by *GBR* was normal. We believe that the National Bureau of Standards records also show no unusual occurrences.

As we are separated from Salisbury by about 3,200 km and as the National Bureau of Standards, Boulder, records were not affected, then presumably there is a powerful transmitter besides *GBR* able to operate on 16 kc/s relatively close to Australia and New Zealand.

This conclusion could be modified if the receiving aerials at the National Bureau of Standards are directional.

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GEOPHYSICS

Radiogenic and Atmospheric Argon Content of Tektites

IN previous publications it has been shown that tektites can be dated by the potassium/argon method[1-3]. The potassium/argon ages give the time of their formation and also show which tektite localities belong together. It has been found that tektites from North America, the moldavites and tektites from Indo-China, Indonesia and from Australia form three independent strewn fields. The size of the strewn fields is of crucial interest to all hypotheses concerned with the origin of tektites. Therefore, these experiments have been extended with improved techniques and with a larger variety of samples. The results are given in Table 1.

Table 1. AVERAGE POTASSIUM/ARGON AGES OF THE 4 DIFFERENT TEKTITE STREWN FIELDS

Locality	Age (10^6y)
Georgia	34·0
Texas	34·2
Martha's Vineyard	33·7
Moldavites (results of 8 different localities)	14·6
Indo-China, Billiton, Java, Borneo and the Philippines (results of 12 specimens)	0·71
Australites (6 widespread localities)	0·72
Ivory Coast	1·3

Six specimens from different localities of Texas, two specimens from Georgia, and a fragment of the recently discovered Martha's Vineyard tektite gave the same age of $34·2 \pm 2 \times 10^6$ y. The Texas tektites are found in the Jackson formation, which is late Eocene. The agreement with the potassium/argon age is quite good. The stratigraphy of the Georgia and Martha's Vineyard tektites is not well established. From the close agreement of the potassium/argon ages, one has to conclude that all North American tektites belong to one event.

Eight moldavites from different localities gave a potassium/argon age of $14·6 \pm 0·9 \times 10^6$ y. They form a distinctly different group. Their potassium/argon age is in reasonable agreement with their stratigraphic age, which is thought to be late Miocene.

Twelve samples from Indo-China and Indonesia, and six samples from Australia have been investigated. Although previously only one australite has been analysed, it was already indicated that all these tektites belong to one strewn field. For these reasons, more australites from widely spread locations throughout Australia have been selected. For all these specimens an age $0·72 \pm 0·6 \times 10^6$ y has been found, and, within the errors, no difference in the potassium/argon age of Indo-China, Indonesia, and Australia can be observed. This result has important consequences. While the tektite sites from Indo-China and Indonesia are thought to be of Middle Pleistocene age and agree within the uncertainties of the time scale with the potassium/argon ages, there seems to exist a discrepancy for the Australian tektites. Although no definite stratigraphic age exists for these finds, some authors believe that they can be only a few thousand years old[4,5]. Some of them were found 5 m deep in the clay drift of an old river course; others were lying at the surface and in recent soils. The fact that older material can always be transported in younger deposits makes an estimate of the age difficult. An underestimation of the age seems to be likely. It is suggested, instead, that the potassium/argon measurements be considered as a basis for the age discussion, and that confirming geological evidence be sought. There are also relations in the chemical composition among the whole group of these tektites. The aerodynamic structures of australites are no longer an outstanding feature since these structures are also found in samples from Flores, Java, and Billiton.

If the australites were really younger the potassium/argon values could only be understood if the australites were incompletely degassed. It is, however, extremely unlikely that the amount of inherited argon in the australites is exactly the same as the radiogenic argon content of the tektites from Indo-China and Indonesia.

From these results, it may be concluded, therefore, that all tektites from this area belong to a single event. The strewn field is of tremendous dimensions, and reaches 8,000 km from Indo-China to Australia. This fact has to be faced by all hypotheses about the origin of tektites.

Three tektite specimens from the Ivory Coast have also been investigated, and their age has been determined to be $1·3 \times 10^6$ y. These tektite finds have to be considered as a fourth independent strewn field. A comparison with the stratigraphic age is, however, not possible, since more should be known about the geology of their sites.

Table 2. ARGON EXCESS AND GAS PRESSURE IN BUBBLES OF SOME GAS RICH SPECIMENS. THE ISOTOPIC COMPOSITION OF ARGON IS THE SAME AS IN AIR ARGON

Locality	Argon excess ($\times 10^{-8}$ c.c./g)	Gas pressure in bubbles (mm Hg)	$^{40}A/^{36}A$ ratio
Muong Nong	1,040	40	298
Hai Nan	380	—	305
Philippinite	83	1·3	294
Ivory Coast	7·8	—	295
Libyan Desert Glass	290	24	300
Darwin Glass	440	—	305
Atmospheric argon	—	—	296

In addition to the age determinations, bubble-rich specimens have been investigated for excess gases of other than radiogenic origin[6]. These have been found in the Muong Nong tektites, in the Darwin Glass and the Libyan Desert Glass, and also in the Ivory Coast tektites. In these samples the gases are homogeneously distributed. Excess gases have also been found in some philippinites from the Santa Mesa district, which had visible macroscopic bubbles. Nitrogen, argon, krypton and xenon have been measured; their abundance and the isotopic composition of argon are the same as in air. By cracking the samples in the ultra-high vacuum it was found that these gases are mainly included in the bubbles. The pressure in the bubbles, calculated from the amount of gases released and from the deviation of the densities, reaches values up to 40 mm mercury (Table 2). The characteristic value of the $^{40}A/^{36}A$ ratio in air is a conclusive criterion that these gases are of terrestrial origin. Since the gases in most of these samples are homogeneously distributed and the weight of the Muong Nong tektites amounts to kg, the inclusion of the air cannot have occurred through ablation in the atmosphere. The high pressure found in some bubbles also indicates that tektites were molten close to the surface of the Earth. These investigations, therefore, are considered as further support to the hypothesis that the tektite material itself is of terrestrial origin.

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