DISCUSSION AND CORRESPONDENCE

THALLIUM AS AN INSECTICIDE

THE remarkable properties of the metal thallium and its salts have recently been the subject of considerable research among biochemical workers, and thallium sulphate has attained some commercial use as a poison for rodents, both in this country and Europe. W. J. Dilling (Ann. Appl. Biol., XIII, 165–167, 1926) found that thallium ion was potent in checking both growth and germination in the seeds of cress, and that tadpoles were killed on emergence from the egg by N/500,000 solutions of thallium nitrate. Small doses of thallium acetate caused rats to lose all their hair except the tactile hairs (Buschke and Peiser, Klinische Wochenschrift, V. 977, 1926).

The writer knows of no experiments toward determination of the toxicity of thallium to insects. Its present price appears to make improbable its application to large scale economic entomological operations. Nevertheless, experiments undertaken in a small way during the past spring and summer indicate that thallium sulphate has a limited field in the control of house ants. The small red ant (*Monomorium pharaonis* L.), a species which arsenic sirups fail to control, has been exterminated in a number of houses and apartments within periods of three weeks to a month by the application of a sirup prepared by the writer and consisting of ½ pint water, 1 pound sugar, 27 grains thallium sulphate and 3 ounces honey, the whole being brought to a boil and thoroughly stirred. The ants continue to consume this sirup until the entire colony is destroyed, the thallium appearing to act as a slow cumulative poison, the effects of which are apparent in observable colonies by the considerable numbers of dead queens, larvae and workers discarded daily. The pavement ant (*Tetramorium cespitum* L.) is even more readily controlled, while several other species have shown themselves susceptible. The value of this poison on other insects is being tested.

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"PINK-ROOT" OF ONIONS CAUSED BY PHOMA SP.

WITH the rapid development of the onion industry in the west and southwest there has been a corresponding increase in loss from the "pink-root" disease. For this reason considerable time and effort have been devoted, at this laboratory and elsewhere, to studies of the various phases of this disease. Taubenhaus[1] presented evidence that, in Texas, the causal organism is a species of *Fusarium,* which he named *Fusarium malli* Taub. Later, in California, Sideris[2] isolated and named four new species and two new varieties of *Fusarium* which he had found associated with the disease.

The writer of this note, also working in California, has observed that the extent and diversity of the cryptogamic flora obtained when diseased onion roots are cultured depend largely on the condition and treatment of the material used. If the roots cultured are partly decayed and shrivelled they yield a large number of *Fusaria* and several other members of the soil flora; if, on the other hand, roots are cultured that, though distinctly pink, are still turgid and firm, the number of fungi obtained is greatly reduced, and if roots in the same condition are immersed in mercuric chloride 1:500 for three minutes and then cultured only one fungus is obtained which, according to the following description, belongs in the genus *Phoma:* Pycnidia subglobose, gregarious, dark-brown to black, 170–250 μ, conidia oblong, hyaline, one-celled 3–3.5 x 1.2–1.5 μ escaping as a gelatinous cirrus.

Typical "pink-root" symptoms, a diffuse pink color, followed by shrivelling of invaded parts, were readily produced in roots of onion seedlings grown in sterilized soil inoculated with *Phoma sp.* The organism was reisolated in pure culture from affected parts.

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THE VELOCITY OF GRAVITATION

FOR many years the velocity of gravitation or more properly the velocity of propagation of gravitational potential has been the subject of much theoretical discussion. The magnitude of this velocity according to proposed theories varies from the velocity of light to infinity. According to the theory of relativity the velocity of gravitation should be equal to that of light and the success which the experimental tests of the theory have met justify this assumption. No previous work has been done, however, which would form the basis of a direct measurement. During the past year certain experiments relating to the velocity of gravitation have been devised and partially tested but since no immediate results may be expected it seems best to make note of the method employed.

The attractive force of the sun on a mass situated on the surface of the earth varies by small amounts

[1] Texas Agr. Expt. Sta. Bull. 273: 1–43. 1921.
[2] *Phytopathology,* 14: 211–216. 1924.

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.

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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