The Breaking of Diapause in Embryonic Broad-Shell River Turtles (Chelodina expansa)

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The Australian broad-shelled turtle (Chelodina expansa) typically constructs its nests during the Austral autumn or early winter when soil temperatures are decreasing (Goode and Russell, 1968; Legler, 1985; Booth, 1998). Eggs laid in early autumn may experience warm temperatures for a month or two before soil temperature drops below 20°C, eggs laid in winter experience cool soil temperatures immediately, and eggs laid in rare late season nests experience warm temperatures (>20°C) throughout incubation (Booth, 1998). Embryos of C. expansa normally experience two periods of developmental diapause during ontogeny (Booth, 2000). The first is a preovipositional diapause (primary diapause) termed “extension of preovipositional arrest” by Ewert and Wilson (1996) that is common to all turtles (Ewert 1985, 1991), and in C. expansa this may extend for up to six weeks after oviposition (Booth, 2000). Once primary diapause is broken and the white-patch has developed to cover half to three-quarters of the eggshell, embryos invariably enter a second diapause period termed “embryonic diapause” by Ewert and Wilson (1996).

Embryos of C. expansa have an exceptionally long incubation period not only because embryonic development is inherently slow (Goode and Russell, 1968; Legler 1985) but also because embryos enter a second-