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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

THE ACTUAL NUMBER OF TUBERCLE BACILLI WHICH MAY BE PRESENT IN TUBERCULOUS SPUTUM.

DR. GEORGE H. F. NUTTALL of Johns Hopkins University, in the last number of the "Johns Hopkins Hospital Bulletin,"[1] describes at length a method by which he has been able to make accurate estimates of the actual numbers of tubercle bacilli present in tuberculous sputum. His communication is accompanied by cuts of the apparatus used. The methods heretofore employed for estimating simply the relative number of tubercle bacilli in sputum are condemned as unscientific. Nuttall's observations for the first time give us an idea of the enormous number of tubercle bacilli which a patient may expectorate in the course of twenty-four hours.

In three cases undergoing the Koch treatment observations on the numbers of bacilli in the sputum were made every few days. In the first case the patient expectorated two billions of tubercle bacilli during the twenty-four hours; after the patient was inoculated with tuberculine the number of bacilli rose to three and four billions; after the inoculations ceased the number fell again to two billions.

In the second case the number of bacilli in the sputum varied between twenty and one hundred and sixty-five millions on the days preceding the Koch inoculations, rose irregularly to two hundred and eighty-three millions after the first inoculation, and fell to only two hundred and sixty-five thousand by the time the sixteenth inoculation had been reached. The third case showed a decrease from seventy millions before the inoculations to twelve and nineteen millions after treatment had commenced.

A great rise in the number of tubercle bacilli in sputum was observed in one case (which was not undergoing the Koch treatment) to occur simultaneously with the appearance of elastic tissue. The number of bacilli in this case rose from between three and four hundred millions to over four billions.

[1] A Method for the Estimation of the Actual Number of Tubercle Bacilli in Tuberculous Sputum. With a Note on the General Application of the Method to Bacteriology. By George H. F. Nuttall, M.D., Ph.D. (Göttingen). Reported before the Johns Hopkins Hospital Medical Society, April 6, 1891.

The accuracy of the method is shown by a number of control and culture experiments. Nuttall believes his method will prove valuable in any experiments where it is desirable to introduce a definite number of organisms into culture media, disinfectants, etc. In point of accuracy it far surpasses the loop method generally employed. With such organisms as the tubercle bacillus this method will enable the experimenter to determine the number he is inoculating into an animal in a way that has not been possible hitherto. Inoculations made under such conditions will clearly show the difference in degree of virulence possessed by various organisms, as also the relation between the number of bacteria introduced and the progress of the disease. This method finally brings us a step nearer to solving the problem of the significance of involution and degeneration forms of bacteria.

COLOR-PHOTOGRAPHY.

AT the reading of a paper on "Chromo Photography in Practice," by Leon Vidal, before a recent meeting of the Photographic Society of Great Britain, in London, a collection of photo-mechanical pictures in color was shown, from different countries, and made by different processes. According to the *British Journal of Photography*, the majority of the examples shown were far in advance of anything of the kind produced heretofore.

The journal mentioned goes on to say that the majority of the pictures are produced by methods analogous to ordinary chromo printing processes, inasmuch as different matrices are used for the different colors. The printing plates or stones being made more or less by the aid of photography, as an incentive to experiments in this direction, the journal indicates some of the methods by which prints in color may be obtained, and probably the ways by which the majority of those exhibited were made.

In 1876 M. Ducos Duhauron patented a method which he termed "photographs in colors." His method was to obtain three negatives of the subject, one by green light, another by yellow, and a third by violet light, by means of colored screens; aurine, eosine, and chlorophyl being employed as different color sensitizers. From the three negatives thus obtained prints were made on semi-transparent media, prepared with the complementary colors, and then superimposed on each other. The late Mr. W. B. Woodbury devised a process for producing prints in color. It was this. He made a Woodbury print on paper which had previously had the appropriate colors printed upon it by lithography. By this process Léon Vidal, some years ago, produced some excellent work, and evidently does so still, as proved by the specimens exhibited.

Another plan is to take three or more negatives of the same subject, and then stop out by hand in each certain portions representing the various colors, finally using these negatives to prepare printing plates or stones for successive printings, as in the case of chromo-lithography. By this system chromo-collotypes have long been made.

Messrs. Goupil & Co. have for some years past been producing photogravures in colors in one printing from a single plate. The method is this. The intaglio plate is inked in with different colored inks applied locally as required. This method is a somewhat tedious one, and necessarily requires considerable artistic skill on the part of the printer. Notwithstanding this, the firm have shown many excellent examples from time to time in the exhibitions of the Photographic Society. Instead of applying different colored inks on the same plate, it is obvious that separate intaglio plates can be prepared for the different colors and used for separate printings.

In his paper Léon Vidal alluded to the original method of superimposing a Woodburytype in monocrome on paper printed with suitable colors by lithography, and also treating similarly printed paper by imposing upon it a collotype print, as being the best in practice. He also expressed the opinion that the claims, which had been put forward by some, that the effects of nature could be obtained by the photographic selective character of the negatives