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Defining the Jurassic–Cretaceous Boundary in the Panboreal Superrealm: A Review of Correlative Levels Traced by Ammonites and Bivalves

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Abstract The Jurassic–Cretaceous (J/K) boundary currently lacks a ratified Global Boundary Stratotype Section and Point (GSSP). However, three intervals between the “traditional” base of the Upper Tithonian and the base of the Middle Berriasian have been identified as candidates for the future GSSP level (Grabowski et al., 2026). Due to the absence of globally traceable events with the exception of palaeomagnetic reversals a set of levels suitable for subglobal correlation is required. Here, we consider such levels within the Panboreal Super-realm. In this extensive region, the Volgian and Ryazanian stages are traditionally employed for the boundary interval instead of the Tithonian and Berriasian (Rogov et al., 2024). Among the various fossil groups, ammonites (the preeminent ‘geological clock’ for the Jurassic) and certain bivalves are of paramount importance. The following succession of ammonite bio-events, principally the first appearance datums (FADs) of key genera with broad geographic ranges, can be recognized within the studied interval (from older to younger): 1) FAD of *Epilaugeites*; 2) FAD of *Praechetaites* ex gr. *exoticus* and *Laugeites mesezhnikowi*; 3) FAD of *Swinertonella*; 4) FAD of *Subcraspedites*; 5) FAD of *Craspedites* and the last appearance datum (LAD) of *Laugeites*, an event that marks the base of the Upper Volgian; 6) FAD of *Craspedites* (*Trautscholdiceras*); 7) FAD of *Volgidiscus* and *Chetaites*; 8) FAD of *Praetollia* and LAD of *Volgidiscus*, defining the Volgian–Ryazanian boundary; 9) FAD of *Hectoroceras*. Bivalves of the families *Buchiidae* and *Inoceramidae* (genera *Buchia*, *Anopaea*, “*Inoceramus*”, and “*Parainoceramya*”) were characterized by high evolutionary rates during this interval. The following bivalve-based events have been recognized: 1) FAD of *Buchia terebratuloides* near the Middle–Upper Volgian boundary; 2) FAD of *Anopaea*, first in NW Europe and the Russian Platform, and later in Siberia; 3) FAD of *Buchia unschensis*, which may also exhibit minor diachroneity. At approximately the same level, the first “*Parainoceramya*” *golberti* appears in Eastern Siberia and, possibly, in NE Europe, while “*Inoceramus*” *subplanus* appears in Eastern and Western Siberia; 4) LAD of *Anopaea* in the Volgian–Ryazanian transition of the Russian Platform and Siberia; 5) FAD of *Buchia okensis* and *B. volgensis*, situated slightly above the base of the *Hectoroceras kochi* ammonite zone. The successions of bioevents described



above provide a framework for the more or less precise identification of the J/K boundary, independent of the final decision regarding the GSSP level. This study was supported by the Russian Science Foundation (project no. 25-17-00210).

Key words Arctic, correlation, ammonites, bivalves, J/K boundary