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Letters

Old morphologies misinterpreted

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Contrary to Galis *et al.* [1], the reduction of digit V in the hand of early theropods is well documented. The earliest theropods include *Eoraptor* and *Herrerasaurus*, both with well preserved hands. Recent phylogenetic analyses with these taxa clearly support their position as basal theropod dinosaurs that are successive sister taxa to the Neotheropoda; the clade comprising 'ceratosaurs' and all other theropods, including birds [2]. These phylogenetic arrangements clearly imply that theropod dinosaurs reduced digits IV and V, and that digit V was the first to be completely lost. These hypotheses of digit reduction are further supported in the shared morphologies, including phalangeal numbers, present in the first three digits of *Herrerasaurus* and neotheropods [1].

Galis *et al.*'s argument that *Herrerasaurus* cannot represent the basal neotheropodan condition because ceratosaurs have a larger digit IV is mute. Not only could *Herrerasaurus* have independently reduced this digit along it's own lineage, but also, upon closer examination, we believe that the degree of digit IV reduction in *Herrerasaurus* is quite similar to that of basal ceratosaurs, such as *Coelophysis* and *Dilophosaurus*, which also have a reduced slender metacarpal with a single reduced phalanx held within the palm of the hand. This degree of similarity, and the shared morphologies mentioned above, strengthen the position that digits I–III of neotheropods share the identities of digits I–III of the pentadactyl theropods, *Eoraptor* and *Herrerasaurus*.

The controversy of digit identity and development in bird wings reveals more and more evidence for a possible homeotic transformation of digital identity. Although homeotic transformations can be produced in laboratory experiments, Galis *et al.* are right in questioning the proposed mechanism in an evolutionary context. However, questioning the validity of a hypothesis about an historical event because of implausible mechanisms can be fallacious. For instance, objections against evolution or against continental drift were misleading if solely based on doubting the mechanisms. The validity of an historical hypothesis, such as digital identity frame shift, is independent of its mechanistic plausibility; implausible mechanisms of an hypothesized event often only reflect our limited understanding.

References

1 Galis, F. *et al.* (2002) An old controversy solved: bird embryos have five fingers *Trends Ecol. Evol.* S0169-5347(02)00018-6

2 Sereno, P.C. (1999) The evolution of dinosaurs. *Science* 284, 2137–2147

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