ML method supports the true tree only for the group of nonconservative proteins but not for the group of conservative proteins. This would not be a good property. It is more reasonable to argue that tree III is the true tree and the ML method supports this tree for the group of conservative proteins.

In conclusion, there is actually no conflict between the result of Hasegawa *et al.* and ours, because when the more divergent sequences are excluded their analysis also supports our hypothesis. But as we have noted[1], more sequence data are required to resolve whether rodents are polyphyletic or whether our analysis represents a dramatic example that unequal rates of evolution can consistently mislead parsimony inference.

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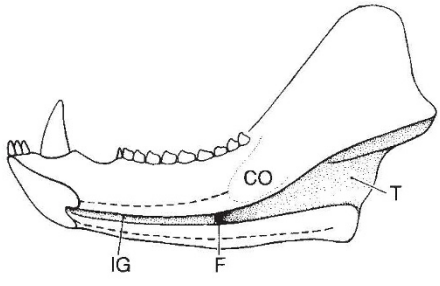
No Palaeocene 'mammal-like reptile'

SIR — Fox *et al.*[1] believe that a tooth-bearing fragment of a dentary and four isolated teeth of a distinctive new taxon, *Chronoperates paradoxus*, from the Palaeocene of Alberta, Canada, extend the record of 'mammal-like reptiles' (or, properly speaking, nonmammalian synapsids) by some 100 million years. A review of the anatomical evidence at hand does not bear out their remarkable claim.

Fox *et al.* enumerate four features in support of their interpretation of *Chronoperates* as a nonmammalian cynodont: (1) single-rooted lower postcanines with transversely narrow, multiple-cusped crowns lacking cingula; (2) presence of pseudoprismatic enamel; (3) retention of postdentary bones including a splenial; (4) small masseteric fossa.

First, it should be pointed out that the postcanine teeth are, in fact, quite distinct from those of derived Triassic nonmammalian cynodonts such as *Microconodon* mentioned by Fox *et al.* In *Microconodon*[2,3] and the closely related *Pseudotriconodon*[4], the multiple-cusped postcanines typically have at least incipiently divided roots. Furthermore, these teeth have anteroposteriorly aligned, rather than obtusely angled, cusps, and lack the peculiar interlocking of crowns found in *Chronoperates* (and similarly in various mammalian taxa). The derived absence of cingula is a character of doubtful phylogenetic significance[4]; cingula are also absent or at best slightly developed in the early Jurassic *Sinoconodon*, which is considered the most primitive known mammal by many authors[5,6].



Dentary of the derived nonmammalian cynodont *Diademodon* (based on ref. 12) in lingual view to show the trough for the postdentary bones (T), posterior foramen for the mandibular canal (F) and articular facets ('scars') for the splenial (broken lines) and coronoid (CO). Note forward continuation of the trough as internal groove (IG).

Second, the phylogenetic significance of pseudoprismatic ultrastructure of the enamel has been the subject of continuing debate. Recent work indicates that most Mesozoic mammals (or mammaliaforms) have pseudoprismatic or 'preprismatic' enamel[7].

Third, the alleged 'posteromedial trough' is rather different from the trough for the postdentary bones (articular, prearticular, surangular, angular) on the dentaries of nonmammalian cynodonts (see figure) and primitive mammals and is more likely to represent the posterior entrance of the mandibular canal. Significantly, *Chronoperates* lacks the internal mandibular groove for the more anterior portion of Meckel's cartilage (the posterior portion being represented by the articular bone) found in nonmammalian cynodonts and primitive mammals[8]. The 'scar for splenial and prearticular' is quite unlike the corresponding features on the lingual surface of the dentaries of nonmammalian cynodonts (see figure). There is no feature on any known dentaries of undoubted nonmammalian cynodonts that can be homologized with the 'hook-shaped depression' (which might be a preservational artefact).

Finally, the full extent of the masseteric fossa cannot be determined on the holotype of *C. paradoxus* owing to the fragmentary condition of the coronoid process, but the masseteric fossa in all advanced nonmammalian cynodonts is as extensive as in mammals[9].

The fossils currently available do not justify classification of *Chronoperates* as a nonmammalian cynodont and the resultant range extension of about 100 million years for nonmammalian synapsids. *Chronoperates* shares no clearly derived characters with any known taxon of nonmammalian cynodonts[5,10], and Novacek[11] noted that the dental differences between this form and symmetrodont mammals are rather subtle. There is a clear need for more complete cranial material to determine the precise affinities of this interesting new taxon.

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