

of the virus itself. The study of the absorption of the material will be the key of further optical improvement in microscopy.

Dr. M. H. Gordon dealt with the problem of the filter-passing viruses in the light of his experimental work on vaccinia and variola. These diseases are particularly suitable for the preliminary attack on the problem since a small animal is available that is susceptible to the virus, and the lesions produced by the virus are so characteristic that there is no likelihood that they will be mistaken for accidental lesions. In his work Dr. Gordon decided that since the cultivation of the virus and any attempts to make it visible by microscopic means are beset with difficulties, the most promising line of attack is by the methods of immunity. Vaccinia also satisfied the criterion of particulate matter, and centrifugalisation can separate infectious material into layers of varying infectiousness. Vaccinia is filterable, but only with special precautions, *e.g.* after previous treatment of the material with trypsin.

Active immunity to vaccinia can be produced not only by normal living virus but also by means of heated attenuated virus. In rabbits a passive immunity can also be transferred. Agglutination and complement fixation experiments have been done with the virus and its immune serum. Agglutination of the virus is easily visible with the naked eye or with a hand lens. Preparations of the agglutinated material show objects which bear a close resemblance to those figured by Dr. Gye and Mr. Barnard in their paper on cancer. The use of the agglutination method has given some interesting results. Material from confluent smallpox and from the so-called Alastrim absorbs the agglutinin in the same way as the homologous virus of vaccinia. From the point of view of agglutination, the close relationship, if not identity, of these three diseases was confirmed. Dr. Gordon finds a very striking susceptibility of vaccinia virus to potassium permanganate, which is more destructive than the customary disinfectants. Potassium permanganate in 1 in 100,000 dilution destroys

the virus in a short time. This curious susceptibility of the virus may, indeed, to some extent, explain the result credited to this drug in the treatment of smallpox. Dr. J. E. McCartney stated that in the case of herpes virus he has been unable to separate virus from its suspension fluid by means of spinning. This he ascribed to the activity of the virus at much greater dilutions than that of the sarcoma or vaccinia viruses.

As was to be expected from the great interest that has recently been taken in the action of light and other physical agents in medicine, this subject was also prominent at the Bath meeting. Three discussions dealing with different aspects of this subject were included in the programme. Prof. S. Russ opened a discussion on the pathological basis of treatment by radiation with a general statement of the physical problems involved. Dr. E. T. Strangeways gave an account of experiments on the effect of X-rays on the division and development of tissue cells grown *in vitro*. He has been able to kill chick embryos while in the shell with X-rays, though after death of the embryo as a whole, successful tissue cultivation could still be made.

Miss M. E. Hume discussed the action of ultraviolet light on rickets, and the relation of light effects due to vitamin A. Dr. Canti described the action of radium on the mitosis of cells in human carcinoma.

In the Section of Therapeutics, Prof. W. E. Dixon opened a discussion on the therapeutic action of light; and in the Section of Public Medicine, Prof. Leonard Hill dealt with the influence of sunlight and artificial light on health. In all these communications there was the healthy sign that this branch of medicine, which a short time ago was in an empirical state, is now rapidly being co-ordinated on a scientific and experimental basis. Prof. Russ's concluding remarks seem to sum up the present position with regard to this branch of experimental medicine. "There is nothing so depressing as being told that we are only at the beginning of the subject. I do not think that this is the case, but rather that we are well in the middle of it."

### Strong Electrolytes.

A SERIES of papers on the activities of strong electrolytes, by G. Scatchard, appears in the Journal of the American Chemical Society for March. The activity of hydrochloric acid was obtained from measurements of the E.M.F. of the cell  $\text{Pt}(\text{H}_2)/\text{HCl}, \text{AgCl}/\text{Ag}$ . The hydrogen electrode was of a rocking pattern suitable for use in a thermostat and simplified by the absence of a liquid junction. The activity coefficients obtained agree with those calculated from Randall and Vanselow's freezing-point measurements; the values at low concentrations are consistent with Debye and Hückel's limiting equation, the theoretical value of the constant in that equation being retained. The activities of potassium, sodium, and lithium chlorides are also considered; the existing data are compared and discussed in the light of Debye and Hückel's theory.

Individual ion activities have always been calculated through one of three assumptions, namely, (1) that the activities of the ions in a uni-univalent electrolyte are equal; (2) that the above is true in the case of potassium chloride, and that the activity of an ion depends only upon the total ionic concentration and not on the ions with which it is associated; (3) that the saturated potassium chloride bridge eliminates liquid-junction potentials. Assumptions (1) and (2) are in general incompatible; assumption (3), however, is quite distinct and is compared with the first two by G. Scatchard by measuring the E.M.F.'s of the cells,

$\text{Pt}(\text{H}_2)/\text{HCl}, \text{AgCl}/\text{Ag}$  and  $\text{Hg}/\text{HgCl}, \text{KCl}(\text{sat.})/\text{HCl}/\text{AgCl}/\text{Ag}$ , the latter containing a flowing junction.

The results indicate that assumption (2) above is correct and that the saturated potassium chloride bridge gives a liquid-junction which does not vary with the acid concentration. The liquid-junction potential alters slightly on stopping the flow. In more concentrated solutions the chloride ion appears to attain a maximum activity, whilst that of the hydrogen ion appears to drop to a minimum value. The results obtained enable certain single electrode potentials to be accurately calculated.

From a series of papers by H. S. Harned on the subject in the same issue of the Journal of the American Chemical Society, the activity coefficient and the vapour pressures of the solutions are calculated from the E.M.F. of the cell  $\text{H}_2/\text{NaOH}(c_1)/\text{NaHg}/\text{NaOH}(c_2)/\text{H}_2$ . The activity coefficient of potassium hydroxide is greater than that of sodium hydroxide at concentrations greater than 0.05 molar. In the presence of sodium chloride the logarithm of the activity of the hydroxide (concentration less than 0.5 molar) is a linear function of its concentration at constant total molality. For potassium hydroxide in potassium chloride solution the activity coefficient is greater than that of sodium hydroxide in a sodium chloride solution when the hydroxides and salts are at the same strength. W. Lucasse records the activity coefficients and transport numbers of the alkaline-earth chlorides in the same journal.