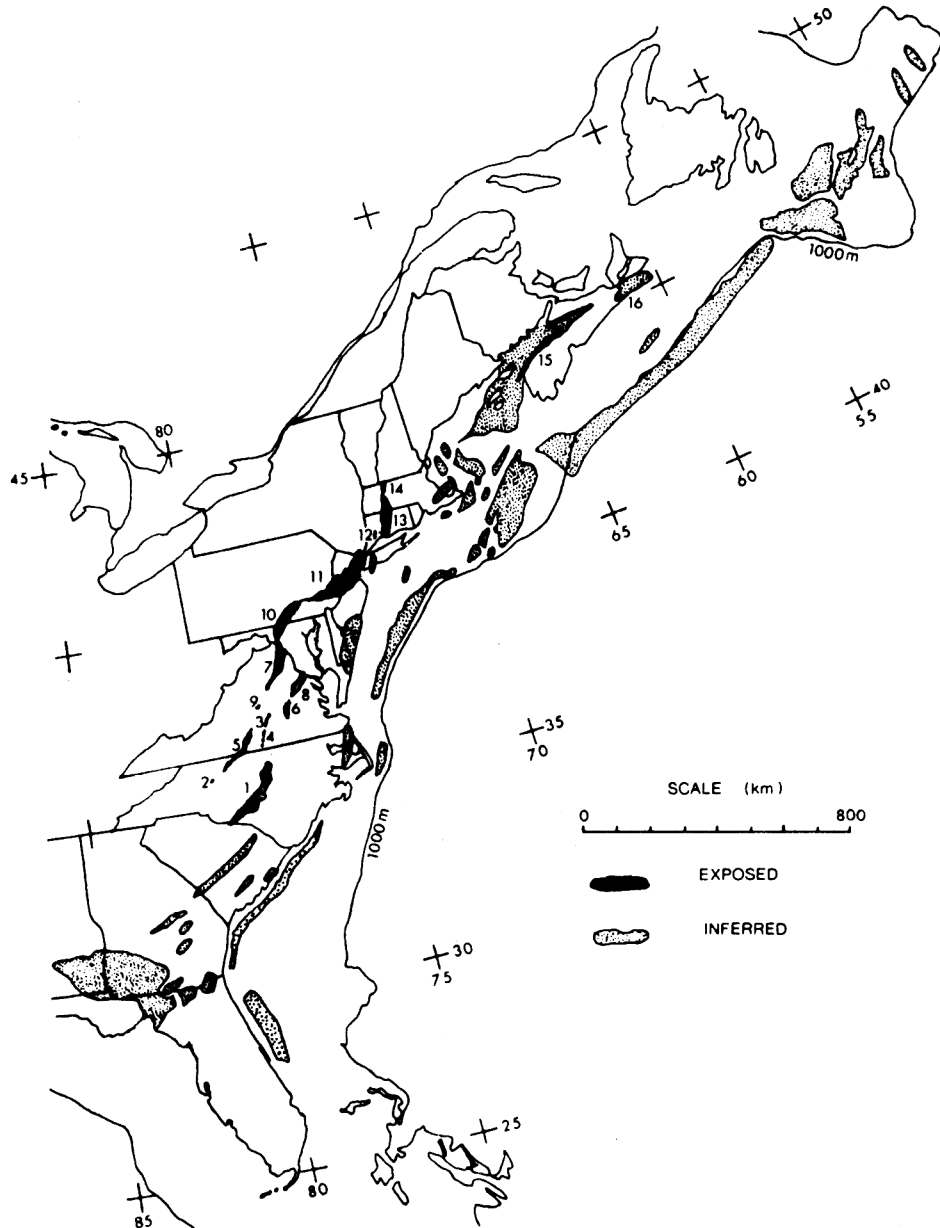


Figure 1: The Newark Supergroup of Eastern North America. Modified from OLSEN (1978). The inferred areas probably overlap the Newark in age but some may not be lithologically similar to the Newark. Key to Figure in Table 1.

tern of coarse fluvial sediments along the basin edges and finer sediments in the middle. Evidently most basins had internal drainages and perched outlets and therefore contained lakes as long as there was sufficient precipitation. Some of these lakes covered more than 7,000 km² and may have been deeper than 100 m. In addition to fluvio-lacustrine sediments, several Newark Supergroup basins also contain extrusive basalt sequences high in the sections, and in one basin (the Fundy Basin in Nova Scotia, Cana-

da) there are a number of intervals of eolian sandstone (HUBERT and MERTZ, 1980; OLSEN, 1981).

No marine fossils are known from the Newark Supergroup and this has greatly hindered correlation of these continental beds with the standard European section. Fortunately most intervals contain at least some beds with well preserved pollen and spore assemblages, megafossil plants, and terrestrial and aquatic vertebrates. These allow an internal correlation of the Newark as well

Key to Figure	Rock-stratigraphic term	Basin name	Age range
1	Chatham Group	Deep River Basin	Carnian-?Norian (Late Triassic)
2	undifferentiated	Davie County Basin	?Late Triassic
3	undifferentiated	Farmville Basin	?Carnian (Late Triassic)
4	undifferentiated	4 small basins south of Farmville Basin	?Carnian (Late Triassic)
5	Dan River Group	Dan River and Danville Basins	Carnian-?Norian (Late Triassic)
6	Tuckahoe and Chesterfield Groups	Richmond Basin and subsidiary basins	Carnian (Late Triassic)
7	Culpeper Group	Culpeper Basin	Norian-?Sinemurian (Late Triassic-Early Jurassic)
8	none	Taylorville Basin	Carnian (Late Triassic)
9	undifferentiated	Scottsville Basin and 2 subsidiary basins	?Late Triassic-Early Jurassic
10	none	Gettysburg Basin	Carnian-Hettangian (Late Triassic-Early Jurassic)
11	none	Newark Basin	Carnian Sinemurian (Late Triassic-Early Jurassic)
12	none	Pomperaug Basin	?Late Triassic-Early Jurassic
13	none	Hartford Basin and subsidiary Cherry Brook Basin	Norian-?Bajocian (Late Triassic-?Middle Jurassic)
14	none	Deerfield Basin	?Norian-?Toarcian (Late Triassic-Early Jurassic)
15	Fundy Group	Fundy Basin	?Middle Triassic-Early Jurassic
16	Chedabucto Formation (=Eurydice Formation?)	Chedabucto Basin (=Orpheus Basin?)	?Late Triassic-Early Jurassic

Table 1: Divisions of the Newark Supergroup and key to Figure 1. Note that "none" under the rock-stratigraphic term category indicates that, although the rocks of the basin may have been divided into formations, no inclusive name for all the formations of that basin have been proposed. Modified from OLSEN (1978).

