
This is a delightful, discursive, and well-documented series of essays reviewing various aspects of the cytopathology and cyto-physiology of osteoarthritis. Since the author's own work lies primarily in the field of experimental and comparative pathology, these aspects of degenerative joint disease, which in the past have been rather neglected, are particularly well treated. The detailed analyses of other aspects of arthritis, such as disturbances in cartilage, collagen, and ground substance, are very well written. Again, the chapters on "bio-mechanics" and the role of "systematic factors" are likely, by reason of their practical implications, to be of particular interest to surgeons and physicians.

Sokoloff's monograph is in fact an expansion of an earlier essay published in 1963, and does not aim at being comprehensive. His analysis, for example, of diseases of the vertebrae is rather a light-weight effort, but it is difficult these days for most workers to match the experience of human disease acquired by careful and protracted participation in necropsies by Schmorl in Dresden or by Landells and Collins at the London Hospital and Leeds respectively. Collins' monograph on joint disease remains among the best in the field.

Sokoloff's approach is more detached, and to this extent has its own particular merits. He is primarily writing a review, presenting as he puts it "a framework for systematic research". The obscurity of the picture within this frame is apparent enough in one of his own conclusions (p. 23):

"The pathological findings in osteoarthritis are those of plastic remodelling and abrasion of the joint surfaces, and constitute clear evidence that mechanical factors influence the development of the lesion. They describe a disturbance of an internally interacting system, and, in this reviewer's judgement, no single point can be recognized from them as the initial or central focus of the pathological process."

This is a frank if rather confusing admission, but it does reflect Sokoloff's ability to view dispassionately his own experimental work and that of others. Yet I would hope that in the future he will devote time to developing and justifying his own working hypotheses: to writing as it were an apologia rather than a review. This would be of even greater value to research workers in the field of joint disease.

J. C. Sloper


Early controversy about the nature of the rheumatoid factor (RhF) appears to have been resolved. It is now widely agreed that RhF reactivity is antibody activity directed against immunoglobulin G (IgG). The papers presented at this Conference represent an attempted reassessment of the nature of this reactivity, its mode of formation, and its role in the body.

The first section is concerned with methods of measurement of RhF and its distribution in health and disease. From the immunological standpoint, RhF can be considered as one of many kinds of anti-IgG reactivities which modern methods have revealed in the serum. Sensitive methods which detect reactivity directed against the intact IgG molecule reveal antiglobulin activity both in health and in a wide variety of diseases. In confirmation of previous observations, the latter have been noted to be preponderantly chronic infections, but it is of interest that antiglobulin activity has now been reported after the rejection of renal transplants. This suggests that an immune response to homologous tissue can provoke an antiglobulin reactivity similar to that aroused by "foreign" organisms.

It is widely held that RhF reactivity most probably arises because the combination of IgG as antibody with antigen alters the molecular conformation of the IgG with the exposure of determinants rendering the molecule autoantiicogenic. This is supported by the evidence, presented in the second section, that RhF shows higher affinity of interaction for aggregated or structurally distorted IgG than for the native molecule. In such interactions, RhF reactivity appears to be directed against a site (or sites) located on the C-terminal half of the heavy chain of IgG. This specificity distinguishes RhF and "RhF-like" reactivity from antiglobulins directed at sites on the light chains of IgG or at selected allotypic determinants. But the problem remains of defining the hypothetical "antigen" characteristic of rheumatoid arthritis which initiates the whole process.

Interest has been centred recently in IgG-antiglobulins and the capacity of RhF to interact with and reveal IgG-anti-IgG complexes in the joint fluids. In some circum-
stances, the incorporation of complement components in such interactions has been demonstrated. It is now reported that a correlation can be shown between the amount of such complexes and the diminution in titre of complement activity in joint fluids.

Complement-containing immune complexes have long been known to show phlogistic properties and their possible role in promoting phagocytosis (with the subsequent release of lysosomal enzymes), in the immune vasculitis which characterizes severe rheumatoid arthritis, and in the possible direct activation of kinins, are topics examined in the concluding sections of the conference.

The papers are accompanied by references to earlier, and to other current, work in this field and also by verbatim accounts of the discussion generated by each paper. This volume therefore serves as an admirable reference source for those actively engaged in this field.

K. W. WALTON


This book contains the papers given at a Symposium on ‘Lubrication and Wear in Joints’ held in Leeds in 1969. The papers are grouped broadly into subjects and the discussions which took place at the meeting are accurately recorded after each group of papers. The topic of these papers is the mechanism of lubrication in normal human synovial joints, but there are two chapters dealing with joint simulators built at Leeds and Stanmore for the evaluation of prosthetic joint replacements. A further chapter deals with the requirements of an artificial lubricant for synovial joints; but unfortunately Helal, who has used such lubricants clinically for some years, was not a contributor.

The subject of synovial joint lubrication is a peculiar one. Most of the investigators who have made a material contribution to the subject are either engineers or physicists, since the problem of lubrication is a highly technical one not readily understood by biologists. On the other hand, the interested public consists almost entirely of clinicians who have no understanding of the relevant physical concepts. The discussion therefore tends to consist of a dialogue between experts conducted before a technically uncritical audience. In these circumstances there is a danger that the views of the ‘experts’ will remain untested since they are not subjected to informed criticism from a substantial body of interested workers. This problem is exacerbated by the fact that relatively few engineers are currently working in the field: of the sixteen chapters in this book, ten were contributed by the groups working at Leeds and Imperial College, London.

The second peculiarity is that there has been a tendency to designate lubrication regimes presumed to be operating in synovial joints by easily memorable terminology. Thus McCutchen introduced the term ‘weeping lubrication’ and the Leeds workers have now introduced the term ‘boosted lubrication’. These terms have the disadvantage that they are susceptible of a wide variety of definitions. Thus at one time ‘weeping lubrication’ appeared to imply the expression of fluid from the cartilage matrix into the loaded film (i.e. the cartilage ‘wept’ into the film), whilst at other times it appeared to be used to describe the opposite possibility in which the film ‘wept’ into the cartilage. Although the symposium which this book reports was conducted at Leeds there is no mention of the Leeds concept of boosted lubrication. This concept rests upon two hypotheses: first that in a loaded film of synovial fluid (between the two surfaces of articular cartilage) the water and small molecular weight solutes in the film pass into the cartilage so as to leave the film itself increasingly concentrated; and secondly that there are pools of synovial fluid trapped between loaded articular cartilage surfaces. The suggestion that synovial fluid becomes ultra-filtered when loaded between surfaces of articular cartilage was first mooted by Ogston, and details of a possible mechanism were advanced by Maroudas in 1967. In the present volume Dr Maroudas advances further data in support of this concept. The idea that pools of synovial fluid are trapped between articular surfaces under load was first put forward in 1968 by Dowson and his co-workers at Leeds. They based this suggestion upon the observation that articular cartilage had a surface substantially rougher than had previously been thought and that, using the scanning electron microscope, it was possible to identify what appeared to be pools of synovial fluid on the cartilage surface. Although it seems very likely that the asperities on the surface cartilage are such as to produce cartilage to cartilage contact only on the apices of asperities, it remains unproven that the fluid in the interposing pools contributes materially to the lubrication regime of synovial joints. To suggest that it does so is to suggest that articular cartilage surfaces are slippery because they are rough, not in spite of the fact that they are rough. Put in engineering terms, two questions remain unanswered: does the fluid in the allegedly trapped pools contribute to the slipperiness of the synovial surface in any way, and if so does it do so because the fluid itself is pressurized (in which case the lubrication regime is, at least in part, a fluid film one)? Alternatively, does it do so by providing a reservoir of hyaluronic acid which can be transferred by adsorption or otherwise on to the asperities of the opposite surface?

This book provides a series of observations which are to varying degrees relevant to the understanding of the lubrication of synovial joints, but a clear understanding of the likely mechanism does not emerge. Such an understanding is not to be expected at the present time since insufficient data are available and since there is still a measure of disagreement as to certain fundamental observations.

This book represents a valuable introduction to the subject of synovial joint lubrication and contains an excellent list of references. The question however remains unanswered: who should be interested in synovial joint lubrication? Clearly the subject is of physiological interest since it represents an important component in the functioning of the locomotor system. It is far less clear that it represents a subject of clinical interest. It might become so if it could be shown that there was any disease process in man which was due to a breakdown in the normal lubrication regime. If this demonstration were to be made, obviously an understanding of the disease process in question would necessitate a prior understand-