of its adaptive radiation; these affect shape of incisors, crest pattern on molars and degree of reduction of last molar. Finally, those which show no significant pattern as in the erratic evolution of the third upper pre-molars. Wood has calculated the rates of evolutionary change which at generic level within the paramyids he found to be similar to those of horses, but in some lines much faster.

Regarding classification, relationships and origin of rodents in general and of paramyids in particular, Wood gives a very fair summary of the views of Stehlin and Schaub[2], his chief rivals, though it becomes patently clear to the reader that the two schools are still very distinct. On the evidence made available in this monograph, together with his interpretation of cusp homologies and the significance of parallelisms, Wood's thesis that "the Paramyidae are ancestral to all other known rodents" seems rather more probable than Schaub's view, based on a different interpretation of cusp homologies, which places the ancestry of the rodents farther back in the Palæocene with the paramyids as specialized descendants and the Oligocene squirrels as structurally the most primitive known rodents. Both views and their consequent implications are plausible analyses of the present evidence; only new evidence can produce an approximation nearer the truth. Wood's monograph enables us to ask more questions about rodent evolution; this is the surest way of unravelling the enigma.

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[1] Matthew, W. D., *Bull. Amer. Mus. Nat. Hist.*, **28**, 43 (1910).
[2] Stehlin, H. G., and Schaub, S., *Schweiz. palaont. Abh.*, **67**, 1 (1951).

A SUGGESTED RECONSTRUCTION OF THE LAND MASSES OF THE EARTH AS A COMPLETE CRUST

WEGENER'S theory of continental drift is by no means universally accepted by geophysicists[1]. However, as Carey[2] has pointed out, the degree of congruence between Africa and South America, compared at the 2,000-m. isobath, is so great that pure chance can scarcely be the explanation for the fit. Moreover, this theory satisfactorily accounts for the fact that the Earth's granite is collected in the continents, the remaining three-quarters of the Earth's surface, forming the ocean bed, almost certainly consisting of basalt.

An alternative hypothesis is that the Earth was formerly much smaller and was covered by a complete crust of granite, subsequent expansion causing the splitting of the crust and the filling of the cracks by upward movement of the underlying molten basalt. If this hypothesis were valid it would be possible to fit together the outlines of the continents on a small globe, thus representing the Earth in its early state. I attempted to do so before becoming aware of the evidence adduced by Egyed[3] and Heezen[4] that this type of expansion may in fact have occurred, and the outcome provides collateral evidence in support of their views.

It was estimated that the representation of the continents, together with the continental shelf extending to the 1,000-fathom isobath, on a globe 4½ in. in diameter, had a total area which corresponded to somewhat less than the surface area of a 3-in. sphere. The outline of each continent was transferred from such a globe to thin sheets of rubber and cut out. The separate pieces of rubber were then placed on a wooden ball 3 in. in diameter and their outlines marked on the wood, to represent the appearance of the Earth soon after the hypothetical splitting of the crust. Despite the crude method used, the land masses fitted together reasonably well, though there was some distortion of certain regions and there was a triangular gap in the North Atlantic ocean (Fig. 1). It is to be noted that post-palæozoic geology need not be identical in masses which would appear to have been adjacent, as the movements envisaged possibly originated at a much earlier phase. It is difficult to

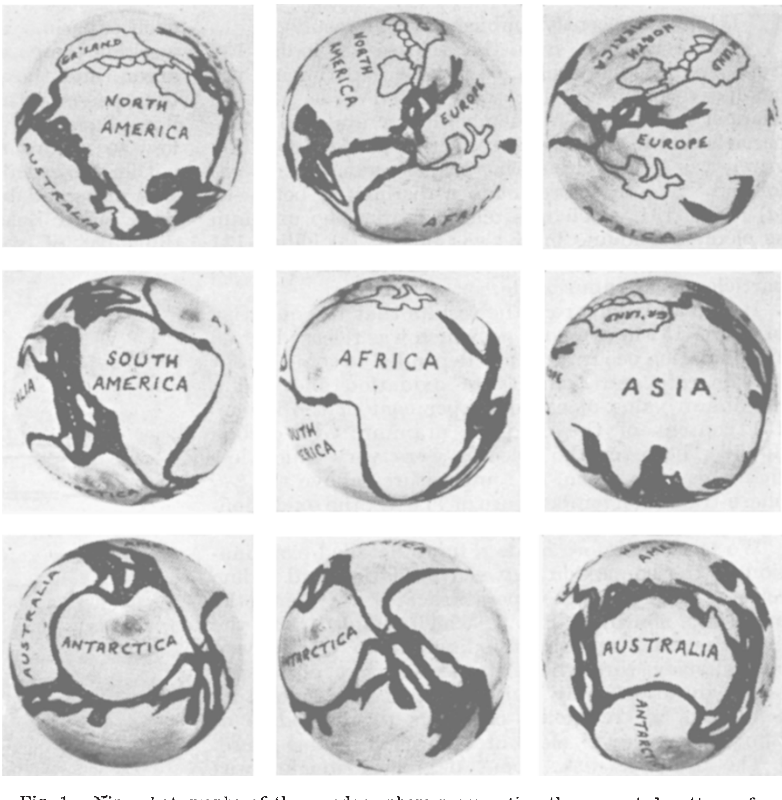

Fig. 1. Nine photographs of the wooden sphere representing the suggested pattern of the continents soon after splitting of the crust

believe that chance alone can explain this fitting together of the continental margins.

I thank Mr. P. S. B. Digby for helpful advice.

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[1] Jeffreys, H., *The Earth*, fourth ed. (Cambridge University Press, 1959).
[2] Carey, S. W., *Geol. Mag.*, **92**, 196 (1955).
[3] Egyed, L., *Geol. Rdsch.*, **46**, 101 (1957); **50**, 251 (1960); *Geophysica, Helsinki*, **7**, 13 (1959).
[4] Heezen, B. C., *Sci. Amer.*, **203**, 98 (1960).

It is interesting to see what sort of fit can be produced in accordance with Egyed's ideas. It is better than I should have expected, and will probably give rise to much discussion. Apart from the problem of explaining how the Earth's volume can have increased three-fold, it will probably take some time for structural geologists, palæontologists, meteorologists and magneticians to agree about whether the separation of the land masses occurred soon after the formation of the Earth, in the Palæozoic, or at the end of the Cretaceous.

However, it should be pointed out that areas on a 4½-in. sphere cannot be placed on a 3-in. one without distortion; the rubber must have been stretched, and the quality of the fit must depend on the distribution of the stretching. I cannot, therefore, accept the suggestion that the only alternative to the reconstruction is chance.

I pointed out in the 1929 edition of *The Earth* that Wegener's alleged fit of South America into Africa is a misfit by about 15°. This is obvious on inspection of a globe. The east coast of South America is close to a pair of great circles meeting at 90°; Africa from Liberia to the Cape near a pair meeting at 105°–110°. Nevertheless, drawings have been published until recently showing a good fit. This cannot be produced without considerable distortion, which has disappeared in Barnett's reconstruction owing to the extra curvature downwards in fitting to the smaller sphere.

Dr. Barnett is wrong in claiming that Wegener was the first to explain the differences between continents and oceans. The notion of a light upper layer was due to Airy, based on deflexions of the plumb-line in India, and was extended to the difference between continents and oceans by Suess.

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RELEASE OF IODINE-131 FROM IRRADIATED URANIUM OXIDIZING IN AIR AND IN CARBON DIOXIDE

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We have recently published[1] the results of an investigation into the release of iodine-131 from irradiated uranium. In those experiments the irradiated uranium slug was heated in a vertical channel by a radio-frequency heater and the oxide particles were removed from the heated zone by gravity, or by the circulating gas, as soon as they were formed. We therefore made a distinction between: (*a*) iodine-131 which was released from the uranium as elemental iodine in the gas phase; (*b*) iodine-131 which was released contained in or adsorbed on particles of uranium oxide.

It was apparent from the results that the quantity of iodine-131 in category (*a*) which was released when the oxidation occurred in air, depended to some extent on the rate and quantity of oxidation and had a maximum value of about 30 per cent of the iodine-131 content of the oxidized uranium. In carbon dioxide, however the releases were very much less than this even when, at temperatures above the β–γ phase-transition temperature of 771° C., the oxidation-rates were much greater than in air.

We have therefore made a more detailed examination of the connexion between oxidation and iodine release, at a single temperature 800° C., using the apparatus shown in Fig. 1, which enabled both the oxidation and release of iodine-131 to be followed continuously throughout an experiment of several hours duration. By suitable choice of operating conditions we restricted ourselves to the iodine of category (*a*), that is, elemental iodine in the gas phase.

The uranium disk, about 6 gm. in weight, was supported in a platinum crucible which was suspended in the furnace at *A* from one arm of a balance. In each experiment the uranium was brought up to the working temperature of 800° C. in an atmosphere of argon, and the preheated air or carbon dioxide was then passed in at the top of the reaction vessel. The flow of gas used was 0·2 l./min., which was sufficiently low to ensure the retention of the oxide particles within the crucible. The temperature of the uranium was measured by means of a thermocouple inserted in a small hole drilled in the uranium disk, the difficulty of weighing the specimen continuously

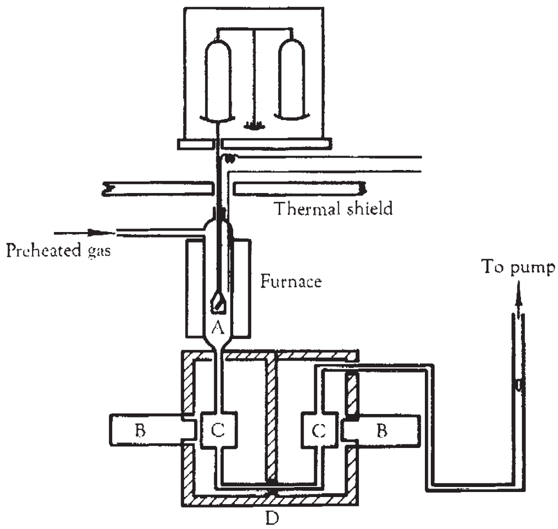

Fig. 1. Experimental arrangement. *A*, irradiated uranium disk; *B*, γ-counters; *C*, iodine samplers; *D*, lead shield