a width comparable to that of the native flagella. The fine structure of the filaments was not described.

Flagellin was prepared as follows. The bacteria were deflagellated in a blender, and the cells removed by centrifugation. The flagella which remained in the supernatant were concentrated and purified by alternate fast (105,000g for 1 h) and slow (20,000g for 5 min) centrifugation, and then dissociated into monomeric flagellin by adjusting the pH to 2·0 with N hydrochloric acid[2]. Insoluble material was removed by centrifugation at 105,000g for 1 h. The remaining material in the supernatant which contained the flagellin was adjusted to pH 7·0 with 0·1 N sodium hydroxide and then brought to 70 per cent saturation with ammonium sulphate. The flocculent white precipitate was spun down, suspended in distilled water and then dialysed against several changes of distilled water at 4° C. The suspension, which was now opalescent and somewhat viscous, was centrifuged at 105,000g for 1 h and a large, clear, gelatinous pellet was obtained.

Small portions of this material were suspended in distilled water and prepared for examination in the electron microscope by the negative contrast method of Huxley and Zubay[8]. The microscope was a Philips 200 (80 kV, double condenser, 20μ objective aperture).

Much of the flagellin material thus prepared consisted of short structures of filamentous form up to about 2000 Å long; many curved filaments (several thousand Å in length) were also present (Fig. 2b). Occasionally filaments several microns in length and looking like sine waves were seen. All the re-aggregated structures show regularly arranged globules which are lined up both longitudinally and obliquely with respect to the long axis (Fig. 1c). Either 4 or 5 longitudinal rows can be seen (Fig. 2b) and their lateral separation was found to be about 41 Å (20 measurements, ranging from 38 Å to 46 Å). The axial separation of the globules was about 50 Å (26 measurements, ranging from 46 Å to 54 Å). In all these respects the structure of the flagellin filaments very closely resembles that of A structure flagella attached to the bacterium (cf. Fig. 1a and c, Fig. 2a and b), where the corresponding results were 37 Å (17 measurements, ranging from 29 Å to 40 Å) and 51 Å (38 measurements, ranging from 48 Å to 55 Å). Furthermore, as in negatively stained preparations of A structure flagella[4,5], there was no indication of a hollow centre in the flagellin filaments.

We conclude that flagellin molecules can 'self assemble' into curved filaments, presumably helical, which have a fine structure indistinguishable in the electron microscope from that of the original flagella. Perhaps the most interesting problem now is to find whether flagellin filaments can be made to contract or if, as in muscle, this process requires the presence of two protein components.

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NEWS and VIEWS

Director of the Royal Aircraft Establishment: Sir Robert Cockburn, K.B.E., C.B.

Sir Robert Cockburn, chief scientist of the Ministry of Aviation, has been appointed director of the Royal Aircraft Establishment, Farnborough, in succession to Dr. M. J. Lighthill, who is taking up a Royal Society research professorship (*Nature*, 202, 134; 1964). Sir Robert Cockburn took up his new appointment on October 1, 1964. Sir Robert has been chief scientist of the Ministry of Aviation since its formation five years ago (*Nature*, **184**, 938; 1959). He was born at Portsmouth in 1909 and educated at the Portsmouth Secondary School and Portsmouth Municipal College. He entered the Scientific Civil Service in 1937 and served at the Royal Aircraft Establishment, at the Air-Ministry Research Establishment at Worth Matravers and later at the Telecommunications Research Establishment (now Royal Radar Establishment), Malvern. On promotion to senior principal scientific officer in January 1946 he was appointed deputy head of the Nuclear Physics Division at the Atomic Energy Research Establishment, Harwell. He was seconded to the Air Ministry as a scientific adviser, with the grade of chief scientific officer, in September 1948, and on return to this department in January 1954 was appointed principal director of scientific research (guided weapons and electronics). In June 1955 he was appointed deputy controller of electronics and in October 1956 became controller of guided weapons and electronics and three years later was appointed chief scientist.

Physics in the University of Warwick : Prof. A. J. Forty

Dr. A. J. Forty, whose appointment to the chair of physics in the University of Warwick has recently been announced, was educated at the University of Bristol. He took his B.Sc. there, and stayed to work for his Ph.D. under Prof. F. C. Frank. His work was on the mechanism of crystal growth, and the paper by Forty and Frank on the growth of cadmium iodide crystals, showing spiral growth steps associated with screw dislocations, is now a classic. After service in the Royal Air Force, Forty joined the research laboratories of Tube Investments, where he worked for several years. He then returned to Bristol, where he has been directing an active research group investigating the mechanical properties of solids. This research has been on several fronts; notably the direct examination of the atomic processes of damage to crystals by electron bombardment in an electron microscope; the investigation of the physical processes governing stress corrosion; examination of the mechanism of cleavage and fracture of crystals; and the use of ultra-violet microscopy. An interesting by-product of the damage investigations, which may have practical application, has been the observation that lead iodide at high temperatures is capable of forming a photographic image of high definition. Dr. Forty combines a flair for applying fundamental physics to problems of technological interest with an ability to organize fruitful research programmes. His appointment to a new university in a highly industrial region is most fitting.

Physical Chemistry in the University of Strathclyde: Prof. Manfred Gordon

Dr. Manfred Gordon, who has been appointed to the chair of physical chemistry, recently created in the University of Strathclyde, Glasgow (*Nature*, 203, 125; 1964), graduated in the University of London in 1940, and afterwards was awarded the degrees of M.Sc., Ph.D. and D.Sc. of that University. He has had a wide and varied experience in departments of (pure) chemistry, technical chemistry and textile chemistry in the three