We plan to extend these investigations and publish a more complete account elsewhere.

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BIOLOGY

Molecular Biology or Ultrastructural Biology?

In a recent communication[1], Prof. C. H. Waddington protests against the increasing use of the name 'molecular biology' for a large and ever-growing field to which, he argues, it does not apply, and suggests confining it to more restricted topics for which in any event a better name would be 'ultrastructural biology'. Since, as I believe, I was responsible for first propagating the name 'molecular biology', and its widespread adoption seems to date particularly from my 1950 Harvey Lecture "Adventures in Molecular Biology"[2], it may be worth while stating again what I personally had in mind. In that lecture I said that molecular biology, as I envisaged it, "implies not so much a technique as an approach, an approach from the viewpoint of the so-called basic sciences with the leading idea of searching below the large-scale manifestations of classical biology for the corresponding molecular plan. It is concerned particularly with the *forms* of biological molecules, and with the evolution, exploitation and ramification of those forms in the ascent to higher and higher levels of organisation. Molecular biology is predominantly three-dimensional and structural—which does not mean, however, that it is merely a refinement of morphology. It must at the same time inquire into genesis and function".

I was inspired, obviously, by our early X-ray and accessory adventures at Leeds in demonstrating, for example, the folding and unfolding of protein chains and the nature of the long-range elasticity of mammalian hairs; the classification of the fibrous proteins into two principal configurational families—the *k-m-e-f* group and the collagen group; the similarity between the keratins of birds and reptiles which distinguishes them from the mammals; the apparent common configurational plan underlying the elastic and contractile properties of hair, epidermis, muscle and (more recently) bacterial flagella; the interpretation of protein denaturation and the relation between the fibrous proteins and the globular proteins (as we called them); the detailed exploration of the cellulose fabric of the cell wall of the alga *Valonia ventricosa*; first studies of the structure of the nucleic acids and nucleo-proteins, etc. Of later years, other examples of how we have continued along the same general line of thought are Rudall's work on the molecular structure of types of cuticles and of the various kinds of silks and other cocoon proteins[3], and Pautard's investigations into the problem of biological calcification, from ciliates to cetaceans, with his latest X-ray demonstration that the organic matrix of tooth enamel is not a collagen (as it is with dentine and bone) but is more like a member of the *k-m-e-f* group[4].

I trust that Prof. Waddington will not mind my recalling in this way our original concept of molecular biology, and will agree that we have kept fairly faithfully to it. It is impossible, though, to embark seriously on work of this kind without being interested in, and becoming more and more involved in, numerous associated studies, with the result that, as has happened, there soon comes a time when there seems to be no end to the business. Molecular biology has now inevitably spread to all aspects of biology looked at from fundamental molecular viewpoints—and thus includes 'molecular genetics', for example, if I may dare suggest it; and it is difficult to maintain that such an eventual extrapolation is unwarranted, for it is simply saying that that is the coming biology.

After all this it might well be asked, Why then is our laboratory at Leeds called the Department of Biomolecular Structure? The answer is that, when in 1945 I was appointed professor, the university committee considering me, and from which I was naturally excluded, preferred the name 'biomolecular structure' to 'molecular biology', which was what I myself wanted. Presumably, a majority of the members of that committee held opinions similar to those expressed by Prof. Waddington, and I offer this argument in his support; though I will confess that a probably more candid, and conceivably better justified, assessment that leaked out to me was that "he may know something about molecules but he knows precious little about biology". The answer to that one of course, in the tiresomely good old words, is that it all depends on what you mean by biology.

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Of all the recently developed types of analytical biology, the field of which Prof. Astbury was one of the main initiators has probably the best claim to the title 'molecular biology'. But even granting this, it is as well to remember that it was just because Astbury went on from the study of well-defined molecules to investigate entities such as hairs, which can at best by courtesy be called molecular, that he was able to open the doors through which so many people are now passing. If we want a title for the whole field of which Astbury's work forms a part, but which includes also the study of genes, microsomes, endoplasmic reticulum, antibodies and so on, by techniques only a few of which are definitely chemical, then I submit that