by its distinguished author, though the supplementary treatment was far from convincing.

This general subject was discussed at some length by the undersigned in a paper on "A Geometric Basis for Physical and Organic Phenomena" which was printed in SCIENCE for October 11, 1918. The same was afterwards privately reprinted under a general title, "Fundamentals of the Cosmos," with an addendum in which was outlined a still farther simplification of the basic principle referred to. This may be concisely formulated as follows: *In an aggregate of an indefinite number of points with equal intervals between neighboring points throughout, a grouping that will give both complete symmetry and maximum concentration or minimum total space occupied is impossible.* Herein is to be sought the key to the apparently anomalous or irregular forms which Mr. Lewis finds. His observations of the actual shapes of organic cells found in nature are exceedingly interesting and significant, but the conclusion he suggests that "cells in masses are typically tetrakaidecahedral" should, I think, be understood as meaning that this is a form to which natural organic cells often approximate; not one which they will ever be found actually to attain in groups or aggregates.

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THE BIG STONE GAP SHALE OF SOUTHWESTERN VIRGINIA

THE stratigraphic relationships of the Big Stone Gap shale and its bearing on the Chattanooga shale problem have long been an outstanding geological question. Ulrich, Bassler, Schuchert and others have regarded both as Mississippian in age. Kindle, David White, Butts and others have regarded them as Devonian. But neither group has been able to offer conclusive proof of its position. In Virginia the Big Stone Gap shale lies at the top of the Portage and, where recognized in the past, has always been overlain by lower Mississippian beds (Grainger and Price formations). Stose[1] made an effort to solve the problem by tracing the Big Stone Gap shale up from the southwest and the Chemung formation down from the northeast, but at no locality was he able to find them together.

The writer's studies in Tennessee[2] had led him to believe the Chattanoogan series entirely Mississippian, as held by Ulrich. Partially completed studies of the Big Stone Gap shale, especially in the vicinity of Mendota, have led him to alter that decision. Six miles northeast of Mendota a series of sandy shales and shaly sandstones were found above the Big Stone Gap shale, forming a ridge traceable for a considerable distance to the northeast, where it lies everywhere higher stratigraphically than the Big Stone Gap shale. In the shaly sandstones were found *Camarotoechia orbicularis, C. contracta* var. (identical with the small variety from the Maryland Chemung), and *Productella* cf. *hystricula,* all typical Chemung forms found in the middle Chemung of Maryland. The Big Stone Gap shale near Mendota is thus definitely Devonian in age.

The Big Stone Gap shale has been recognized for some ten miles northeast of Mendota, where it is found to be accompanied by an increasing number of sandstone and sandy shale beds. It would thus seem to be probably lower Chemung in age. Near Saltville a similar black shale was found in the base of the Chemung and is here tentatively correlated with the Big Stone Gap shale.

The completed study will be published shortly as a separate paper.

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A STOCK FOR THE MANGOSTEEN

ON the hacienda of Mr. John R. Schultz, Calauan, Laguna, Philippine Islands, in May, 1924, I inarched a seedling of the mangosteen, *Garcinia mangostana* L., on a plant of a native species of *Garcinia,* locally called *Bunag.* A successful union was rapidly established, and the grafted plant had made a good start when last I saw it shortly before leaving Manila for the United States in January, 1925. Photographs recently received from Mr. A. W. Prautch, Bureau of Agriculture, Manila, show that the plant now reaches to a man's hips and is in excellent condition.

The success obtained in this graft is of more than ordinary interest in view of the fact that for a period of some 25 years attempts repeatedly have been made to graft the mangosteen on more than twenty species of *Garcinia* and related plants, all, except the instance recorded, ending in failure.

The mangosteen is one of the most highly prized fruits in the world, but is particular in its climatic requirements, has a weak root system, and is of very slow growth, especially in the nursery stage. Therefore, unlike many other fruits, the mango, for instance, the mangosteen has never become widely disseminated, and still is grown on a comparatively restricted area and in small quantities, notwithstanding its unsurpassed eating qualities and good shipping qualities.

The *Bunag* not only is a plant of vigorous growth which may be expected to force the grafted plants

[1] Va. Geol. Surv., Bull. 24, 1923, pp. 48 to 52.

[2] *Amer. Jour. Sci.,* Vol. 7, 1924, pp. 24 to 30.

into bearing several years in advance of mangosteens grown on its own roots, but it thrives exposed to a long dry season. Therefore, by the use of *Bunag* as a stock, it would appear feasible to extend the culture of the mangosteen over large areas where for climatic reasons this hitherto has been impossible.

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QUOTATIONS

THE OXFORD MEETING

THE personality of the Prince of Wales as President, the amenities of Oxford, and the excellent arrangements made by the university and the city have all combined to make the meeting of the British Association, which ended recently, a conspicuous success. Even the copious reports of the daily proceedings sent by our correspondents gave an incomplete record of the multifarious activities of the sections. We have commented more than once on the disadvantages of division into thirteen concurrent sections, some of which even had further subdivision; but at least it has the merit of giving a wide display of the scope of modern science. The president in his address, almost by way of warning against any hasty judgment, reminded his hearers that theoretical research was often far in advance of practical application, and that even great men of science had sometimes under-estimated the implications of statements made to meetings. Lord Balfour, in his epilogue on the first evening, recalled that the last meetings at Oxford and at Cambridge had each been quickly followed by an efflorescence of physical discovery, and prophesied a similar consequence of the meeting this year. Sir Oliver Lodge, although admitting that he did not speak for the general body of science, suggested that the great advance would be an extension of the methods of science into the realm of the spiritual. But it may be that the next important discovery was really foreshadowed in the meeting of the Chemical Section on Tuesday. Hitherto the chemical element helium, although believed to be a constituent of all the elements above it in the scale, has refused all attempts of the laboratory to make it enter into combination with any other element. Mr. J. J. Manley explained a long series of experiments, conducted by himself, which pointed to a combination of helium with mercury and the formation of a "helide of mercury." This startling announcement, admitted to be as yet tentative, was said to have received the benediction of Professor Soddy, than whom there is no higher authority, and may well prove the starting-point of a new avenue to knowledge. Apart from this the work of the association at Oxford, both in theoretical and in applied science, was of a high order, and there were fewer than usual of the rather foolish or feeble communications which are sometimes accepted out of kindness.

On principle and from personal knowledge, the Prince of Wales in his address urged the advantage of close relations between science at home and science in the distant parts of the empire. It was an opportune comment, because the association has had to consider an invitation from the South African Association for the Advancement of Science, with the concurrence of General Hertzog, to hold the 1929 meeting in South Africa. The General Committee at each of its three meetings discussed the proposal, and on Tuesday evening instructed the Council to make the requisite inquiries as to date, period of absence from this country, cost to individual members, and general finance. No more could have been done for the present, but it is clear that the association has decided in principle to accept the invitation provided that the details can be adjusted. Naturally there are difficulties, but there are three years in which to meet them. July is the most convenient month for South Africa, since her universities begin their sessions in August, whilst our sessions linger well into July. But a compromise could be arranged, institutions and individuals here being released a little earlier, there beginning a little later. Those who can not spare the time for six weeks at sea might bear in mind that in all probability by 1929 it will be possible to go from London to Johannesburg in a week by aeroplane, certainly at no greater cost than that of a cabin passage by sea. South Africa is generous and hospitable, and—as on the former visit in 1905—the Government is likely to give free passes on the railways and the steamship companies to reduce their rates. It is true that, if the British Association holds its annual meeting in South Africa, there can not well be another during the same year in Great Britain without robbing both of some of their authority and their dignity. But, when all these temporary disadvantages have been weighed, there can be no doubt that a South African visit should prove a permanent advantage to science and to the empire.—The London *Times*.

SCIENTIFIC BOOKS

CONCERNING REPTILES AND FROGS

Reptiles and Amphibians: Their Habits and Adaptations. By THOMAS BARBOUR, Curator of Reptiles and Amphibians in the Museum of Comparative Zoology at Harvard College. Illustrated in part by George Nelson, Preparator in the Museum of Comparative Zoology. Boston. Houghton Mifflin Co.

BARBOUR'S "Reptiles and Amphibians" is a model of a popular treatise in natural history. It is throughout