Deutsche Seewarte (1910).—The results of the valuable observations made at the stations under the control of the Seewarte are published in practically the same form as in previous years. Part i. contains observations made three times daily at ten stations of the second order, monthly and yearly results, and five-day means of temperature. Part ii. contains hourly readings at four normal stations; the anemometrical velocities are obtained by a revised factor, determined experimentally. Part iii. gives very useful statistics of storms experienced at fifty-seven signal stations in each month, in the North and Baltic Seas. Only those cases are given in which storms were reported by at least three stations. An appendix gives the sunshine values for Hamburg during the year: 1441 hours, or 32·3 per cent. of the possible amount.

Deutsche Seewarte, Hamburg (1911).—The thirty-fourth yearly report on the useful work of the Seewarte shows, as usual, great activity in all its branches. On November 1 Captain Behm succeeded Admiral Herz as director. Among the principal publications relating to the marine branch may be mentioned the monthly meteorological charts of the North Atlantic, and the daily synoptic weather charts of the same ocean issued in connection with the Danish Meteorological Institute. Monthly charts for the Pacific Ocean are being prepared in view of the proposed opening of the Panama Canal. For the present they will be in manuscript only, for private use. During the year 87 complete meteorological logs were received from the Imperial Navy, 1810 from the mercantile marine, and 214 shortened registers, containing altogether about 4585 months' observations.

Bombay and Alibag Observatories (1911).—The report shows that a considerable portion of the arrears of the usual publications has been disposed of, and that much time has been occupied in investigating discrepancies between some of the magnetic instruments. The mean temperature of the year at Colaba was 79·9°, being 0·5° above the normal; the greatest maximum hourly temperature was 91·4° in May, and the least minimum 59·3° in February.

THE OPTICAL PROPERTIES OF MUSCLE.[1]

IN this brilliant monograph, which embodies the results of five years' laborious and painstaking investigation and is a monument of ingenuity in devising and using new methods of technique, Dr. Vlès has made out a good case for revising our ideas concerning the nature of muscular striation.

Dr. Vlès believes that modern teaching loses sight of the big, broad facts of muscular structure, and has prevented their recognition hitherto by too much insistence on minute details, which are commonly and erroneously assumed to be material realities rather than merely optical illusions. By taking cognisance of well-known optical phenomena, and by employing such methods as spectroscopic and ultramicroscopic examination and polarisation, it is possible to disprove the reality of many apparently material features and appreciably to simplify the structure of muscle fibres.

The most primitive muscular fibre is of the smooth variety, and contains a general substratum which can be recognised by its spectroscopic appearance. Superposed on this general substratum, and diffused throughout the fibre, are other molecular groupings comprising sarcoplasmic and hæmatogenous derivatives and doubly refracting substances. Smooth muscle possesses the contractile character just as does striated muscle, but its contractility is of a nature different from that of striated muscle. Dr. Vlès has quoted evidence to show that all muscle develops primitively as "smooth" fibres, but may later take on a striated appearance, exhibiting at the same time transformations in the nature of its contraction.

He shows that the appearance of striation in muscular fibre is associated with increase in frequency or rapidity of movement, or with the occurrence of a regular rhythm in contraction.

Any cause, such as immobilisation or injury of the muscle or nerve, which interferes with these conditions affects the striation of the muscle. The striæ disappear, and the muscle undergoes hyaline degeneration. Should the conditions under which striation normally occurs again obtain, the striæ appear anew. The distinction between striated and smooth muscle appears to be due to the fact that in the former the superposed molecular groupings become localised to certain areas of the muscular fibre, which have received the name of the Q discs (Rollet) (see figure). The Q disc of the striated muscular fibre is therefore the physical analogue of the whole smooth fibre. The intervening I discs are of simpler molecular constitution, and correspond to the general substratum only of the smooth fibre. When movement is lost in striated muscle the superposed molecular groupings become diffused throughout the fibre exactly as in smooth muscle.

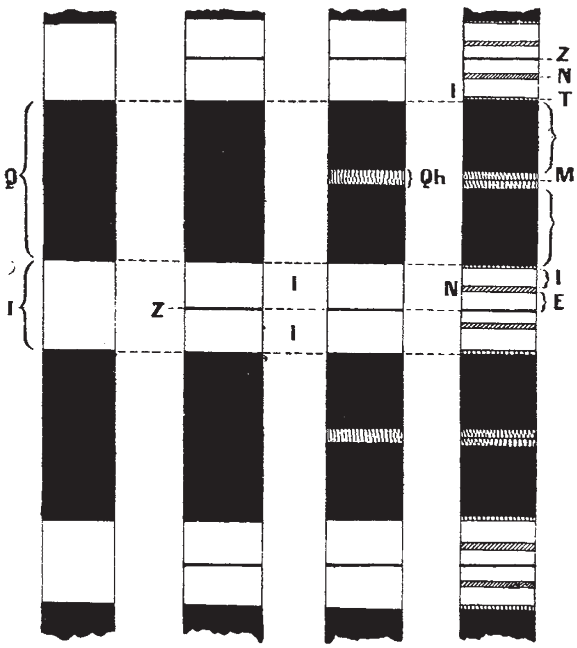

Diagram to illustrate the nomenclature of the muscular striæ in the four principal types of striation. The simplest variety of striated muscular fibre is shown on the left side of the diagram. The anisotropic disc Q differs from the isotropic band I in containing a greater number of molecular groupings. These molecular groupings are not localised in the "smooth" fibre but are diffused throughout its extent, and hence the disc Q of striated muscle is the physical analogue of the whole "smooth" fibre.

Contrary to general opinion, there is probably no membrane present between the Q and the I discs. Dr. Vlès's interpretation of the relation between a smooth and a striped fibre is that the latter corresponds to smooth fibre which has undergone localisation of its molecular groupings. Striation is probably only an expression of quite general laws of elasticity and hydrodynamics applied to the heterogeneous complex of the muscular fibre.

T. WINGATE TODD.

[1] "Propriétés Optiques des Muscles." By Dr. Fred Vlès. Pp. xviii+372. (Paris: A. Hermann & Fils, 1911.) Price 15 francs.