Interim Note

by F.H.C.Crick

Studies on the physical properties of the cytoplasm of cells in tissue culture

The general method was described in the report for the year ending 14th September 1948. Since then the work has followed two main lines.

1. Experiments at room temperatures. The lowere temperature reduces the perturbations produced by the living cell.
2. Experiments on two non-biological materials having an elasticity of the same order of magnitude as that of the cytoplasm. The materials were a dilute gel of a clay, bentonite, and an elastic soap solution.

A large number of cinematograph films have been taken and analysed to obtain the necessary curves of angular deflection against time. The previous conclusions about the elastic and plastic nature of the cytoplasm have been confirmed and extended. It has also been established that the cytoplasm is thixotropic: that is, that its "structure" can be temporarily destroyed by mechanical agitation, and that it is not "highly elastic" i.e. if a particle is deflected rapidly through a large angle it never returns completely when the couple is remove . This is in contrast to the behavior of the elastic soap, but in line with that of a very feeble gel of bentonite.

A paper is being written incorporating all these results together with the general theoretical treatment required. It is at present in rough draft.

It will be remembered that in my original application to the Council I stated that I wished to obtain experience on working on living material. The problem suggested to me by Miss Fell and Dr. Hughes has now reached a stage whan it can be conveniently written up. A very brief note on its present state is attached. Although this technique has enabled the approximate elastic properties of the cytoplasm to be measured satisfactorily for the first time, and although many further experiments suggest themselves, both in the biological and in the corresponding physical-chemical field, I do not wish to continue working on this type of problem.

During my first year at Cambridge I attended a number of courses of lectures, mainly in Zoology and Biochemistry, but also in the Physiology and Physical Chemistry Departments, and I have had ample time for general reading in these subjects. This has only served to increase my interest in the structure of the proteins, and to convince me that this is the problem to which I should like to apply myself.

As forshadowed in my original application, therefore, I should like to take up X-ray Crystallography, and to become attached to the M.R.C. group at the Cavendish under Dr. Perutz. He has suggested that I should tackle secretin, a polypeptide of molecular weight about 5000. This is not only of great interest for its own sake, but also for the light it might throw on the structure of myoglobin, haemoglobin and other proteins already being studied by X-rays. This could conveniently be made a subject for a Ph.D. thesis.

Although it has been a very generous one, I would very much prefere not to continue on a studentship. This was very reasonable while I was entering biophysics, but it is bad for one's morale to continue as a student for too long, and I

should like to feel that I could settle down to some years steady research, without having recurrent worries about financial matters.

As to the date for the proposed change I feel it should be as soon as possible, subject to my having completed my work at the Strangeways. Both Miss Fell and Dr. Perutz have agreed to the tentative date of 1st June 1949.