

## ABSTRACTS OF MEMOIRS

### RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

#### THE MECHANISM OF THE SEMICIRCULAR CANAL.

#### A STUDY OF THE RESPONSES OF SINGLE-FIBRE PREPARATIONS TO ANGULAR ACCELERATIONS AND TO ROTATION AT CONSTANT SPEED

By O. Lowenstein and A. Sand

*Proc. Roy. Soc., B, Vol. 129, 1940, pp. 256-75*

Single-fibre responses from the horizontal ampulla of the isolated labyrinth of *Raja* have been recorded by the oscillographic method with the aim of a quantitative analysis of the responses of this sense organ. The rate of increase or decrease of discharge above or below the level of a spontaneous resting rhythm is a linear function of the rate of angular acceleration. The threshold acceleration first producing a noticeable response from the organ is in the region of  $3^\circ$  per sec.<sup>2</sup>

During prolonged rotation of constant speed the frequency of discharge, having attained a maximum or minimum according to the nature of the initial acceleration, gradually returns to the spontaneous value over a period of about 20-30 sec. These results when interpreted in terms of the physical properties of the cupula terminalis account adequately for the time relations of the rotatory nystagmus and after-nystagmus of the eyes. O.L.

#### THE INDIVIDUAL AND INTEGRATED ACTIVITY OF THE SEMICIRCULAR CANALS OF THE ELASMOBRANCH LABYRINTH

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synergy according to the nature of the rotation. The integrated action of the canals during rotation about the three axes was analysed in relation to the eye-muscle reflexes evoked by these rotations. O.L.

#### OSMOTIC RELATIONS OF SOME METAZOAN PARASITES

By N. Kesava Panikkar and Nora G. Sproston

*Parasitology*, Vol. xxxiii, 1941, pp. 214-23

The osmotic behaviour of three parasites in normal and experimental media has been studied with a view to understanding the relationship with their hosts. *Angusticaecum* sp., a nematode from the intestine of the tortoise, is hypertonic in media of very low concentrations (1.1-1.3 % NaCl in tap water), but becomes isotonic in sea water and slightly hypertonic in 50 % sea water. Ligaturing experiments show that its cuticle is permeable to water and probably to salts. *Lernaeocera branchialis*, a blood-feeding copepod from *Gadus* spp., is hypotonic to the surrounding sea water so long as it remains attached to its host, its blood showing an osmotic pressure equivalent to 2.0-2.8 % NaCl. Isotonicity with the medium is established when the parasite is excised and kept alive. Hypotonicity of *Lernaeocera* is probably caused by the low osmotic pressure of the blood of its host (1.443 % NaCl in *Gadus pollachius*), to which it is permanently attached. *Bopyrus squillarum*, a blood-sucking isopod from *Leander serratus*, is isotonic or slightly hypotonic to sea water, the tendency towards hypotonicity being probably the result of the hypotonic nature of the blood of the host. The osmotic properties of *Lernaeocera* and *Bopyrus* would suggest their ability to survive in dilute sea water, a fact which is supported by their occurrence on hosts living in inshore or estuarine habitats. N.K.P. and N.G.S.

#### A COMPARATIVE STUDY OF THE EFFECTS OF IONS ON WHOLE NERVE AND ISOLATED SINGLE NERVE FIBRE PREPARATIONS OF CRUSTACEAN NEUROMUSCULAR SYSTEMS

By Talbot Howe Waterman

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A comparative study of the effects of ions on the perfused neuromuscular system of three decapod crustaceans has been made. The contractile responses of the flexor dactyl muscle to stimulation of the whole leg nerve (in *Panulirus*, *Maia*, and *Cambarus*) and to stimulation of isolated single motor nerve fibres (in *Cambarus*) have been isometrically recorded. The tension developed in response to brief tetanizing stimulation varied inversely with the amount of magnesium in the perfusion fluid, being greatest when none of this ion was

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present and approaching zero when four to five times the normal amount were perfused.

Changes in perfusion fluid calcium content usually gave rather irregular results, but some single nerve fibre experiments suggested that this ion had qualitatively different effects on the slow and the fast neuromuscular systems. Increased potassium led to decreased contractile responses in whole nerve preparations and single nerve fibre preparations of the slow closer system, but to markedly increased contractile responses in single nerve fibre preparations of the fast closer system. Exactly comparable results were found when both the slow and the fast motor closer motor fibres were prepared and alternately stimulated in the same nerve muscle preparation. Evidence is cited suggesting that these potassium effects occurred at the myoneural junction in some of the steps involved in neuromuscular transmission.

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Data on calcium:potassium antagonism and ammonium:potassium parallelism in the *Helix* heart are also presented; in connexion with the former, there is a brief discussion of the physiological differences between marine and other animals.

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