FORUM

Polonium Halos

I welcome York's contribution [York, 1979] to the exchange of views concerning the possible existence and potential cosmological implications of polonium halos in Precambrian granites [*Damon,* 1979; *Gentry,* 1979], but I must take exception to some omissions from his comments about my results on Po halos.

York seems to regard even the existence of Po halos as only tentative. But notwithstanding the uncertainties, his article leans heavily toward the proposition that Po halos do exist, at least in micas. York's thesis is that Po halos are most probably explainable within the accepted framework because the interlocking nature of various radiometric dating techniques provides powerful evidence that conventional geochronoiogy is correct. York faults me for ignoring this internal consistency. Contrary to his understanding. I do not ignore these data. But neither do I accept the idea that the presumed agreement between techniques is really coercive evidence for the correctness of the uniformitarian assumption which undergirds the present model. There was no discussion of the ^{238}U-^{206}Pb ratios [*Gentry* etal., 1976], which raise significant questions about the accepted geochronological scheme.

While I can appreciate York's desire to emphasize internal consistency, it should be evident that irrespective of how much data has been or yet can be fitted into the present model, the question of its ultimate reliability hinges on whether there exist any observations which falsify the theory.

Given the presumption that polonium halos exist, York considers Henderson's hypothesis [*Henderson,* 1939] quite reasonable, i.e., that Po halos in micas formed from selective accumulation of U-daughter Po atoms that had slowly migrated away from the source of uranium. Here York takes me to task for presuming to question Henderson's hypothesis. However, when he states that my observations (on mica halos) 'do nothing to detract from Henderson's theory of their mode of origin,' he did not mention either the original report [*Gentry,* 1968] or the subsequent review article [*Gentry,* 1973] in which I discussed my lengthy but unsuccessful efforts to confirm Henderson's hypothesis for Po halos in micas by using a-recoil techniques.

York's surprise that I would accept Henderson's hypothesis for Po halos in coalified wood [*Gentry etal.,* 1976] but reject this explanation for mica because of the slowness of solid state diffusion suggests first that the same type of Po halos has been found in both substances and second that my only objection to accepting Henderson's hypothesis in mica was the slowness of solid state diffusion. Here some very important data has been glossed over.

Mica contains three types of Po halos, but coalified wood only one. Much evidence suggests the ^{210}Po halos in coalified wood formed from selective accumulation of ^{210}Po and ^{210}Pb, which have half-lives sufficiently long (138 days and 22 years, respectively) to have migrated to the radiocenters before serious loss occurred from decay. Likewise, the relatively short half-lives of ^{214}Pb and ^{218}Po (27 minutes and 3 minutes, respectively) mean these nuclides generally decayed away before reaching the accumulation sites, which explains the absence of ^{214}Po and ^{218}Po halos. Thus the crucial question is: If Henderson's model results in only ^{2l0}Po halos being formed under ideal conditions of rapid transport (plus an abundant supply) of U-derived Po atoms, then how can this model account for all three Po halo types in mica, where both the U content and the transport rate are considerably tower? Indeed, the close proximity in clear mica (i.e., without any conduits) of two or more types of Po halos presents what may be incontrovertible evidence against explaining these halos by Henderson's hypothesis [Feather, 1 978].

Finally, York failed to mention that my hypothesis that Po halos in Precambrian granites are primordial [*Gentry,* 1974] could in theory be falsified (and Feather's objections negated) by the experimental synthesis of a biotite crystal that contained at least two dissimilar Po halos in close proximity *[Gentry,* 1979].

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