Geological Semantics

SIR,—More than fifty years ago, Professor Crum Brown coined the word 'kerogen' (Greek=wax producer) to denote, exclusively, the oil-yielding component of oil shale. Regrettably, 'kerogen' is now being applied to the insoluble organic matter of rocks in general, and its original usefulness appears to be lost. Reference to the early literature shows also that the word 'sporopollenin' was invented to specify another indefinite mixture of insoluble matter; in this case, a major portion of exines. During a recent conference on sporopollenin, it was suggested that the meaning of this term be also widened. A research paper has now suggested that some kerogens can be identified with sporopollenin and this, in turn, may be considered as polymerized carotenoids.

Until a decade ago, one could use the word 'kerogen' with significance, although, as Carlson has stated, "one does not presume to attribute to kerogen itself any certain composition, but recognises that it is made up of a mixture of organic debris in varying proportions". Unfortunately, some contemporary research appears to be based on the imprudent assumption that, in kerogen, a singular molecular genus is involved. This, of course, is not true; kerogen, by any acceptable definition, can never be considered more than a vague mixture of partially lithified organic residuals. Simple microscopic examination will reveal this point.

An undesirable semantic trend is apparent. Initially, 'kerogen' was a term with explicit application but covering obscure organic matter in certain rocks. Today, the interpretation is equivocal but the substance has acquired a chemical identity entirely out of keeping with its actual nature and origin.

Yours faithfully,

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Theories of Electromagnetism

SIR,—The difference between Stopes-Roe (*Nature*, **228**, 193; 1970) and myself (*Nature*, **227**, 935; 1970) is less a question of fact than of what we consider has fundamental importance. We agree that the influence of a surrounding medium on the field of a magnet depends

on the shape of that magnet. We also agree that for the special case of the historically important long thin magnet immersed in a magnetic medium, the Kennelly formulation is correct and the Sommerfeld formulation is incorrect.

The difference seems to be that Stopes-Roe thinks that formulae applying to long thin magnets are still fundamentally important in the theory of electromagnetism while I regard them as applying to a rather trivial special case. The inverse square law for a point pole is still important, however, provided it is not regarded as a real point pole, but as a small element in a distribution of poles. These poles may be distributed over a large surface or even a volume, but provided the distribution of poles is known, H can be calculated both in free space and inside the magnet itself, where it is the self-demagnetizing field. The latter is independent of the permeability of the magnet except in as far as that permeability affects the pole distribution. Alternatively one may use the inverse cube dipole law and the distribution of dipoles, and, of course, in either case the appropriate scalar potentials can be introduced with advantage.

The point is that these formulae predict the field due to a magnet of any shape or size for which the distribution of magnetization is known provided that the magnet is situated in free space. In this integral form these magnetic laws are practically useful and have some claim to be regarded as fundamental laws comparable with Biot-Savart's law for the field due to an element of an electric circuit, the usefulness of which is not that it predicts the field produced by a very small circuit, but can be integrated to predict the field due to any circuit.

Thus the purpose of my letter was to show that the classical laws for H due to small poles or dipoles are of fundamental importance because they can be integrated to give H due to a magnet of any shape or size, but if the relative permeability μ_r of a medium surrounding the magnet is introduced the integration is invalid except for certain special cases such as the long thin magnet.

The only valid solution appears to be to extend the integration to include the poles or dipoles induced in the surrounding medium. It would be premature to write further on this subject at present, and it is unlikely that it could be adequately treated in a short letter.

Yours faithfully,

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Obituaries

M. G. M. Pryor

THE scientific career of Mark Pryor, who died on October 19, 1970, was tantalizingly incomplete. A born naturalist, a more than competent botanist and knowledgeable entomologist, interested particularly in freshwater biology, his contributions to knowledge were mainly on the borderline between biophysics and biochemistry.

After gaining a first class in both parts of the natural sciences tripos at Cambridge, Pryor was a research student under A. D. Imms and produced a thesis which completely revolutionized our conception of the insect cuticle by demonstrating that the dark and horny component, "sclerotin", the nature of which had been a puzzle for a century or more, was essentially protein tanned by quinones generated *in situ* by the enzymic oxidation of diphenols. This theory, of course, was incomplete; we

now know that there are other forms of polymerization going on at the same time; but it is still the basis of our understanding of the arthropod cuticle. Indeed, the same process is widespread, from the egg-shells of helminths to the capsules of skates and dogfish.

Pryor was elected to a fellowship of Trinity College in 1939. On the outbreak of war he promptly enlisted. But it was not long before he was pulled out of the army and transferred to the Timber and Adhesives Division of the Royal Aircraft Establishment at Farnborough, where his deep interest in plastics and polymers had every opportunity to develop. It was here that he conceived a highly original theory of muscle as a heat engine, according to which it was supposed that in the resting state the myosin fibres were closely aligned and stabilized by mutual attraction and that ATP acted as