sedimentary rocks of the Gulf Coastal Plain from Texas to Georgia[8–10]. Some of these tuffs and tuffaceous sedimentary rocks are similar in composition to the North American tektites[8] and are the probable target rocks from which the North American tektites were derived by a terrestrial impact. Thus, the terrestrial impact mechanism proposed by Urey[11] and others for faunal extinctions and major breaks in the geological record also should be considered, particularly in view of the recent work by Alvarez *et al.*[12] which supports this possibility.

If there ever were rings around the Earth, it is certain that the North American tektites (or any of the other presently known tektites) were never a cosmically derived fraction of those rings.

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O'KEEFE REPLIES—The present issue is whether tektites are cosmic or terrestrial in origin. The main point[1,2] is that the terrestrial hypothesis is found to conflict with the laws of physics, and these arguments have not been answered. Two examples are given below.

First, tektites are good glasses; that is, even in decimetre-sized pieces they are homogeneous and non-porous, unlike impact glasses. The production by meteorite impact (and immediate distribution over distances of thousands of kilometres) of good glass having very low water content, starting from ordinary rocks or soil, is not possible. The diffusion coefficients are too small to permit rapid homogenization[3], and the bubbles will not escape in free flight because they have no buoyancy.

Second, many tektites were obviously shaped by surface tension. Certain hollow tektites, when liquid, were so delicate that a breath (literally) would have destroyed them[1]. But the terrestrial origin idea demands non-isotropic launch pressures of over half a million atmospheres (50 GPa), followed by entrainment in air behind a shock wave capable, as a minimum, of blowing out the top of the atmosphere[4].

As regards King's first difficulty, lunar quartz monzonites and rhyodacites having tektitic major-element composition have been reported[5–7].

On his second difficulty, note that terrestrial obsidians are also largely confined to the Cenozoic[8], and further that although most lunar basalts are more than 3,000 Myr in age, others[9] are distributed over younger ages.

The remaining two difficulties and the conclusion are invalidated by the fact, which I had mentioned, that the (dominant) solar Poynting–Robertson effect seems to move the particles outward.

I have discussed elsewhere[2,10] the detailed chemical arguments in King's references, and my discussion of them has not been answered. Those arguments are, in any case, merely appeals to plausibility, which should not persuade us to accept violations of physical law.

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Proposed fossil tree shrew genus *Palaeotupaia*

CHOPRA and Vasishat[1] described a skull fragment with partial dentition of a fossil tree shew (family Tupaiidae) from Miocene Siwalik deposits in India. Together with a maxillary fragment and an isolated lower molar from the same locality[2], and some incomplete craniodental remains from the Miocene Siwaliks of Pakistan[3], these specimens provide the first documentation of the fossil history of tree shrews. No generic or specific allocation was attempted for the Pakistani fossils or for the maxillary and isolated dental remains from India.

In contrast, Chopra and Vasishat[1] assigned their skull fragment to the new genus and species *Palaeotupaia sivalicus.* Although acknowledging that *Palaeotupaia* closely resembles *Tupaia,* they asserted that generic distinction was warranted because of "morphological differences and the large age gap between our specimens and the living genus". However, their only discussion of differences between the two genera was limited to enumerating several cranial and dental traits that distinguish between *Palaeotupaia* and *Tupaia minor.* All the supposed differences of *Palaeotupaia* (proportionately longer face, less posterior incisive foramina, distinct protocone on P^3, more transverse P^4, and divided mesostyles on upper molars) occur in some species of *Tupaia*[4–6]. No assessment was presented of the possible primitive or derived nature of resemblances among Siwalik fossils and extant tupaiids. Few, if any, dental traits of *Tupaia* are uniquely derived within the subfamily Tupaiinae. Although at least two derived cranial features (posterior palatal vacuities and enlarged zygomatic foramen) distinguish *Tupaia* and *Lyonogale* from other tupaiines[6,7], these regions are unfortunately missing from both the Indian and Pakistani fossil skull fragments. Finally, the geological age of the Indian skull fragment is not a biological attribute and is irrelevant in evaluating its possible generic affinities. There are several extant eutherian genera whose geological history extends back to the Miocene or earlier, including the chiropteran genera *Rhinolophus, Hipposideros, Megaderma,* and *Myotis*[8].

Because no essential differences in craniodental morphology which might serve to distinguish between *Tupaia* and *Palaeotupaia* were identified, it is premature to propose generic distinction for the Indian Siwalik skull fragment. Instead, the evolutionary relationship of this fossil can be expressed best by either including it questionably in the genus *Tupaia,* or, perhaps more appropriately, by stressing its essentially modern aspect while withholding generic allocation until more complete specimens are recovered, or the holotype of *Palaeotupaia* is studied more thoroughly.

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