end, was again reflected and once more reached the search coil end and again developed an E.M.F. which was recorded by the oscillograph. An inspection of the oscillogram (Fig. 1) shows that, in addition to the original pulse of stress which has travelled the full length of the wire before reaching the search coil, three successive reappearances of this pulse can be detected, each pulse being due to the reflection of the previous pulse at the clamped end of the wire.

The distance on the oscillogram between two successive records of the E.M.F. is a measure of the time taken for the pulse to travel twice the total length of the wire. The speed at which the pulse travels has been found in this way to be given by

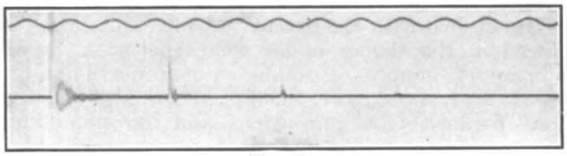

FIG. 1.

$c = 5 \cdot 04 \times 10^5$ cm. per second; or since $E = c^2\rho$, it follows that $E = 1 \cdot 99 \times 10^{12}$ dynes per sq. cm., or, 29×10^6 lb. per sq. in.

The rate of decay of the amplitude of the pulse due to its passage to and fro along the wire is a measure of the damping.

One purpose of the investigation is to examine the influence of work hardening on this rate of decay, and thus to find out whether the effect can be used as a practical method for the detection of work hardening in the wires of wire ropes.

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Chemistry of the Brown Algæ

OUR attention has been directed to a recent paper by Bergmann and Johnson[1] in which they describe the isolation of a sterol, m.p. 126–127°, from *Microciona Prolifera*, a deep red sponge from Long Island Sound. According to these authors, the sterol is a singly unsaturated compound of formula $C_{27}H_{46}O$, different in properties from either spongosterol isolated by Henze[2] or from clionasterol, described by Dorée[3].

We are at present engaged on a detailed survey of the marine brown algæ, and during the course of this work have isolated both from *Fucus vesiculosus* and *Pelvetia canaliculata* a sterol different in properties from the above mentioned sterols for which we propose the name 'fucosterol'.

Fucosterol melts at 124° (*acetate* m.p. 119°; *propionate* m.p. 104°) and gives analyses in good agreement with either a formula, $C_{29}H_{48}O$ or $C_{30}H_{50}O$. The presence of two ethenoid linkages in the molecule has been demonstrated by bromine absorption, perbenzoic acid titration and quantitative catalytic hydrogenation. A detailed account of the chemistry of this new sterol will be published elsewhere.

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[1] *Z. physiol. Chem.*, **222**, 220; 1933.
[2] *Z. physiol. Chem.*, **41**, 109; 1903. *ibid.*, **55**, 427; 1908.
[3] *Biochem. J.*, **4**, 92; 1909.

Cosmic Rays under 600 Metres of Water

IN October 1933, further work was done to investigate the hardest cosmic rays first found in the salt-mine of Stassfurt (Berlepschschacht der Preussischen Bergwerks- und Hütten A.-G.)[1,2]. The new observations were made in the same manner, and at the same levels, as in July, that is, under 500 m. and 1,000 m. of water; but this time they were extended to the second level (600 m. of water) and with two sets of double counter coincidence apparatuses operating simultaneously. They showed conclusively that these hardest cosmic rays penetrate also to 600 m. of water, as already expected from the 500 m. level measurements[1] and the earlier ionisation chamber observations[2]. From the July experiments[3] the apparent mass absorption coefficient $(\mu/\rho)_{H_2O}$ was deduced as being less than 5×10^{-5} cm.^{2} gm.$^{-1}$ if the penetrating power can be characterised by such a figure, which is of small value as compared with distinct specification of the absorbing screens penetrated.

The new measurements in the 500 m. and 600 m. levels confirm this coefficient as being less than 5×10^{-5} cm.^{2} gm.$^{-1}$ and show the upper limit to be $1 \cdot 8 \times 10^{-5}$ cm.^{2} gm.$^{-1}$. Full details of this, and of the other investigations such as the 'law of straight line', 'ω-effect' and directional distribution of these hardest rays, will be given elsewhere.

It is very interesting that Corlin[4], performing ionisation chamber observations in the iron ore mine Kiirunavaara near Kiruna (Northern Sweden) in a manner similar to that which I used in 1928 in Stassfurt, now deduces from his measurements at a depth of 52–86 m. of iron ore (215–430 m. of water) the existence of such hard rays with $(\mu/\rho)_{H_2O} = 11 \times 10^{-5}$ and 3×10^{-5} cm.^{2} gm.$^{-1}$.

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Jan. 20.

[1] W. Kolhörster, *Berl. Ber.*, 23, 689; 1933.
[2] W. Kolhörster, *Ber. Pruss. Met. Institut*, 1931, p. 34; Berlin, 1932.
[3] W. Kolhörster, NATURE, **132**, 407, Sept. 9, 1933.
[4] A. Corlin, NATURE, **133**, 63, Jan. 13, 1934.

A New Hard Component of the Cosmic Ultra-Radiation

PROF. KOLHÖRSTER has kindly directed my attention to a possible misunderstanding of the statement "a hitherto unknown component" in my communication entitled "A New Hard Component of the Cosmic Ultra-Radiation"[1]. This statement, which referred to the harder Kiirunavaara component, was not intended in any way to dispute Kolhörster's earlier discovery of a very hard radiation capable of penetrating more than 500 m. of water. I had, however, overlooked that Kolhörster has also mentioned[2] a small decrease of the ionisation even down to 700 m. of water found by him so early as 1928 in the Stassfurt mines; it is evident that the whole radiation found by him should not be identified with the softer Kiirunavaara component alone.

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Feb. 1.

[1] NATURE, **133**, 63, Jan. 13, 1934.
[2] *Berlin Ber.*, No. 23, July 19, 1933.