

## A Reassessment of *Sinornis santensis* and *Cathayornis yandica* (Aves: Enantiornithes)

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**ABSTRACT.** The taxonomy of the first two enantiornithine birds named from the Early Cretaceous of China, *Cathayornis yandica* and *Sinornis santensis*, has remained controversial despite the relative completeness of both holotype specimens. This is because *C. yandica* is regarded as a junior synonym of *S. santensis* by some researchers, and as a distinct taxon by others. This question is revisited in this paper; in order to determine the validity of *C. yandica*, we conduct a detailed morphological review of both holotype specimens. Despite proposed synonymy we argue that there are clear and distinct anatomical differences between the two taxa; indeed our morphological observations demonstrate that the two birds constitute valid and distinct branches in the diverse enantiornithine evolutionary radiation. Of course, and like many other groups of fossil vertebrates, the diverse Cretaceous bird lineage Enantiornithes requires taxonomic revision yet in the case of *C. yandica* and *S. santensis* we attribute much of the confusion to: (1) incomplete specimens being designated as holotypes, and (2) the absence of clear morphological character-based taxon diagnoses founded on rigorous anatomical comparisons.

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Enantiornithes are the most diverse known lineage of Mesozoic birds (Chiappe, 2002; Chiappe & Dyke, 2007; Dyke & Nudds, 2009) with over 60 species named, and in China dozens, if not hundreds, of undescribed specimens (O'Connor, 2009). However, despite this apparent diversity, the taxonomy of Enantiornithes remains largely unreviewed and at least a third of named species are based upon extremely fragmentary, sometimes non-overlapping, fossil material (Table 1) (for example, six named species from the Cretaceous of Uzbekistan are based on coracoid fragments; Panteleyev, 1998) (see O'Connor, 2009). While revisions have been limited, several taxa have nevertheless been

questioned and re-evaluated: *Nanantius valifanovi* has been synonymized under *Gobipteryx minuta* (Chiappe *et al.*, 2001); *Cathayornis yandica* under *Sinornis santensis* (Serenó *et al.*, 2002); *Liaoxiornis delicatus* and *Lingyuanornis parvus* have been considered Euenantiornithes indeterminate (Chiappe *et al.*, 2007); and *Aberratiodontus gui* has been synonymized under *Yanornis martini* (Zhou *et al.*, 2008a). Of these revisions to the taxonomy of Enantiornithes, most have passed largely unquestioned into subsequent literature with the exception of the proposed synonymy of *Cathayornis yandica* and *Sinornis santensis*, in which there is no consensus (cf. Li *et al.*, 2006; Chiappe *et al.*, 2007; Cau

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