with the position of the sun. The time curve of the force in the direction of the vertical contains two maximum and two minimum points daily. If gravitation travels with the same velocity as light one of these points should occur at exactly noon local apparent time. If gravity has an infinite velocity the minimum point should occur about 8.3 minutes before noon since light requires that interval of time to pass from the sun to the earth. In other words, the velocity of gravitation is to be compared with the velocity of light, or

$$v = \frac{t}{t + t'} c$$

where v is the velocity of gravitation, t the time for light to travel from the sun to the earth, t′ the time displacement between the observed minimum and noon, and c the velocity of light.

The final form of apparatus used consisted of a mass attached to the end of a flat steel spring which was bent almost to its elastic limit and adjusted so that the mass could move in a vertical direction. For recording the position of the mass a modification of the ultramicrometer circuit was employed in connection with galvanometer, rotating drum with photographic film, and timing apparatus.

The problem is not as simple as stated above, since both the sun and the moon exert tidal forces, but these effects may be separated mathematically from the displacement curves.

These experiments were carried out in the Physics Laboratory at Clark University but no results were obtained because the effect sought was masked by earth tremors of local and possibly distant origin. Because of the importance to theoretical physics of the quantity in question it is hoped that the work may be continued with more refined apparatus and in a suitable location.

The writer wishes to express his thanks to Dr. R. H. Goddard for his interest in the work and his many valuable suggestions.

PERCY M. ROOPE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
OCT. 14, 1926

NOTE ON THE SCIENTIFIC METHOD AND AUTHORITY

YESTERDAY I received a marked copy of the August-September (1926) issue of *The Bible Champion*, Reading, Pa., which had been forwarded to me from Augusta, Georgia. The sender had marked with blue pencil an editorial, pp. 406–407, entitled: "The Scientific Method and Authority," signed L. S. K., which initials indicate that the editorial had been written by an associate editor, Leander S. Keyser, D.D.

Dr. Keyser says that an obliging friend had sent him copies of SCIENCE containing a long article by me which he finds to be "out and out for evolution" and with which he finds serious fault. Thus: "But in this whole amplified article not an established fact is cited to prove evolution. Not a word occurs to prove spontaneous generation, or transformism, or man's animal pedigree."

Dr. Keyser also finds fault with my treatment of Price's "The New Geology." "He tries to find in it," he says, "a technical error, and in that way thinks he has discounted the whole work. Whether there is such an error or not we do not know, but are very much inclined to doubt it."

Of course I would not ask SCIENCE to give space for a discussion of Dr. Keyser's criticism. But since some publicity has already been given to the matter I should like to be permitted to call the attention of Dr. Keyser and those who think as he does to the fact that the article which he finds to be so objectionable was a vice-presidential address made before Section F, zoology, at the Kansas City meeting of the American Association for the Advancement of Science. With such an audience, and with the topic which I was trying to discuss, which, by the way, was not specifically evolution, it would have been quite inappropriate to have presented arguments for any phase of the evolution problem. For such an audience as that which listened to the paper the term evolution is a convenient name for the processes of nature which we see going on about us, and of which we are a part, of which also a partial record is preserved in the earth's crust, and elsewhere in the visible universe. It is only when an attempt is made to explain how any particular thing comes to be as it is that any theory of evolution is introduced.

As to my treatment of "The New Geology" it may also help to a better understanding of the address when it is remembered that the audience, although mainly zoologists, could be presumed to be well enough acquainted with the science of geology, and especially of paleontology, to make it unnecessary to have it pointed out to them the transcendent absurdity of the position taken by the author of "The New Geology" on such subjects as catastrophism and the contemporaneity of fossils.

Since, in a letter which I have received from another reverend theological unbeliever in the divine testimony of the rocks, I have been called to account for my lack of appreciation of Price as a geologist, it may be worth while to make a brief comment.

Following the quotation which I made from "The New Geology" to illustrate the author's view of the contemporaneous existence of living forms, whose

fossils have been referred by geologists to such severally remote times as the Ordovician and Tertiary, for example, it would have been appropriate to add that such a view of fossil records would be paralleled, and not in the least exaggerated, by the thesis that George Washington, Queen Elizabeth of England, Charlemagne, Cleopatra and the Pharaoh Tut-Ankh-Amen were contemporaries in the sense in which that word is used in human affairs.

Perhaps I may be permitted space to comment on Dr. Keyser's strictures on the scientific method as opposed to authority by asking, in all seriousness, how we are to arrive at a satisfactory conclusion as to the claims for credibility of different systems of religion except by the employment of the scientific method.

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SCIENTIFIC BOOKS

Pathologische Pflanzenanatomie in ihren Grundzügen, Dargestellt von DR. ERNST KÜSTER, Professor der Botanik an der Universität Giessen. Dritte, neu bearbeitete Auflage. Mit 285 Abbildungen im Text, darunter 2 farbigen. Verlag von Gustav Fisher in Jena, 1925. Pages, XII, 558. Price: paper cover, 24 gold marks; bound, 26 marks.

PUBLISHER and author have both done their best to make the third edition of Dr. Küster's "Pathological Plant Anatomy" an attractive and useful book. It is one that should be in the hands of every professional plant pathologist and of every student who can read German. In 570 well-illustrated compact pages the author deals with all the more important phases of the morbid anatomy of plants, summarizing what is best known. The book is divided into two parts of about equal size. The special part deals with: (1) Panaschierung; (2) etiolation; (3) hyperhydric tissue, and under this, with overgrowth of lenticels and bark, and with intumescences; (4) wound tissue and regeneration, callus, thyloses, wound wood, wound bark, wound cork, gum and resin formation and regeneration; (5) galls. The second general part deals with: (1) Histogenesis of pathological tissues with eleven subdivisions; (2) developmental mechanics of pathological tissue with five subdivisions; (3) ecology of pathological tissue. The book also has a brief supplement and a good index. It is the best book there is on this subject and is likely to remain so for a considerable time. Most of the references are to German literature. Judging by the number of original figures (82 out of 175) the subjects most familiar to Dr. Küster are variegation, wound reactions and the anatomy of insect galls. Most of the illustrations in the other chapters (91 out of 109) are borrowed. There is a commendable abundance of literature references and the figures are good.

ERWIN F. SMITH

Bones of the Ethmoid Region of the Fish Skull. By EDWIN CHAPIN STARKS, (Stanford University, California, Biological Sciences, Vol. IV, No. 1).

THE osteology of the bony fishes, an immense and highly varied group of animals, has been relatively neglected of late years. For while these creatures date back to the separation of the land-breathing animals from primitive fishes, they are out of the line of descent which leads towards mammals and men. This memoir of Professor Starks's comprises a very thorough study of the bones of the roof of the mouth in fishes, and their evolution from the one end of the long series to the other. No study of vertebrate morphology can safely lose sight of the osteology of fishes, to which the present paper is one of the most notable contributions. An earlier paper by the same author (Vol. III, No. 3) deals with the Osteology and Relationships of the Uranoscopoid Fishes (Star-gazers), a large group in which the systematic position of many of the families is still in doubt. The true place in Taxonomy and in Evolution (which should be the same thing) can rarely be determined until the bony structure, which underlies superficial traits, is well understood.

DAVID STARR JORDAN

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A CONVENIENT METHOD FOR FEEDING PLANARIANS

THERE are many biological problems for which planarians and rhabdocoeles may serve as very suitable material and in many laboratories these animals are kept for some length of time for this purpose. With a proper care as in Professor Child's laboratory, University of Chicago, they live well on beef liver. In Manila we found that beef liver can not be used to our entire satisfaction. On account of a warm climate the liver soon putrefies and after a few hours the water becomes very polluted and injurious to the animals. Besides this, the fresh beef liver is not always obtainable when it is needed. This led me to search for other food materials which could be used in place of beef liver.

After some investigation, it was found out that the yolk of egg is a very convenient food material. The duck's egg on account of its denser yolk is better than the hen's egg, but the latter is quite satisfactory. The method of feeding which I adopted is very simple. A wide-mouthed pipette (with 3 to 4 mm opening) is inserted in a freshly opened egg so as to get directly