methods there seems little doubt of its correctness, and because there seems no reason in principle why it cannot be extended to higher resolutions.

Other results in this field were reported by Barbara Low, by D. Harker (Brooklyn Polytechnic) and by J. C. Kendrew (Cambridge). Barbara Low described the three-dimensional Patterson synthesis of dry orthorhombic insulin, and gave evidence that it contains parallel rods of high vector density corresponding to polypeptide chains; she also described model-building experiments in which the amino-acid sequence derived by Sanger is used to investigate the topological possibilities of linking the chains together by means of —S—S— bridges. D. Harker gave details of the counter apparatus designed in his laboratory, by the use of which the intensities of 2,500 reflexions from a protein crystal could be measured with an accuracy of ± 10 per cent in six working days; there was discussion here of discrepancies in the measurement of absolute intensities of standard crystals. J. C. Kendrew described the main features of some ten new crystalline forms of myoglobin, derived from various species of whales, seals and penguins (in collaboration with R. G. Parrish and M. M. Bluhm). He also showed a Fourier projection of one form of whale myoglobin in which it is believed that the chains are viewed end-on. This was obtained by application of Cochran's inequality relations, and consists of two layers of three chains each; it is compatible with other evidence but at present cannot be proved to be correct.

There were discussions of other topics which will be mentioned only briefly. Thus one session was devoted to the Watson–Crick structure of deoxyribonucleic acid[14], and M. H. F. Wilkins (King's College, London) gave an account of a detailed study of the X-ray pattern which strongly supports this structure[15]; A. Rich (California Institute of Technology) also described X-ray studies of deoxyribonucleic acid. Accounts were given of recent investigations of the crystal structures of peptides; especially of glycylasparagine (R. Pasternak) and of N,N′-diglycyl cystine (E. W. Hughes, California Institute of Technology). V. Luzzati (Brooklyn Polytechnic) described his investigations of the statistical distribution of intensities of reflexions from protein crystals; he finds that the relations shown by A. J. C. Wilson to be valid in crystals of simple compounds may give misleading results if applied directly to proteins, and has himself developed methods more appropriate to complex structures. Finally, there was a discussion of the infra-red spectra of proteins led by G. B. B. M. Sutherland (Ann Arbor) and A. Elliott (Courtaulds, Ltd.); the complexity of these spectra is such that great caution must be exercised in interpreting them.

In my own view and, I believe, in that of many others present, the conference was the most successful ever held in this field. Its success was due partly to the most liberal hospitality of its hosts, and partly to certain features of its organization: that it included representatives of virtually every group working in the field, that attendance was restricted to protein crystallographers and a very few closely associated workers, enabling discussions to be conducted at a technical level, and finally that the meetings extended over five days, so that discussion could be exhaustive. The conference was made possible by the support of the Rockefeller Foundation, the National Foundation for Infantile Paralysis, and the American Institute of Biological Sciences in conjunction with the Office of Naval Research; to all these organizations, and especially to Profs. Pauling, Corey, and Hughes and their staff, those present at the conference owe a great debt.

J. C. KENDREW

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OBITUARIES

Prof. C. L. Huskins

CHARLES LEONARD HUSKINS, who died at the age of fifty-five in Madison, Wisconsin, on July 26, 1953, was a leading figure in the study of the structure of chromosomes, and in relating the morphological and dynamic aspects of nuclear cytology to genetic behaviour and to cellular function and differentiation.

Huskins was born at Walsall, Staffordshire; when he was nine the family moved to Red Deer, Alberta. During the First World War Huskins served with the 187th Battalion, Canadian Infantry, and as a pilot in the Royal Flying Corps. Returning to the wheat-growing west of Canada, his interests turned to cereal production and the sciences underlying it, and he studied botany and plant breeding at the University of Alberta, receiving the M.S. degree in agriculture for work on the origin of false wild oats. In 1925 he was awarded an 1851 Exhibition scholarship to study for his Ph.D. under R. R. Gates at King's College, London, where he was much influenced by Bateson and his colleagues. The fast-growing field of plant cytogenetics captivated him, and during 1927–30 he was research fellow at the John Innes Horticultural Institution. During this time he travelled widely in Europe and contributed a number of papers on the cytology of cereals and other plants in relation to their breeding behaviour and evolution. He received the D.Sc. of the University of London in 1934.

In 1930 Huskins was appointed associate professor of botany at McGill University. He entered enthusiastically into teaching, and into initiating a Department of Genetics, the first of its kind in Canada, which was formed under his chairmanship in 1934. In his teaching and in building up the research facilities of the Department, Huskins was guided by his energetically expressed belief in the fundamental importance of genetics in biological thought and its value to social and medical science. This belief, coupled with his vigorous personality and wide interests, brought into contact students, colleagues

and friends of diverse disciplines and outlook, and added much to the life of the University and of the wider community. While continuing, together with his students, the cytogenetic study of oats and wheat, his published papers of this period and later cover many fields of interest, notably the structure of chromosomes and their behaviour at meiosis, atypical features of cell division in relation to the cancer problem and the role of the nucleus in growth and differentiation.

Huskins was invited to a professorship in botany in the University of Wisconsin in 1945. He left Canada with many regrets, but kept in close contact with colleagues and friends there and with the Royal Society of Canada, of the Biological and Medical Sciences Section of which he was president in 1951. At Wisconsin he devoted much energy to general questions of education and helped to formulate and put into action the University's programme of integrated liberal studies.

In 1923 Huskins married Margaret Villy, a native of Manchester, who was at that time lecturer in English in the University of Alberta. Her steady wisdom and unusual artistic and spiritual qualities contributed greatly to the delight of their home, always generously open to many students and friends. Her death in March of last year, after a long illness, clouded the closing months of Huskins's life. They are survived by two daughters and a son.

In his scientific approach Huskins combined a mistrust of simplification and generalization with a driving desire to find a pattern in diversity. Never content to isolate a problem, however deeply absorbed in it, he always tried to relate his thoughts and findings not only to neighbouring scientific fields, but also to practical, social and philosophical questions. He was a champion of the exception, and throughout his life his receptive and tenacious mind built up a store of intellectual and spiritual valuables which he sought continuously to set into a meaningful pattern. He had great energy and a taste for the purposeful use of time, effort and material. These characteristics were expressed in a love of physical work (he was skilled in many useful crafts), in quick movements and speech, and in a rich imagination promptly and emphatically expressed. To his students he was a buoyantly enthusiastic and versatile personality and a stimulating friend. He will be sadly missed for the fire and colour which he lent to all his enterprises.

Prof. W. K. Fisher

Walter Kenrick Fisher, professor emeritus of zoology at Stanford University, died on November 2 in California. He was born in Ossining, New York, on February 1, 1878, the son of A. K. Fisher, a prominent naturalist and one of the founders of the U.S. Biological Survey. After a boyhood in New York State and Washington, D.C., his entire academic career was associated with Stanford University, from which he graduated in 1901, with a doctorate in 1906. He was early interested in botany, as well as in art, but turned to zoology as the result of summers as field naturalist with the Biological Survey, and two voyages as assistant on the famous *Albatross* expeditions, in 1902 and 1904. The wealth of collections from these cruises and other Pacific sources led him into the taxonomy of the echinoderms, in which he soon became a recognized authority.

Prof. Fisher published "Starfishes of the Hawaiian Islands" in 1906, and in 1911 there appeared "Asteroidea of the North Pacific and Adjacent Waters", a monograph of the U.S. National Museum. Part 2 of this appeared in 1928 and Part 3 in 1930, making nearly a thousand pages. In 1940 he published "Asteroidea", based on the "Discovery" Expeditions. These are, however, but the chief monuments of his work. Dozens of smaller papers, not only on echinoderms but also on other invertebrates, attested his wide competence.

He was a Fellow of the California Academy of Sciences, and was a curator of its collections during 1916–32. He had a continuing interest in ornithology, having been a president of the Cooper Ornithological Society, and an editor of its journal, *The Condor*.

Appointed assistant professor of zoology at Stanford in 1909, in 1917 Dr. Fisher became resident director of the Hopkins Marine Station, a division of the University, which had just moved to new quarters at Pacific Grove. At first almost alone, later with an increasing resident staff, he studied the rich fauna of the Monterey Bay region, and built up the reputation of the laboratory as a year-round centre of biological and oceanographical investigation. He was an effective teacher, influencing the careers of many students.

After his retirement in 1943, Prof. Fisher found time to develop his artistic ability. He had long illustrated his own scientific papers in beautiful manner, but now he could take up oil painting. Many careful still-lifes and portraits displayed his real talent in this direction: texture and the play of colour on surfaces especially intrigued him. Yet he also continued zoological study, as research associate of the Smithsonian Institution, and was working on collections from that Museum, and naming new species, up to the last week of his life.

In a biological science tending strongly in other directions, Prof. Fisher was admired and respected as a great protagonist of accurate, scholarly taxonomic work. As one of his colleagues recently wrote: "Systematic Zoology has lost one of its best friends, because he combined so many fine qualities with so much zoological knowledge". L. R. Blinks

Dr. A. L. Hagedoorn

By the death of Dr. A. L. Hagedoorn, on November 20, genetics has lost one of its most colourful figures. An iconoclast by nature, he entered with zest into controversy, especially where established notions were the object of attack. Indeed, it was the lure of battle that brought him as an eager recruit into the Mendelian camp in the early days. But argument never soured Hagedoorn; he remained eager, full of wit and zest, always good-tempered and genial, and always ready with help, advice and encouragement.

Hagedoorn was born in Amsterdam in 1885 and studied at the University there for a short while before going to the United States in 1909, where he studied under Loeb at the University of California, obtaining his doctor's degree for a thesis on "The Purely Maternal Characters of the Hybrids produced from Eggs of Strongylocentrotus". He was one of the small band of early Mendelian experimenters, doing pioneer work mainly with mice and to a less extent with rats, guinea pigs and rabbits. He was quick to point out the analogies in the inheritance of coat colours in rodents, though he failed to formulate the generalization which some years later