The Cretaceous-Tertiary boundary –
the ideal geologic time scale boundary?

by William B. N. Berry

with 1 figure

Abstract. The Silurian-Devonian Boundary Working Group selected a speciation event in a
lineage of marine planktic organisms (graptolites) as that event in time on which to define the
base of the Devonian System. That speciation is recorded in the graptolitic biofacies and litho­
facies. To recognize the base of the Devonian in other biofacies and lithofacies, a web of
correlations, many of which are imprecise, has to be developed. Similarly, the Cretaceous-Ter­
tiary boundary, if that System boundary be considered the Maastrichtian-Danian boundary,
may be recognized by certain changes in marine planktic organisms. A distinctive clay with a
unique geochemical signature (notably an anomalously high iridium content) and sand-sized
spherules occurs in both marine and terrestrial facies at the stratigraphically highest part of
the Maastrichtian. The base of that clay is the stratigraphic position at which not only many
marine plankton became extinct but also a change in pollen occurs in certain stratigraphic
sequences of terrestrial strata. The distinctive clay layer is essentially worldwide in occurrence.
Its unique geochemical signature and the composition of the sand-sized spherules in it indicate
that it formed from the fall-out of materials generated by impact of a large bolide on a target
that may have been oceanic basaltic in composition. Models of trajectories of particles generated
by such an impact suggest that the materials in the clay could have been carried worldwide in
a matter of hours after impact. The clay appears to be the record of a unique, essentially
geologically instantaneous event in earth history. Because it is, it may be the ideal base for a
System (or any other unit) boundary in the geological time scale.

Introduction

In their discussion of the geologic time scale, Harland and others (1982, p. 1) suggested
that the “traditional stratigraphic time scale” is developing into “a new kind of
standard stratigraphic scale”. Units (such as Systems and Stages) in this “new kind
of standard stratigraphic scale” are delimited by the base of the unit and the base of
the next succeeding or superjacent unit. Accordingly, in such a standard scale, only

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