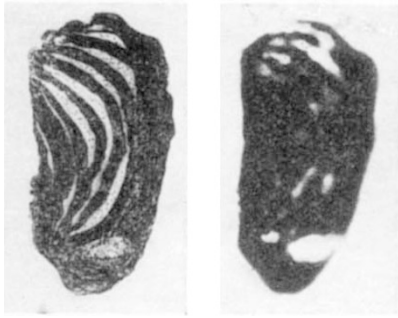

a *b*

Fig. 1. *Schizaea kashmiriensis* sp. nov. *a*, Camera lucida drawing; *b*, photomicrograph (× 400)

and parallel to each other and run along the long axis of the spore. Length, 85·8μ; breadth, 39μ; broad end, 42·9μ; narrow end, 31·2μ (Fig. 1).

From the available knowledge of the morphology of the recent and fossil Schizaeaceae spores, bilateral bean-shaped, striated, monolete spores are met with only in the genus *Schizaea*. No *Schizaea* spores previously described, recent or fossil, from Tertiary or Mesozoic beds[1–10], resemble the spore described here. The new species is named *Schizaea kashmiriensis* sp. nov.

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[1] Bolkhovitina, N. A., in *Catalog of Fossil Spores and Pollen*, Kremp, **10**, 61 (1960).
[2] Bolkhovitina, N. A., *Paleontological J.*, No. 1, Academy of Science, U.S.S.R. (1959).
[3] Delcourt and Sprumont, in *Catalog of Fossil Spores and Pollen*, Kremp, **4**, 32 (1958).
[4] Miklos Kedves, *Pollen et Spores*, **2**, No. 1 (1960).
[5] Pokrovskaia, I. M., *Annales du Service D'information Geologique du B.R.G.G.M.*, **24** (1958).
[6] Potonié, R., *Beih. Geol. Jahrb. Part.*, **23** (1956).
[7] Ramanujam, C. G. K., *J. Indian Bot. Soc.*, **39**, No. 1 (1960).
[8] Rao, A. R., *Palaeobotanist*, **4** (1955).
[9] Siberian Govt., *Stratigraphy of Mesozoic and Cainozoic of Western Siberian Depression* (Union of Western Siberian Petroleum Technology Trust; Moscow, 1958).
[10] Vishnu Mittre, *Palaeobotanist*, **3**, 117 (1954).

GEOCHEMISTRY

'Impact Contamination' of the Mokoia Carbonaceous Chondrite

In the course of inspection of a specimen of the stone from New Zealand, in the Museum of Paris, a rather unusual yellow chondrule-like grain, 1·7 mm in diameter, was detected on what appeared to be fresh fractured surface, some 23 mm from the nearest visible crust on the specimen. On closer examination the grain proved to consist of resinous material soluble in ether, and with volatiles of 92·7 per cent; 4·1 per cent fixed carbon and 3·2 per cent ash. The terrestrial origin of this blob of resin is supported by the ample fragments of wood, spores, Radiolaria, and other typical micro-fossils.

The foregoing observation indicates that in the course of the impact of a given meteorite, foreign bodies can penetrate to considerable depth, particularly in the case of the porous and soft carbonaceous stones. Beside this physical penetration process, illustrated by this work, distillation of surrounding plant remains could be brought about by the hot stone, and the products may become deeply absorbed as a result of vacuum forming through the cooling-down of the meteorite and condensation of vapours of water, etc., in its pores. I consider that this factor of 'impact contamination' should be investigated in greater detail, in order to assess the value of searches for molecules which are generally believed to be exclusively or almosh exclusively biogenic.

I have found[1] that the Cold Bokkeveldt meteorite contained no optically rotating molecules, within the limit of sensitivity of the equipment used, which was of the order of 1 p.p.m. The same conclusion was reached regarding the Mokoia meteorite[2], with measurements made approximately with the same range of sensitivity. B. Nagy[3], using more refined experimental methods, detected optic rotation in the Orgueil meteorite, and G. W. Hodgson and B. L. Baker[4], utilizing elaborate experimental techniques, found also porphyrins in the same meteorite. Although the actual amounts detected were not mentioned by the foregoing workers it appears to me that they may have been of the order of perhaps 0·01 p.p.m. of the whole stone. One should ask the question whether such data are within the range of terrestrial impact and storage contamination. The fact that, according to the aforementioned authors, the Brudenheim and Peace River non-carbonaceous chondrites proved to contain no porphyrins has relatively little significance on account of the much less porous nature of these stones. The absence of chlorins in Orgueil and old terrestrial carbonaceous sediments, claimed by the authors as evidence for the extra-terrestrial origin of the porphyrins, may be due to the fact that, in the course of distillation of plant matter following the impact, the chlorins would be decomposed by the hot surface crust of the meteorite, and therefore mainly the more resistant porphyrins would penetrate to the deeper zones of the stone.

The foregoing questions could be investigated with a more positive approach through simulation of actual falls of meteorites; silicates of the composition of chondrites could be impregnated with synthetic organic polymers, carefully tested for traces of optically active molecules or porphyrins; afterwards such 'synthetic meteorites' could be ejected from high-flying aircraft or preferably satellites, and the degree of contamination of falls to different types of terrain could be examined. The extent of 'storage and handling contamination' could be also determined on the samples in question.

I consider that we must be on uncertain ground in our search for molecules, which are at present believed to be exclusively living products, until the effects of 'impact' and 'storage' contaminations are experimentally evaluated, unless, among the 20 or so carbonaceous stones hitherto not investigated, one is found which contains the substances in considerably higher concentration than in the Orgueil meteorite.

I thank Prof. J. D. Bernal for his advice and Prof. J. Orcel for providing me with facilities to examine the meteorite collection of the Museum of Paris, and placing material at my disposal for experimental work.

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[1] Mueller, G., *Geochim. Cosmochim. Acta*, **4**, 1 (1953).
[2] Briggs, M. H., and Kitto, B. G., *Nature*, **193**, 1126 (1962).
[3] Nagy, B. (personal communication).
[4] Hodgson, G. W., and Baker, B. L., *Nature*, **202**, 125 (1964).

Depth of Source of Lead

We have recently introduced the idea of the liquid fraction value. As defined elsewhere[1–4], this term indicates the quantitative fraction which a liquid at a certain stage of solidification occupies relative to the amount of initial liquid which for the liquid fraction value is taken as unity. As self-evident from the