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A TIME SCALE FOR PROJECT PANGEA

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During an international organizational workshop to develop plans and directions of the new "PROJECT PANGEA" (part of the Global Sedimentary Geology Program directed by Robert Ginsburg), May 1992 the participants quickly recognized a major need for a reasonably detailed geological and numerical time scale to encompass the duration of Pangea's existence. Early conference discussion strikingly illustrated that practitioners of different disciplines, i.e., paleontologists, paleobotantists, paleoclimate modelers, etc., and those from different regions were not using the same series, stage or fossil zone names, were not using the same numerical time scales and, in many cases, were not using the same stratigraphic correlations between different regions. Thus the time and stratigraphic relationships that the workshop participants were discussing were masked by multiple sets of poorly understood time stratigraphic nomenclature and a common time scale was needed to avoid confusion.

The "Project Pangea" time scale (Fig. 1) is one result of this workshop meeting and was prepared by a small working group on "Stratigraphic Constraints on Global Synchroneity". The three of us, each with some background on the progress and direction of the various International Stratigraphic Subcommissions that are trying to establish global stratigraphic time scales for the Carboniferous, Permian, Triassic and Jurassic were assigned to the time scale project. Although some International Subcommissions are well along on their work, their final reports are not yet complete and for several, subdivision of their periods into series and stages likely will not be completed before the end of "Project Pangea". To facilitate communications between the various study groups of the workshop and others who later may become involved in studies in "Project Pangea", a Pangea time scale was assembled (Fig. 1) with the available worldwide expertise from the project participants.

The Pangea time scale extends from the beginning of the assemblage of Pangea in the later part of the Early Carboniferous to a point when Pangea started to break apart very late in the Jurassic. As a working chart on correlations and time scales for these geological periods, it does not replace the work of the Stratigraphic Subcommissions. It fills an immediate need and provides a framework which gives relative durations and numerical ages of the commonly used stages.

Several features of the time scale should be noted. There are only three radiometric ages that can reasonably be used as tie points to biostratigraphic zonation of the stages. Thus the assigned numerical ages for nearly all the of the stages are based on stratigraphic inference.

The base of Namurian A, the time that lesser Pangea (Gondwana and Euramerica) was being assembled, is 333(±11) Ma (Harland and others, 1990), a maximum value. D. Weyer of Magdeburg (pers. comm. to M. Menning) suggests that this age is more likely about 327 Ma. Definition of the base of the Permian is currently favoured to be the base of the Russian Platform Asselian Stage which, if its correlation with the top of the Stephanian of northwestern Europe is correct, is about 295(±6) Ma.

Menning (1986) located the top of the Carboniferous-Permian Reversed Megazone (Kiaman Superchron) within the Upper Rotliegend which, therefore, places the central European Zechstein in the uppermost Permian. This has resulted in assigning nearly equal time to Early and Late Permian and in placement of the Early/Late Permian boundary at about 269 ±5 Ma (estimated from data of Hess and Lippolt, 1986); an age much older than many (except Menning, 1989), would use.

The stratigraphy, biostratigraphy and boundary between the Permian/Triassic are still not decided (Ross and Ross, 1987a, b). We are presently using a radiometric age of 251 ±3 Ma from tuffs of the uppermost Permian in China (Claoué-Long and others, 1991).

The only other radiometric tie point is 233 Ma (Hellmann and Lippolt, 1981), from the Grenzbitumenzone near the base of the Ladinian in western Europe. The base of the Ladinian is assigned 234 Ma. The Jurassic scale is after Harland and others (1990).

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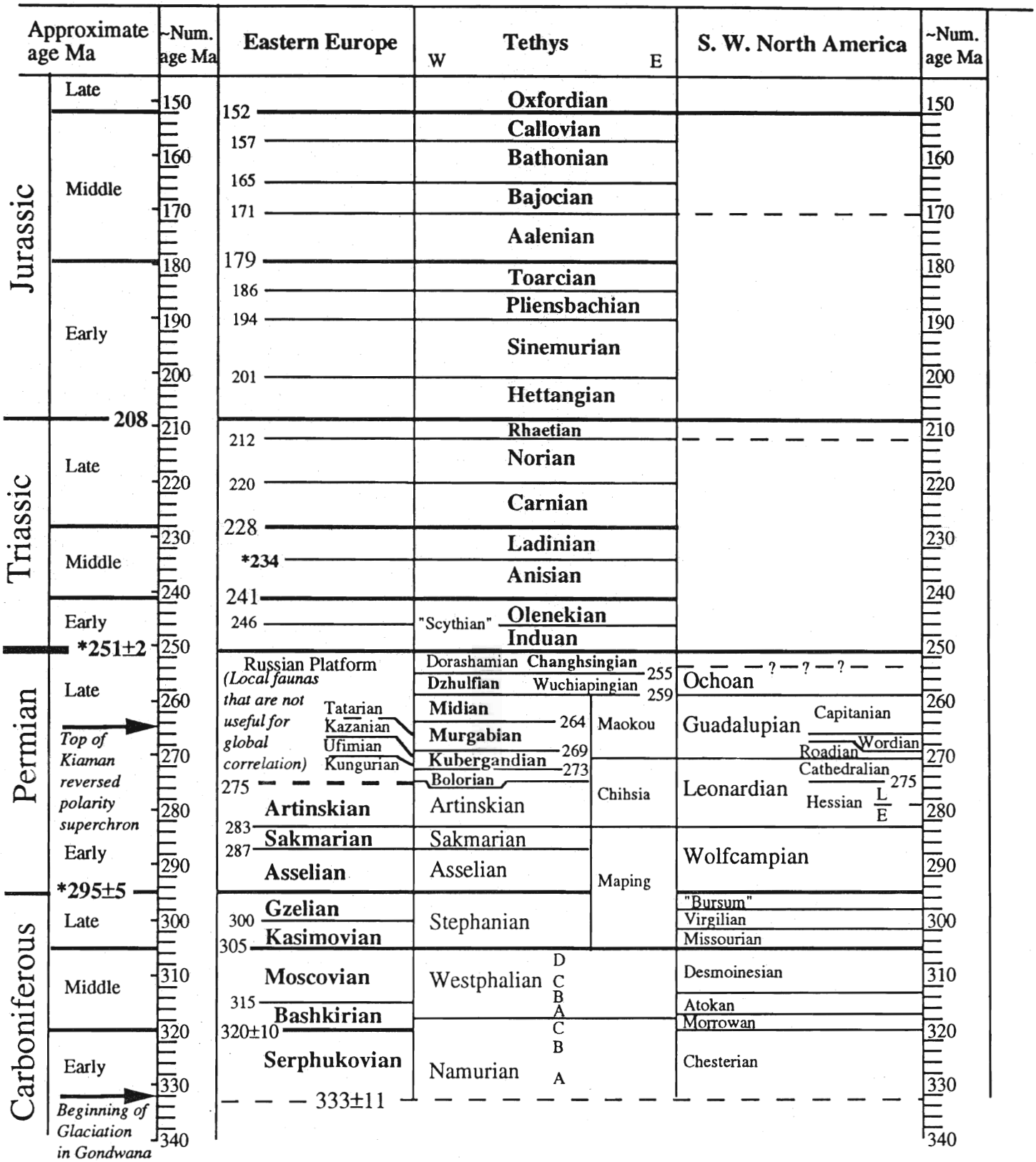

Note: Line thickness is used only to highlight significant boundaries
*radiometric ages (tie points), all others are based on geologic inference.

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Fig. 1. A time scale for Project Pangea. Line thickness is used to highlight significant boundaries. *=radiometric ages (tie points), all others are based on stratigraphic inference.

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