HIGH-PRECISION AGES FOR MESOZOIC FOSSIL-RICH FORMATIONS IN EAST ASIA

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In recent years abundant and well-preserved fossils have been discovered from Jurassic and Cretaceous formations in East Asia. For example, the freshwater and terrestrial Jehol Biota, defined as the characteristic *Eosestheria-Ephemeropsis-Lycoptera* assemblage, which is widely distributed in China (Grabau, 1928; Gu, 1962; Chen, 1988; Chen and Jin, 1999; Chang et al, 2003; Zhou et al., 2003). Discovery of a feathered dinosaur in Sihetun village, Beipiao City, Liaoning, NE China has led to intense exploration efforts, and the fossils of the Jehol Biota are now known to include a diverse assemblage of plants, insects, frogs, salamanders, dinosaurs, pterosaurs, choristoderes, birds, mammals and freshwater invertebrates. These fossils often preserve articulated skeletons, and soft tissues including skin, feathers, claw sheaths, and even color patterns and stomach contents (Chen et al., 1998; Ji et al., 1998; Gao et al., 2000; Currie and Chen, 2001; Xu et al., 2001; Norell and Xu, 2005; Zhang et al., 2010). Because of the exceptional preservation of the fossils therein, the Jehol Biota is regarded as one of the most important Mesozoic Lagerstätten (Zhou and Wang, 2010), rivaling well established other Lagerstätten such as those at Solnhofen and Posidonia from the Jurassic of Europe (Fursich et al., 2007). Terrestrial vertebrate fossils and plants continue to be discovered from the Gyeongsang Supergroup in the southern part of the Korean Peninsula, since the first discovery of dinosaur eggshell fragments there in 1972. Documented fossils include dinosaurs (Lee et al., 1997; Park et al., 2000; Lim et al., 2001; Kim et al., 2005; Lee, 2007; Lee and Lee, 2007; Lee, 2008) and other vertebrate remains such as pterosaurs (Yun and Yang, 2001; Lim et al., 2002), crocodilians (Yun et al., 2004; Lee and Lee, 2005), turtles (Lee et al., 2009) and fish (Lee, 1999). Fossils have been found in quarries, road cuts, stream beds and coastal outcrops mostly as a result of individual surveys (Lee et al., 2001). Although most fossils are yet to be well studied, and only certain fossil occurrences have been published in western journals, the Gyeongsang Supergroup sample has great potential for substantially increasing our knowledge of

Cretaceous terrestrial ecosystems and paleogeography in East Asia. In addition to body fossils, abundant ichnofossils such as those tracks created by dinosaurs, birds and pterosaurs have been found from these formations (Yang, 1982; Lee et al., 2001; Lee et al., 2002; Huh et al., 2003; Houck and Lockley, 2006; Lockley et al., 2006; Lee et al. 2008). Well preserved and extensive vertebrate ichnofaunas from the Gyeongsang Supergroup represent the largest concentration of Cretaceous vertebrate track sites reported from the Asian continent (Lockley et al., 2006). Furthermore, Lockley et al. (2006) pointed out that the stratigraphic frequency of track-bearing levels is greater than that reported for any other region in Asia, and the diversity and abundance of named bird tracks is greater than for any other region. In fact, the Gyeongsang Supergroup rivals long-established known sites such as the Glen Rose Formation of Texas (Pittman, 1989; Pittman and Lockley, 1994) and the Dakota Group of Colorado and New Mexico (Lockley, 1987; Lockley and Hunt, 1994a, b, 1995) in North America. In this study, I aim to establish high-precision and high-resolution ages for the fossil-rich formations in East Asia. Reliable radioisotopic age determinations for these fossil-bearing formations will allow us to calibrate the evolutionary rates for several groups and improve our understanding of the Mesozoic world in general.