

not possible that the germs are really spores formed in the mycelium and that they break away from the mycelial threads when ripe?"

Nelson, writing on the virus bodies of influenza—film made from lung of a fatal case—says: "Minute germs, many on mycelial threads, not unlike those of the vaccine virus, but if my memory is right they were more on a plexus, whilst these were on isolated chains." My powers of microscopic vision are unfortunately not nearly so keen as either those of Nelson or Merlin, and up to the present time I can only see short thread-like appendages on a few of these minute bodies, but I would like to ask Mr. Barnard if his wonderful apparatus and special illumination has enabled him to see any such minute details on the so-called cancer virus.—I am, etc.,

Bournemouth, July 27th.

ALFRED C. COLES.

** Dr. Gordon's remarks in the Section of Pathology and Bacteriology at the Annual Meeting at Bath on July 22nd were reported last week (p. 192). The full text of his report will, we understand, be published shortly by the Medical Research Council.

SIR,—Dr. Gye's recent investigations¹ have been of special interest to me, because I believe his virus will prove to be identical with the ultramicroscopic phase of the complex micro-organism which I described in 1921. This micro-organism I have obtained from a large number of cancers of all types. I have shown that the larger elements (coccal, bacillary, fungal) which soon appear in any ordinary culture medium containing a piece of cancerous tissue can be traced directly from minute elements, which emerge from the cells, or indirectly from an amorphous material, which escapes from the cells as globules and rods and which in this early stage is often curiously resistant to ordinary stains. This unstained "plasm" often first appears in and escaping from the dying cells as minute elements just on the verge of visibility. A study of these facts led me to write in 1922 that "the organism has, during its parasitic phase, acquired the faculty of infecting individual cells and of living in a sort of symbiotic relationship with the cells which it inhabits. This conclusion . . . goes far to confirm the view which I advanced in a previous paper (1921) that the organism lives parasitically in a minute phase which is unrevealed by ordinary methods of staining." The globules and rods can sometimes be seen to emerge from the cells with a clearness that is diagrammatic. The organized forms (coccus, bacillus, yeast) often spring from refractile elements which appear in and are detached from the globule and rod. Glover of New York and his colleagues have recently described a microbe which they have obtained from all types of cancer and whose general characters are similar to mine.

A remarkable feature of this micro-organism is that the alternative forms, although springing from one common stock, can pursue each an individual and stable life as coccus, bacillus, or yeast, and they may resist any efforts to change them, although I have frequently, during five years' study, convinced myself that under certain conditions any one form can pass over into any other form. These facts are foreign to ordinary bacteriological teaching and have made my views uncongenial to many bacteriologists, although there is a great deal of evidence in the literature to support them (Löhnis, Mellon, de Negri, Hort, Almquist, etc.). It is, I believe, apparent from the recent literature that fixity of form in bacteria is illusory as a criterion of specific characters, for, as Löhnis, Mellon, I, and others have shown, the alternative phases of the same organism can often and probably usually pursue an independent true-to-type existence. It is sometimes urged that such a conception is opposed to the facts of biology. This is not so. It is opposed to much of the traditional teaching of bacteriology, but it is obviously in conformity with the great biological fact that a multitude of different cellular elements, each capable of independent propagation, are commonly derivable from one common germ-plasm. The further back we go in the world of life-forms the more we find the differentiated cell retains the multipotential characters of the original plasm. In the bacteria this retention would seem to be complete. The essential resemblance between the

primitive bacterial matrix and the germ-plasm of higher life led me to name the former the bacterioplasm.

The first indications of these facts in regard to the cancer parasite came to me when I discovered that "plasm" rod or globule, minute granule or thread (in this stage strikingly similar to Rickettsia), bacillus or coccus could apparently, depending on the culture medium and other factors, be derived indifferently from the cells of the same piece of cancer. The confirmation of these facts came with the discovery that from the same "plasm" all the different forms were derivable. In this stage the refractile granule is a common index. During this phase the germinating "plasm" is easily mistaken for masses of debris to which the bacterial forms have adhered. As Löhnis has pointed out, in the past it has been commonly looked upon as dirt.

With the attention now being paid to the cancer parasite I look forward confidently to an early confirmation of these views first published in 1921. For long I have been urging that a similar reorientation of the bacteriological mind would probably quickly resolve the difficulties surrounding typhus, influenza, small-pox, etc. If it be true that Weigl, Breinl, and Feigin have all succeeded in deriving the *Bacillus proteus* (X 19) commonly associated with typhus from the Rickettsia of typhus, we have the first augury of the unexpected facts which will transpire with the application of this broadened outlook. We can safely prophesy big developments along the same lines in the near future.

That familiar bacteria may possess a filterable phase is suggested by the work of Heymans (*B. anthracis*), Valtis, Vannucci, etc. (*B. tuberculosis*), Almquist (*B. typhosus*), Hort (*Meningococcus*), and Löhnis. The very striking investigations of Löhnis make it likely that all bacteria have a filterable mode of life; it may even be that this is the essential parasitic form of all bacteria.—I am, etc.,

JAMES YOUNG,

Edinburgh, Aug. 1st.

CANCER: BURIAL OR CREMATION?

SIR,—I am writing to urge that the profession should advocate cremation in cases of persons dead of cancer. I understand that cancer is now shown to be caused by a filter-passing germ. Now if a germ will pass through a porcelain filter, surely it will pass through any soil, either gravel, chalk, or clay, and will slowly percolate downwards until the deep water be contaminated.

Macaulay, in his history, calculates the population of these islands in 1685 as about five million. We are now nearly forty million, which means that if by burial the deep water is contaminated, it is now nearly eight times more likely to happen than in the reign of Charles II.

May not the increase of cancer be due to this? Burial or cremation are essential for the disposal of the dead, but it cannot be pleaded for burial that it is an imitation or following of Nature's way of disposing of a dead body. I think it is quite possible that we are taking too much comfort from the old saying "Out of sight out of mind."—I am, etc.,

Yattendon, Berks, July 20th.

F. A. BRODRIBB,

COLLECTIVE INVESTIGATION OF RHEUMATOID ARTHRITIS AND ALLIED CONDITIONS.

SIR,—After a long and pretty extensive experience I can say without hesitation that rheumatoid arthritis and allied conditions cause more human suffering and incapacity than that produced even by malignant growths.

It seems to me that their collective and intensive investigation might very well be undertaken with rather more hope of beneficial results than in the case of cancer.

No doubt the study of etiology and pathology should receive due attention, but I do not think that it should be at all necessary to postpone the making of careful therapeutic experiments until all points as to nature and causation have been fully and finally settled. Of course, many such experiments have been made and are being made daily—and they will continue to be made. It would be necessary to collect and correlate the nature and results of past, present, and future work carried on in special institutions as well as in general and special practice.

The sending out, the filling up, and the co-ordination of

¹ See BRITISH MEDICAL JOURNAL, July 25th. p. 174