

striated muscle. It has been found that active relaxation is produced by trypsin and papain, but not by pepsin. In the case of pepsin, the active relaxation is produced by the hydrochloric acid medium. These experiments therefore indicate that hydrolysis of proteins by enzymes is preceded by the unfolding of the polypeptide chains. This might be done by the enzyme itself, or by the medium in which the enzyme acts.

TONUS IN UNSTRIATED MUSCLE

During tonic contraction it may be presumed that the unfolding of the polypeptide chains is prevented by the development of cross-linkages between the chains. The nature of these linkages can be ascertained by treatment of the heat-killed muscle with various reagents. There appear to be at least three types of such bonds: (a) hydrogen bonds, (b) S-S linkages, (c) salt linkages. The presence of hydrogen bonds is shown by the active relaxation produced by urea, distilled-water and heat. The presence of S-S linkages is shown by the active relaxation produced by sodium cyanide, sodium sulphide and sodium sulphite. Salt linkages are indicated by relaxation produced by salts.

One kind of tone in unstriated muscle can be mechanically destroyed without affecting the phasic response. The lateral bonds are thus mechanically ruptured. The phasic response shows that the folding of the polypeptide chains remain unimpaired. It is difficult to conceive of normal folding of the polypeptide chains when some of their lateral branches have been destroyed by such a procedure as sudden stretching. It is therefore reasonable to assume that the phasic response is produced by a different set of polypeptide chains. In the muscle, therefore, there appear to be two sets of polypeptide

chains, one for phasic and the other for tonic contraction. It is possible that the tonic mechanism relaxes actively, as the rupture of cross-linkages chemically results in active relaxation. This is also shown by the fact that this kind of tone is unaffected by asphyxia, and results in diminished production of lactic acid and decreased consumption of oxygen.

Unstriated muscle, however, shows a second kind of tone, the mechanical reduction of which also reduces the phasic response. This kind of tone, therefore, is produced by the same system of polypeptide chains which fold to produce the phasic response. This kind of tone is reduced by asphyxia, and is accompanied by increase in the production of lactic acid and more oxygen consumption. But in this system also the polypeptide chains can be maintained in folded condition by the development of cross-linkages, as in *Mytilus* muscle, both the phasic and the tonic responses are reduced by mechanical disruption, but the tone is not affected by asphyxia. In this system relaxation appears to be passive.

PERMEABILITY OF UNSTRIATED MUSCLE

The permeability of unstriated muscle to the monovalent ions varies in the order: Li, Na, NH_4 , K and to anions, in the order Cl, Br, NO_3 , SCN, CN. The stimulating power of these ions also varies in the same order. Calcium appears to cause extrusion of sodium. This might be concerned in the mechanism of absorption and secretion of electrolytes by cells. On the absorbing side, there would be diminished concentration of calcium. On the secreting side of the cell, the arrival of the electrolyte might liberate calcium, which in turn might extrude the electrolyte.

RUMFORD MEDAL AWARD TO DR. S. CHANDRASEKHAR

THE Rumford Medal for Scientific Research in the Fields of Heat and Light has been awarded to Dr. S. Chandrasekhar, Faculty of Theoretical Astrophysics, University of Chicago, and will be presented at a Meeting of the American Academy of Arts and Sciences in Boston on March 13.

Dr. Chandrasekhar will receive the medal for "extending to the cosmic realm the stochastic laws which, on the atomic scale, govern the

phenomenon of heat", and for his monumental work on radiative equilibrium in stellar atmospheres.

In 1935, the same medal was awarded to James Franck and in 1953, to the late Enrico Fermi. It may be recalled that Dr. Chandrasekhar won the Bruce Medal of the Astronomical Society of the Pacific in 1952, and the Gold Medal of the Royal Astronomical Society, London, in 1953.