

# American Journal of Science

JANUARY 1982

## CORRELATION OF THE EARLY MESOZOIC NEWARK SUPERGROUP BY VERTEBRATES, PRINCIPALLY FISHES

PAUL ERIC OLSEN, AMY REED McCUNE, and  
KEITH STEWART THOMSON

Biology Department, Yale University, New Haven, Connecticut

**ABSTRACT.** New data on the distribution of fossil fish together with floral and tetrapod evidence are used to develop an internal correlation of the strata of the early Mesozoic Newark Supergroup of eastern North America. Within the Newark, we recognize five informal biostratigraphic zones, each characterized by a particular fish fauna. These fish zones are then related to other Mesozoic freshwater deposits, augmented by palynologic and tetrapod data, to the European type area, and to important Early Mesozoic terrestrial sequences elsewhere.

The oldest fish zones are the *Dictyopyge* zone found in the Middle Carnian age rocks of the Richmond, Taylorsville, and Scottsburg Basins and the Middle and Late Carnian *Diplurus newarki* zone represented in the Chatham group, Dan River Group, Gettysburg Basin, and Newark Basin. These two zones correlate with the Chinle Formation and the Dockum Group of the southwestern United States as well as the Middle and Late Carnian rocks of the German basin.

The three youngest zones, early Jurassic in age, are characterized primarily by species groups of the holostean *Semionotus*. Fishes of the "*Semionotus tenuiceps* group" zone are known from the Hettangian Feltville and Towaco Formations of the Newark Basin and the Turners Falls Sandstone of the Deerfield Basin. The "*Semionotus micropterus* group" zone is found in the Late Hettangian-Early Sinemurian rocks of the Shuttle Meadow and East Berlin Formations of the Hartford Basin and the "Midland fish bed" of the Culpeper Basin. Youngest of these semionotid zones is the Sinemurian "*Semionotus elegans* group" representatives of which occur in the Sinemurian Portland Formation of the Hartford Basin and the Boonton Formation of the Newark Basin.

Correlation by these fish zones suggests that all the coal-bearing Newark rocks are divisible into an older and younger sequence both dated palynologically (by others) as Middle Carnian. Further, while the time span over which extrusive basalts were deposited is limited to the Hettangian and Sinemurian of the Early Jurassic, the individual basalt flow formations are not correlative among basins in a simple one to one manner according to the biostratigraphic data. With respect to the rest of the world, the "*Semionotus tenuiceps* group," "*S. micropterus* group," and the "*S. elegans* group" zones correlate with the European Early Jurassic, the Glen Canyon Group of the southwestern United States, the upper Stormberg Group of southern Africa, and the Lower Lufeng of China.

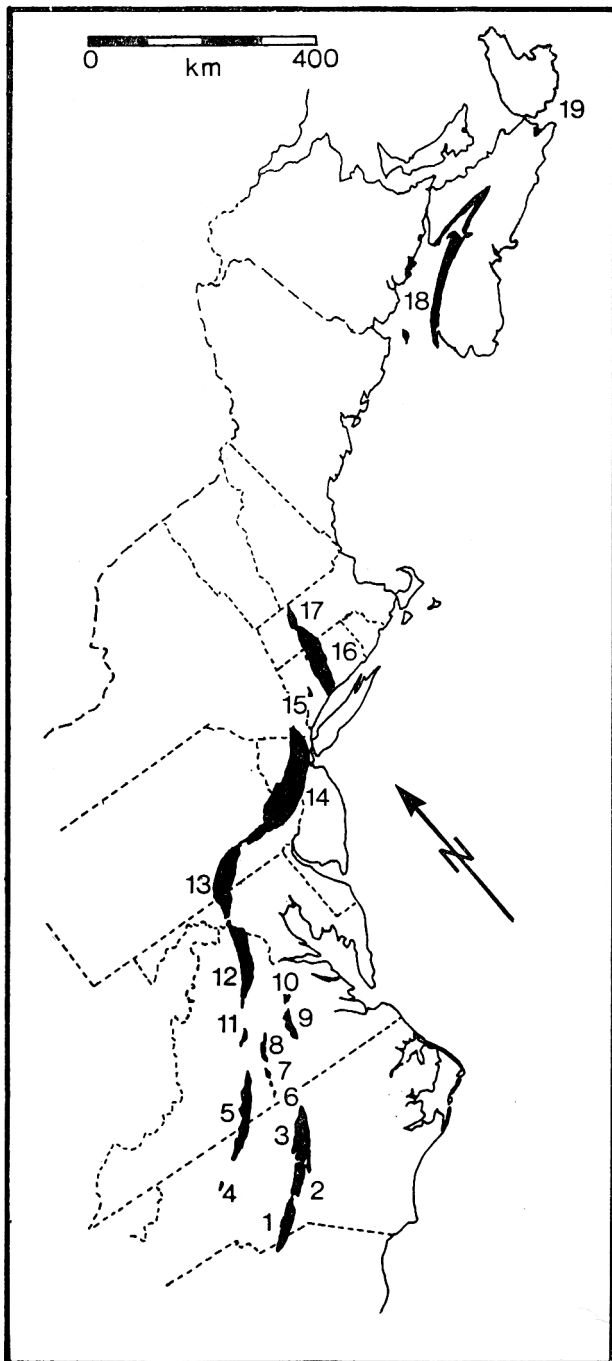


Fig. 1. The Newark Supergroup of eastern North America: (1) Wadesboro Basin (Chatham Group), (2) Sanford Basin (Chatham Group), (3) Durham Basin (Chatham Group), (4) Davie County Basin, (5) Dan River and Danville Basins (Dan River Group), (6) Scottsburg Basin, (7) basins south of the Farmville Basin, (8) Farmville Basin, (9) Richmond Basin, (10) Taylorsville Basin, (11) Scottsville Basin, (12) Culpeper Basin, (13) Gettysburg Basin, (14) Newark Basin, (15) Pomperaug Basin, (16) Hartford Basin and Cherry Brook outlier, (17) Deerfield Basin, (18) Fundy Basin (Fundy Group), (19) Chedabucto Basin (? Orpheus Graben). Data primarily from Calver (1963), Jansa and Wade (1975), King and others (1944), Van Houten (1977), and Olsen (1978).

## INTRODUCTION

Just prior to the Jurassic separation of the North American and African continental plates, a series of elongate basins formed in the region around the incipient rifting axis (Van Houten, 1977; Manspeizer, Puffer, and Cousminer, 1978). In eastern North America, these basins developed parallel to the grain of the basement rocks and were filled with thousands of meters of continental sediments and minor tholeiitic volcanics. The faulted, tilted, and deeply eroded remnants are exposed from Nova Scotia to South Carolina and are termed the Newark Supergroup (Van Houten, 1977; Olsen, 1978) (figs. 1 and 2).

Correlation of the ten major and several minor Newark Supergroup basins with each other and with early Mesozoic deposits of the world

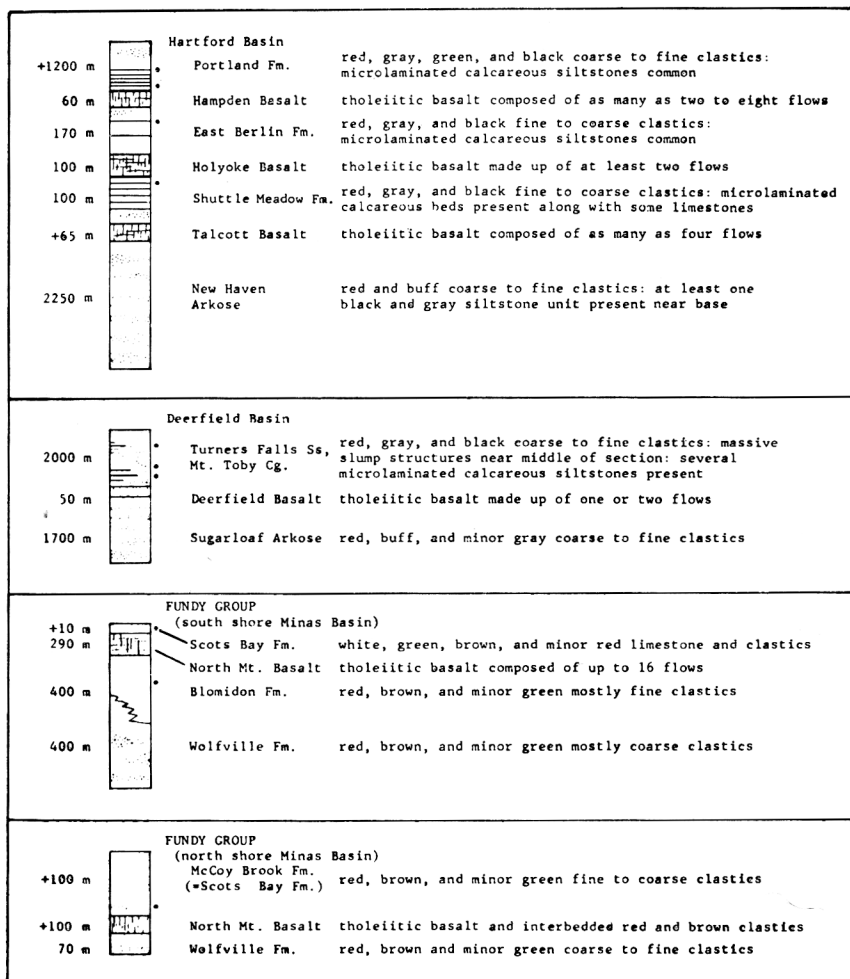


Fig. 2. Formations and divisions of the Newark Supergroup. Data derived mainly from Bain and Harvey (1977), Cornet and Traverse (1975), Cornet (ms), Emerson (1898), Fail (1973), Glaeser (1966), Klein (1962), Keppie and others (1979), Krynine (1950), Lee (1977), Lehman (1959), Lindholm (1979), McCollum (1971), Olsen (1979, 1980b c, d and in press), Olsen and others (1978), Randazzo and Copeland (1976), Reinemund (1955), Thayer (1970), Shaler and Woodworth (1899), Van Houten (1969), Weems (ms), and personal observation. The dots next to the columns show the position of fish producing units.

