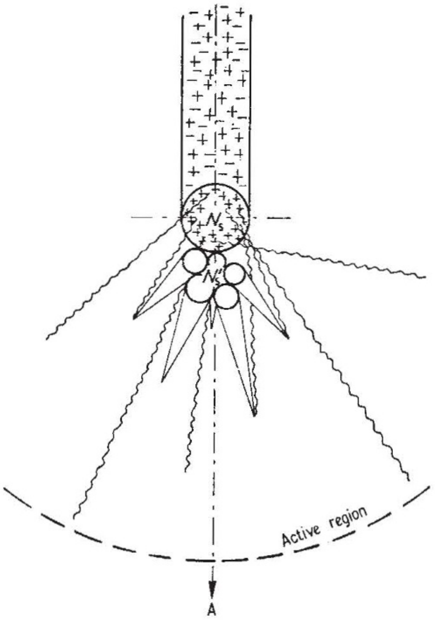
the tip of the avalanche. A streamer ceases to propagate, of course, when the local field in the vicinity of the tip of



The way in which a streamer grows. New ionization phenomena can only take place in the active region. (From *J. Phys. D.*, **5**, 2183 ; 1972.)

the streamer is no longer sufficient to allow further avalanches to form. Gal-limberti's programs yield the length and velocity of the streamer, the current and charge in the external circuit, and the charge in the streamer tip, all as functions of time and for a given arrangement of electrodes.

The accuracy of the calculations can be judged by a comparison between calculation and experiment for an electrode arrangement of a square rod separated from a plane by 150 cm. The applied voltage at the start of streamer formation was 125 kV in this case. It turned out that the computed and measured values for the total streamer lengths were 10.9 and 11.2 cm, and the initial velocities 0.23 and 0.28 cm ns^{-1}.

MICROTEKTITES

Bottle Green Variety

from our Geomagnetism Correspondent

TEKTITES, those strange natural glass bodies with diameters usually of several cm, are apparently limited to four large areas (strewnfields) and four corresponding ages. The Australasian, Ivory Coast, Czechoslovakian and North American strewnfields have approximate ages of 0.7, 1.0, 15.0 and 35.0 million yr, respectively—ages which in some cases are supported by more than one method of dating. The Australasian tektites, for example, have been dated by both K–Ar and fission track methods and are found in a layer coinciding with the Brunhes–Matuyama geomagnetic reversal boundary. Microtektites (diameters <1 mm) are also associated with the two most recent strewnfields, having been found in adjacent deep sea sediment cores. Most of these microtektites ("normal microtektites") are physically and chemically similar to the larger tektites, but a few (0 to 20 per cent in any given core) have significantly different properties. These are the so-called "bottle green microtektites" ; and the fact that they differ from normal microtektites has led several workers, beginning with Martin (at the US Meteorological Society Conference in 1967), to suggest that they are igneous glasses rather than proper tektites.

Martin has been followed in this by several others ; but Glass (*J. Geophys. Res.*, **77**, 7057 ; 1972) has now put paid to the whole idea by showing that although bottle green microtektites differ in some (but not all) respects from the normal variety they differ even more from igneous glasses. For one thing, a search of more than seventy deep sea cores from around the world has shown that bottle green microtektites are found only in cores which contain normal microtektites and, moreover, only in the particular sediment layers containing the normal bodies. On the other hand, the converse is not true—all normal microtektites are not associated with bottle green ones. Thus bottle green microtektites were found in both cores containing Ivory Coast microtektites but in only three of the thirteen corresponding Australasian cores. Even those cores containing normal microtektites but no bottle green microtektites, however, contain yellow-green varieties with physical and chemical properties intermediate between the two. In this sense, the bottle green–normal association is enhanced, and is made even stronger by the coincident ages (because of coincident layering).

Palaeomagnetism and *G. truncatulinoides*

IN next Monday's *Nature Physical Science* (February 19), Theyer shows how palaeomagnetism has been used to invalidate what was once one of palaeontology's most reliable datum planes. The plane in question is defined by the first appearance of the planktonic foraminifer *Globorotalia truncatulinoides* and was taken to mark the onset of the Pleistocene at about 1.8 million yr ago. But if this interpretation were correct, the appearance of *G. truncatulinoides* should lie within the Matuyama reversed geomagnetic polarity epoch, whereas Theyer finds that in the southern hemisphere, south of 36° S, it lies within the earlier Gauss normal epoch.

Theyer's evidence comes from twelve palaeomagnetically dated and six other deep-sea cores from south of Australia and the Tasman Basin. Because radiolarians are the most widely used biostratigraphic correlators with the geomagnetic polarity-time scale, Theyer has used them in conjunction with already available palaeomagnetic measurements to match the cores to the time scale. Having done this, he finds that in ten of the palaeomagnetically dated cores *G. truncatulinoides* either first appears close to the base of the Gauss epoch or is already present towards the end of the epoch. Moreover, it is not possible to attribute the presence of *G. truncatulinoides* in this time period simply to the effects of reworking or contamination, for the populations are strong and, in those cores deposited far enough north to have experienced climatic variations, the abundance of *G. truncatulinoides* fluctuates in phase. Correlations with other planktonic foraminifers also tell the same story.

One of the implications of the appearance of *G. truncatulinoides* some 1.0 to 1.5 million yr before its previously known appearance in lower latitudes is that the supposed evolution of *G. tosaensis* into *G. truncatulinoides* at the Pliocene–Pleistocene boundary cannot be correct. Theyer believes, therefore, that the two are subspecies or even ecological variants which appeared in different areas at roughly the same time. The evidence is that *G. tosaensis* is not found at all in cores from south of 36° S and that others have already reported the appearance of *G. tosaensis* at the base of the Mammoth polarity event in a tropical core.

To put it another way, the suggestion now is that *G. truncatulinoides* and *G. tosaensis* appeared more or less simultaneously, the former at latitudes higher than 36° S and the latter at lower latitudes but probably with a very slight overlap. The latitude separation, in turn, implies environmental (probably climatic) control on the evolution into the two subspecies.

Finally, Theyer's revision has an interesting general consequence. Because the appearance of *G. truncatulinoides* has been regarded as one of the most reliable Neogene foraminiferal datum planes, it has been used in numerous studies involving latitudes higher than 36° S. Presumably, therefore, if Theyer is right, the conclusions drawn in previous studies are wrong and also require revision.