

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

THE ONSET OF SHORTENING IN STRIATED MUSCLE

By B. C. Abbott and J. M. Ritchie

Journ. Physiol., Vol. 113, 1951, pp. 336-45

When a striated muscle is stimulated at one point, the excitation travels away from that point at a finite speed. The whole of the muscle is active when the wave of contraction has travelled the length of the muscle. Doubt has been cast as to whether the electrical wave associated with membrane excitation travels at the same velocity as the wave of contraction.

Isolated muscles from dogfish, frog and toad at 0° C. were stimulated (a) simultaneously at many points along their length, and (b) at one end only. The time course of unloaded isotonic shortening during maximal twitches was recorded photographically. When simultaneously stimulated all over the muscles began to shorten at their maximum speed at the end of a latent period. When stimulated at one end the speed built up gradually, but to the same maximum value, so that the shortening-time curves run parallel: the curves are separated in time by half the propagation time of the contraction wave along the muscle. It is shown experimentally that in the muscles of all three animals studied the propagation velocities of contraction and excitation waves are identical. When a muscle is stimulated in saline the propagation velocity is appreciably greater than when in air.

B.C.A.

THE LOCALIZATION AND ANALYSIS OF THE RESPONSES TO VIBRATION FROM THE ISOLATED ELASMOBRANCH LABYRINTH. A CONTRIBUTION TO THE PROBLEM OF THE EVOLUTION OF HEARING IN VERTEBRATES

By O. Lowenstein and T. D. M. Roberts

Journ. Physiol., Vol. 114, 1951, pp. 471-89

Vibration responses in the form of impulse discharges can be recorded from nerve twigs leading from part of the macula sacculi, the macula neglecta, and the lacinia of the macula utriculi of the isolated elasmobranch labyrinth. The otolith-bearing part of the macula utriculi, the posterior portion of the macula sacculi and the adjoining macula lagenae do not respond to vibrational stimuli. They contain gravity receptors only. An appreciable number of the

sense endings show a resting activity in the absence of vibrational stimulation. There exists, however, convincing evidence that, at any given time, many sensory units are quiescent. These can be recruited to take part in the vibrational responses, and they show a considerable range of thresholds. Under the obtaining experimental conditions vibration responses were recorded to stimulus frequencies extending rarely higher than 120 cyc./sec. Vestibular microphonics were observed up to a signal frequency of 750 cyc./sec. but only responses in the form of nerve impulse discharges are accepted as evidence for vibration sensitivity. At low intensity stimulation the response consists of an increase in the discharge frequency of the 'spontaneously' firing units. Higher intensities lead to the recruitment of previously quiescent sense endings and to a marked synchronization of the response frequency with that of the stimulus. This synchronization closely resembles the responses described for the mammalian cochlea where it occurs at the lower end of the audible spectrum. Adaptation to sustained vibrational stimulation and a 'silent period' after cessation of prolonged stimuli have been observed and the latter has been quantitatively analysed. It is claimed that the theoretical implications of these results may be of considerable importance in relation to the problems of the evolution of hearing and pitch discrimination in vertebrates. O.L.

THE LIFE-HISTORY OF THE MULTIFORM SPECIES *JASSA FALCATA*
(MONTAGU) (CRUSTACEA AMPHIPODA) WITH A REVIEW OF THE
BIBLIOGRAPHY OF THE SPECIES

By E. W. Sexton and D. M. Reid

Journ. Linn. Soc. London (Zool.), Vol. XLII, 1951, pp. 29-91

It has been shown by rearing and breeding experiments that the amphipod *Jassa falcata* (Montagu 1808) is a polymorphic species.

The species falls into two main classes or divisions, characterized particularly by the differing setation and shape of the second antennae, and the second gnathopods of the males. These divisions are called here, in accordance with their appearance, the Broad and the Narrow Forms. There is a third Form, in which the antennal characters of both the other Forms are combined with either the Broad gnathopod or the Narrow one.

In addition a number of Minor variants occur within the limits of the two main divisions.

The species also shows male intersexuality.

The synonyms of the species are summarized, and a full review of the bibliography given.