

A REVIEW OF THE REPTILE AND AMPHIBIAN ASSEMBLAGES FROM THE STORMBERG OF SOUTHERN AFRICA, WITH SPECIAL EMPHASIS ON THE FOOTPRINTS AND THE AGE OF THE STORMBERG

by

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ABSTRACT

The Molteno, Elliot, and Clarens formations comprise the continental Stormberg Group of the Karoo Basin of South Africa and Lesotho. The Molteno Formation contains a well preserved macro- and microfloral assemblage but apparently no vertebrates; the Elliot and Clarens formations contain abundant vertebrates but virtually no floral remains. The vertebrate taxa represented by skeletal remains are listed and divided into two assemblages — the lower Stormberg (lower Elliot) and upper Stormberg (upper Elliot and Clarens) assemblages. The abundant, diagnosable footprint taxa are revised and their names reduced to eight genera. These ichnotaxa also fall into two biostratigraphic zones that parallel the skeletal assemblages. Comparison of the faunal assemblages with those of the European type section strongly suggests that the lower Stormberg assemblage is Late Triassic (Carnian-Norian) in age while the upper Stormberg assemblage is Early Jurassic (Hettangian-Pliensbachian) in age. Comparisons with other continental assemblages from other areas suggest that the upper Stormberg (upper Elliot and Clarens formations) assemblage broadly correlates with the upper Newark Supergroup of eastern North America, the Glen Canyon of the southwestern United States, and the lower Lufeng Series of China — all thought to be of Early Jurassic age on the basis of floral and/or radiometric evidence. Based on these correlations, previously published paleobiogeographic maps are revised; these show a shift from Late Triassic floral and faunal provinciality to Early Jurassic homogeneity. This shift was synchronous with a widening of the equatorial arid zone.

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INTRODUCTION

Late Triassic and Early Jurassic terrestrial reptile remains from fluvial, lacustrine, and eolian sediments are found on all continents, but the best known diverse assemblages are from the Stormberg Group of southern Africa (fig. 1). These vertebrate-bearing beds are virtually barren of other types of fossils, such as marine invertebrates and megafossil or microfossil plants. As a result, interpretations of the age of these assemblages have been based on comparisons of the vertebrates with those of other areas that preserve continental deposits. The past few years have seen a revision in opinion on the relative ages of terrestrial assemblages from eastern North America, Europe, and China, and this redating directly affects assessments of the age of the Stormberg. Here we: 1) briefly review the Stormberg skeletal assemblages; 2) review and revise the Stormberg footprint assemblages; 3) compare these assemblages to faunules from Europe, North America, South America, and China; and 4) use the redating of all of these early Mesozoic assemblages to arrive at new paleobiogeographic distribution maps for the Triassic and Early Jurassic.

Our review and revision of the footprints is almost completely based on the work of Ellenberger (1970, 1972, 1974). Our review of the skeletal remains is based on the compilations of Haughton (1924), Haughton and Brink (1955), Crompton (1967), Anderson and Anderson (1971), Kermack (1974), Kitching (1977), Anderson and Cruickshank (1978), and Cooper (1981b). It was, of course, Haughton who first gave us a comprehensive look at Stormberg faunules. It is interesting to note that, although new taxa have been discovered and assignments of the age of the assemblages have bounced back and forth between Triassic and Jurassic, the basic Gestalt of the assemblages and the rationale for dating them have not really changed much since Haughton's seminal work of 1924.

Geological distribution of fossils

The Stormberg Group of the Karoo Basin covers large portions of South Africa and Lesotho. Over much of that area it overlies earlier Triassic Beaufort beds or older rocks and underlies the Drakensberg Volcanics of Jurassic and younger age (fig. 2). Three sedimentary formations make up the

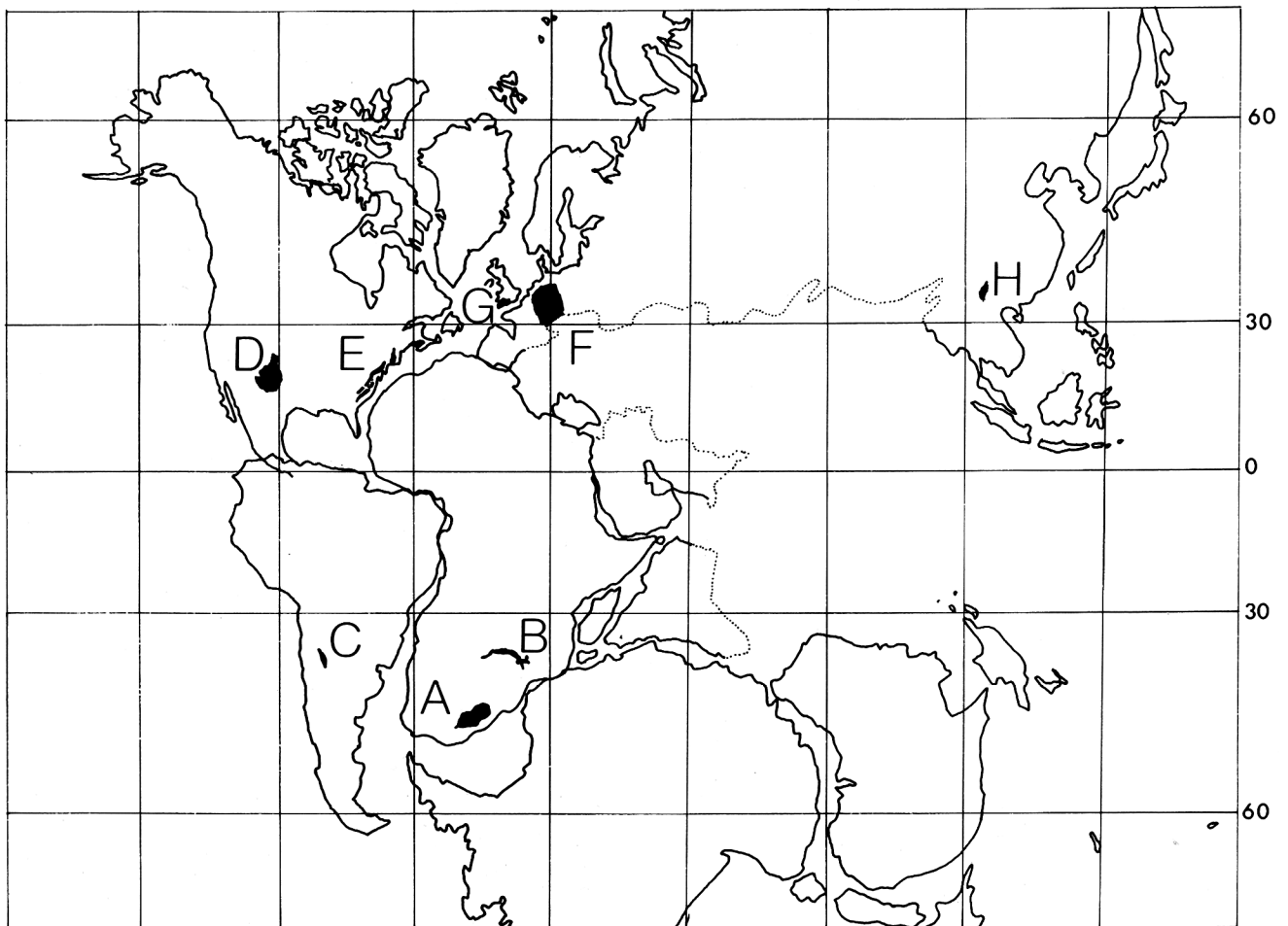


Figure 1

Positions of major areas discussed in text on a map of the positions of the continents during the Early Jurassic (Pliensbachian): A) Karoo Basin, South Africa; B) Middle Zambezi Valley, Zimbabwe; C) Ischigualasto Basin, Argentina; D) Glen Canyon Group, southwestern U.S.A.; E) Newark Supergroup, eastern North America; F) Germanic Basin, Western Europe; G) "Rhaeto-Liassic" fissure fillings, England; and H) Lower Lufeng Series, Yunnan, China. Base map from Smith (1981).

