Letters to the Editor

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NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 846.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Rates of Cleavage of Sea Urchin Eggs in Different Latitudes

THE oxygen consumption of various kinds of poikilothermal marine animals in English waters is higher, at the temperatures at which they live, than that of northern and arctic species of the same genera at their lower sea temperatures, although the arctic animals seem to move about just as fast in their cold habitat as do the English forms in our own waters[1]. The same relation holds for ciliary movement on the gills of scallops: the cilia beat more rapidly in the English species. On the other hand, the respiratory movements of English Crustacea are no more rapid at, say, 15° than those of arctic species at 5°. The same rule applies also to the rates of heart-beat of most of the species studied. I have now measured the rate of cleavage of eggs, and find that this behaves like the respiratory movements and hearts, not like oxygen consumption and cilia.

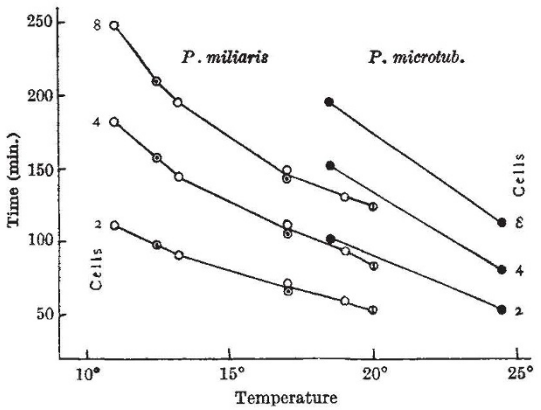

FIG. 1. Time for cleavage of sea urchin eggs. ○, Plymouth; ⊕, Millport; ⊕, Roscoff; ●, Tamaris.

I have compared the rates of cleavage of the eggs of two species of sea urchins, *Psammechinus miliaris* from Roscoff in Brittany[2], Plymouth, and Millport in Scotland, and *P. microtuberculatus* at Tamaris in the south of France. The results are shown in Fig. 1. The points giving the times after fertilization, for the first three cleavages at different temperatures in *P. miliaris* from the various localities fall, on smooth curves, but the eggs of the Mediterranean species at a given temperature, say 20°, cleave much more slowly than those of the northern species. The rate for the southern species at 20° is no faster than that for the northern species at 12°–13°.

From data in the literature, it is evident that the same phenomenon occurs within a single species of sea urchins, namely *Paracentrotus lividus*. At Roscoff the 2-, 4- and 8-cell stages are reached in 66, 100 and 147 minutes at 20°[2]. At Rovigno, in the Adriatic, the respective times are 105, 135 and 182 minutes at the same temperature[3]. Indeed the cleavage rates of *P. lividus* at Naples differ at different times of the year. At 13°, 71 and 91 minutes elapse between one cell division and the next in winter and in summer respectively, while at 26°, 31 minutes are taken in winter and 25 minutes in summer[4].

The results described above will be published in full in the *Proceedings of the Zoological Society*.

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[1] H. Munro Fox, NATURE, 137, 903 (May 30, 1936).
[2] B. Ephrussi, *C. R. Soc. Biol. Paris*, 89, 928 (1923).
[3] O. Koehler, *Arch. Zellforsch.*, 8, 272 (1912).
[4] S. Hörstadius, *Biol. gen.*, 1, 522 (1925).

Physical Nature of Certain of the Vibrating Elements of the Internal Ear

THE sensation resulting in the human subject from a change of phase of π (180°) occurring in the course of a continuous musical tone has been the subject of a number of earlier publications[1]. Under certain conditions, the sensation has been found to resemble the beat produced by two pure tones slightly out of unison, and has been described as a "phase-change beat"[2]. As stated by Hartridge[1], it is demanded by the Helmholtz resonance theory that the physiological event which corresponds to such a phase-change beat must be a transient arrest of the resonant elements of the internal ear brought about by the opposition of the impressed forces following the change of phase to the after-swings enforced by resonance.

An experiment is described below in which direct evidence is adduced that an event of this kind does in fact take place.

For the purpose of acoustic stimulation, the phase-reversing photo-electric siren to which reference is made elsewhere[3] has been employed. By means of this device, tone frequencies of 256 ~ and 1,024 ~ and of 40–80 phons intensity were generated and led by means of thick-walled rubber tubes to the ear of an animal preparation (decerebrate cat).

Employing suitably disposed electrodes and an amplifying system of conventional resistance-capacity type to feed a cathode ray oscillograph, the electrical response of the cochlea (Wever and Bray phenomenon), and also the auditory action-potentials of the mid-brain, were recorded photographically upon fast-moving cine-bromide. In addition, arrangements were made for the simultaneous recording of the sound stimulus by means of a piezo-microphone feeding a separate amplifier and oscillograph.