NATURE

No. 4069 SATURDAY, OCTOBER 25, 1947 Vol. 160

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The annual subscription rate is £4 10 0, payable in advance, Inland or Abroad

TEACHERS IN TECHNICAL COLLEGES AND SCHOOLS

IN an article in *Nature* of June 22, 1946, the salary scales of teachers in technical schools in Great Britain were criticized in the following terms: "the very comprehensive character of the Burnham scales for technical teachers militates against their effectiveness in the realm of higher technology. The scales for technical teachers have, for reasons which it is not easy to understand, been closely tied to those applicable to teachers in primary and secondary schools. For the large majority of teachers in technical institutions they are in fact identical with them, and only in the provision of separate scales for heads of departments in technical colleges and the introduction of a senior assistant scale for a limited number of technical teachers do they differ from the school salaries. The scales are designed to cover the whole range of further education from the teachers in a small country technical institute to the lecturer in a major technical college, the junior lecturer in which, however advanced and important his work, may be on the same salary scale as the teacher in the smallest institution."

These words are no less applicable to the recently announced proposals of the Burnham Technical Committee which will, if accepted by the constituent bodies, become operative on April 1, 1948. The proposals made by the Technical Committee follow closely those put forward by the main Committee, which is responsible for the recommendations in respect of teachers in primary and secondary schools. They include, for example, the same basic scale, the same proposals regarding the 'London Area', the same provision for graduates, and the same intention to abolish the merger clause. Again, in the provision of posts of special responsibility, local education authorities are left to determine the number of such posts (between 20 per cent and 27½ per cent of the number of full-time teachers other than principals) to whom the Burnham Technical Report applies (which is, admittedly, an improvement on the present position of between 19 per cent and 21 per cent); but the financial limits are, as in the main report, between £50 and £150 per annum for men, and between £40 and £140 per annum for women.

More satisfactory, however, are the proposed scales for senior assistants and heads of departments. In these a real attempt has been made to recognize the validity of the claim—made in the McNair Report on the Training of Teachers—that a senior lecturer in a technical college is responsible for work not dissimilar from that of a lecturer in a university, and that the head of a large department in a technical college has responsibilities for organisation and research comparable with those of a university professor. The proposed salary scale for senior assistants is £700–£25–£800 per annum for men, and £560–£20–£640 per annum for women. For heads of departments, it is proposed that there should be four fixed grades with a maximum in the fourth grade of £1,250 per annum for men and £1,000 per annum for women, and a flexible fifth grade which

will allow local education authorities to fix, in agreement with the Minister of Education, a salary beyond these limits for a departmental head in a large college.

Even if these scales are agreed, much must depend on the policy adopted by local education authorities in appointing senior assistants and in grading departmental heads. But the difficulties which local education authorities will encounter—and the variations which must inevitably occur between the practice in one area and another—are not likely to be lessened by the failure of the Burnham Technical Committee to establish salary scales for principals. Since failure to do so in 1945 is an important factor affecting adversely the recruitment of highly qualified men and women possessing suitable training and experience to the staffs of major technical colleges, it is certainly to be hoped that the Minister of Education will interpret generously the provision which empowers him to report to the Committee in 1951 on the review of principals' salaries which local education authorities are required to make in the light of the other recommendations in the report. Since it is not unreasonable to suppose that the recommendations of the Percy Committee regarding the National Council of Technology and the regional advisory councils will, within the next three years, be fully implemented, the time may well be opportune in 1951 for the Minister to consider drastic changes in the administration and finances of technical education in Great Britain.

CHEMICAL BASIS OF MUSCLE CONTRACTION

Chemistry of Muscular Contraction

By A. Szent-Györgyi. Pp. vi+150. (New York: Academic Press, Inc.; London: H. K. Lewis and Co., Ltd., 1947.) 4.50 dollars.

THIS book is largely a summary of the work of the Szeged school carried out just before or during the war years, and is not designed for the consideration of past or contemporary studies on muscle and muscle proteins. It is, indeed, an intensely individual book, representing a rather novel and daring approach to the problem of physiological contraction. This, no doubt, explains the widespread interest which Prof. Szent-Györgyi has aroused, and among the background of polemical discussion which such interest has invoked, the reviewer must attempt an impartial judgment which is not shocked into scientific conservatism by novelty, but is based solely upon objective consideration of experimental data. Unfortunately, a critique along these lines is not wholly possible: some results are personally communicated; others are derived from data not yet accessible; others, still, do not conform with more recent experiments as described in a 'stop-press' section (Part IV). In these circumstances, it seems most profitable to discuss only the more important features which are especially relevant to the problem of muscle biochemistry, leaving the interpolated section on "The Continuum Theory" (Part III) for other comment.

The outstanding contribution is the discovery that the muscle fibril contains an, as yet, ill-defined protein termed 'actin' which interacts with myosin to give an actomyosin complex. Actomyosin is influenced by traces of adenosinetriphosphate in two different ways, according to the ionic strength of the medium. In 0·5 *M* potassium chloride, the complex exists as a thixotropic gel which is broken up into its component molecules in presence of adenosinetriphosphate; in 0·05 *M* potassium chloride, however, the gel on addition of adenosinetriphosphate exhibits an intense synæresis (termed by Prof. Szent-Györgyi 'contraction'), giving a dense precipitate of actomyosin containing 50 per cent of its weight of protein, whereas myosin precipitates ordinarily contain only 2–4 per cent of protein. It is this latter effect which forms the basis of various speculations on muscle contraction.

It is clear that the actin–myosin interaction is an unusual one, and more recent work in Britain and Denmark has emphasized this fact in the finding that the sulphydryl groups of the myosin partner play an essential part. Obviously, the urgent need, before attempting to relate the actin–myosin–adenosinetriphosphate interrelationships to muscle contraction, is to resolve the mechanism of this synæresis. Does it involve the aggregation of micelles and the squeezing-out of intermicellar water as in the formation of the fibrin clot? Or does it involve an intramolecular saturation of side-chain linkages? There are no really adequate data to decide these facts, and to transpose this system to muscle itself as the basis of the contractile process is not to offer an explanation of how muscle contracts; the clockwork of the model is missing. There might be some virtue in the model if it conformed with accepted concepts of the structure of the fibril; but in the assumption that the contracting elements have a spiral structure, it opposes the evidence of the electron microscope and X-ray diffraction. Moreover, the experiments relating to the energetics of muscle contraction, even if valid, are not specific to the theories advanced and reveal nothing of the molecular mechanism of contraction.

In all that concerns the properties of proteins there are serious misconceptions. The whole treatment of the binding of ions by myosin is both confused and confusing, and governed by physico-chemical inventions which not only conflict with each other but also with experimental fact and with physico-chemical theory. It is assumed, for example, that when a neutral salt is added to a negatively charged myosin precipitate, cations are adsorbed in such a way that the protein becomes isoelectric. The extension of this adsorptive process to the point where the protein dissolves lands the author into great difficulties, as a reading of the section on p. 114 adequately shows. Other claims, that myosin is not a globulin, and that it is genuinely crystalline, are quite inadmissible.

To the biochemist, the enzyme sections present a bewildering display of new facts and conclusions which must certainly invite both interest and criticism. No final judgment can be attempted, since much of the experimental detail is not available. There is a tendency, however, to attribute an astonishing variety of findings to an astonishingly simple system. It is said that myosin–adenosinetriphosphatase, acting in conjunction with 'protein II', effects first a breakdown to adenosinediphosphate; phosphate is then transferred from the pyro- to the amino-group to give a new adenosinediphosphate, which is then simultaneously de-