TEKTITE RESEARCH: WHAT IS NEEDED. J. A. O'Keefe, Laboratory for Astronomy and Solar Physics. NASA Goddard, Greenbelt, MD, 20771

1) The clay at the Cretaceous Tertiary boundary appears to result from the alteration of microtektites of the high-magnesium family (1). If so, then, as Smit (2) remarks, the clay is the remnant of the greatest (by far) of all tektite strewn fields. It would be very helpful to find a few unaltered microtektites in this clay. Varekamp and Thomas (3) found four spherules of the proper composition but did not determine whether they were glass.

2) Lunar sample 14425 resembles in composition the microtektites with very high magnesium (4). It will be of great interest to know how far the resemblance of tektitic material goes. Dating, trace-element studies, water content, and isotopic data are needed.

3) A search should be made in the lunar soil for other glass pieces having compositions resembling tektites. In addition, homogeneous glass spherules of high silica content are interesting if they appear to belong to compositional groups. As Glass (5) has pointed out, the groupings suggest the presence of lunar volcanoes erupting high-silica glass. He was, however, unable at that time to follow up with measures of the trace elements and the age; these are now needed.

4) The fabric of Muong Nong-type tektites should be studied, Some of these tektites consist of thin layers of varying composition. It is important to know whether the individual layers are homogeneous. If tektites are a kind of lunar welded tuff, then the alternation of the layers may be due to variation in the composition of the ash emitted from the volcano. In this case, each layer is likely to be homogeneous. Terrestrial thin-bedded ash deposits are not usually welded because they fell through cold air; but in the lunar case the air is missing, and even thin ash layers can perhaps be deposited hot, and hence weld. On the other hand, if tektites are impact glasses from terrestrial sediments, then it is hard to see how they could be homogenized in the directions parallel to the layering, but inhomogeneous in the direction perpendicular to the layering.

5) The siderophile element sequence in Darwin Glass should be studied. The nickel content varies widely from specimen to specimen. If this is the result of meteoritic contamination, then the whole siderophile element sequence should be meteoritic. In the very similar Aouelloul glass, the sequence is not meteoritic (6). If it is not meteoritic, then the Darwin Glass probably cannot be derived from the local rocks.

6) A study of the Bosumtwi crater rocks and glass, and of the Ivory Coast tetites is needed, as thorough as that done by E. Luft at the

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Ries (7) or by Florensky and Dabizha at Zhamanshin (8). At Zhamanshin the evidence indicates the presence of various kinds of impact glass, each relatable to some local rock, plus some tektites which are not relatable to local rock. The evidence could be understood if Zhamanshin had resulted from the fall of a large piece of tektite glass. Could it be that at Bosumtwi a similar explanation would work? There are at least 4 kinds of glass at Bosumtwi; are all relatable to the local rock? Is any one of them homogeneous? At least one of them shows a siderophile element sequence like a tektite (6); do all do so? In particular the lead isotopes should be studied. The Bosumtwi country rock is 2 billion years old, whereas most tektites yiled modern lead. It should be possible to distinguish the two cases, The older study by Wampler et al (9) did not include ^{204}Pb, and was indecisive.

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