

the other hand, selenium dioxide is highly toxic. In mice 0·001 grm. causes death in a few minutes.

It would appear, then, that colloidal selenium cannot be the substance used by Professor Wassermann, as his preparation is highly, but apparently irregularly, toxic. In this connexion it may be well to remember that, as I have already said, colloidal selenium upon slight provocation, such as heat or exposure to an acid atmosphere like that of Glasgow, is transformed gradually into the dioxide, and in the earlier experiments with it in this laboratory we had many disasters before we discovered the cause. The possibility of colloidal selenium being supposed to possess the toxic characters of Wassermann's compound is thus rendered obvious.

Real combinations of eosin and selenium of doubtful composition have also been tried. Eosin is insoluble in an acid medium, and if a solution of eosin be poured into a solution of, say, selenium dioxide (selenious acid) or selenic acid, a precipitate is formed. These precipitates in some cases contain selenium, but injections of these, though highly toxic, apparently have no selective action upon the tumour cells. Again, after the precipitate has been formed, it may be dissolved by the gradual addition of an alkali. The properties of the resulting solutions vary according to the alkali used, but none of those tried here have had any selective action upon the tumours, though they are highly toxic.

My object in writing is not so much to give an account of negative experiments as to place on record the effect of colloidal selenium under experimental conditions in the treatment of tumours in a large number of animals, in order that undue optimism may not be excited by reports of isolated cases of cancer in the human subject which are stated to have been cured.

Glasgow.

## STERILE ABSCESSSES FOLLOWING THE USE OF TUBERCULIN.

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RECENTLY tuberculin has become widely used in the treatment of pulmonary tuberculosis. One or other of many preparations is used and at times considerable doses are given. For the first seven months of 1911, for Brighton municipal work, the preparation T.R. was used. To a few patients, large doses of  $\frac{1}{2}$  to  $1\frac{1}{2}$  mgm. were given with no formation of abscess. Since August the preparation B.E. has been used in gradually increasing doses. As it happened, a considerable number of patients reached large doses about the same time, and 13 of these developed cold abscesses.

*Dose followed by abscess.*—12 of these 13 patients had received  $\frac{1}{5}$ ,  $\frac{1}{10}$ , or  $\frac{1}{20}$  mgm. at the abscess sites; the thirteenth had only received  $\frac{1}{50}$  and  $\frac{1}{40}$  mgm.

*Time between injection and abscess.*—The times which elapsed between the injections and definite abscess formation were usually two to three weeks, but in some cases the interval was longer, in one case being as much as nine weeks.

*Effect on the general health.*—Fortunately, the formation of abscess, its consequent evacuation, and the slow healing up of the abscess cavity seemed in no way to affect the general health of patients. Workmen with abscesses on their arms were able to continue to do heavy work, which did not seem to interfere with the healing process.

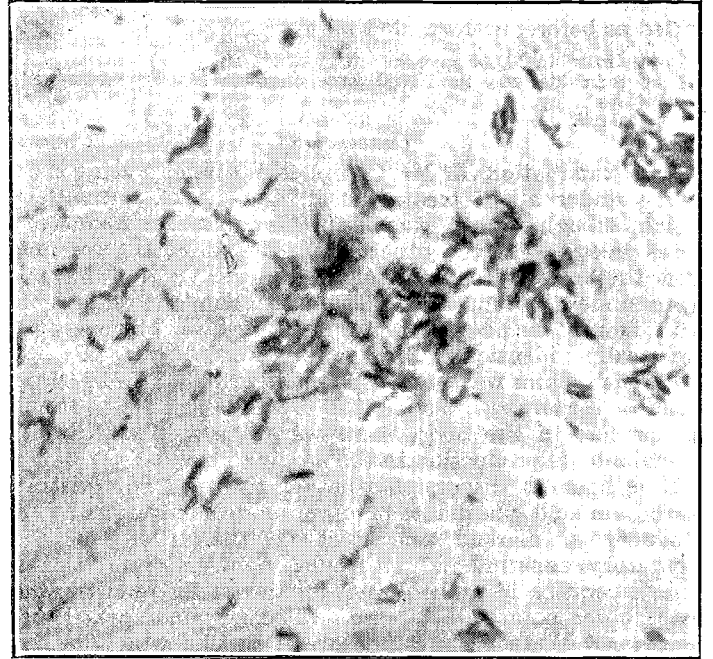
*The cause of the abscesses.*—Pus drawn from the abscesses before they had pointed showed no other organisms than tubercle bacilli. Tubercle bacilli in such pus might have been derived from the patient.

Stained preparations from the stock bottle and dilutions of the bacillary emulsion which caused the abscesses showed no other organism than tubercle bacilli. A large majority of these bacilli appeared to be intact. Injection into guinea-pigs of both pus and the stock preparation of B.E. did not give rise to tuberculosis or sepsis. The abscesses were due, not to living tubercle bacilli or septic organisms, but to

the irritation caused by the non-absorption of dead tubercle bacilli. (See figure.)

*The reason why this special preparation of B.E. produced abscesses.*—On comparing another preparation of B.E. with samples from the abscess-producing B.E. the appearance was quite different. In the former small rounded masses, evidently parts of broken-up bacilli, were found; in the latter unaltered tubercle bacilli. In this instance we suggest that the abscesses were due to insufficient grinding of the tubercle bacilli used.

The lesson seems to be that B.E. should always be carefully examined microscopically before use, in order that any preparation in which the tubercle bacilli have been improperly ground may be discarded. It is true that after



Photomicrograph of film from abscess-producing preparation of B.E.  $\times 2500$ .

doses of less than  $\frac{1}{50}$  mgm. of an improperly ground preparation no abscess may follow, but in such cases small nodules persist for long periods, the tubercle bacilli not being absorbed.

For bacillary-substance-inoculation T.R. appears to be a safer preparation than B.E. In the preparation of T.R. tubercle bacilli are first ground, thereafter distilled water is added, and the mixture is centrifuged. The upper fluid, T.O., is discarded; the deposit is dried, re-ground, again mixed with water, and centrifuged; the supernatant fluid is, however, preserved. The process is repeated again and again until no deposit remains, the various supernatant fluids, with the exception of the first (T.O.) being mixed together to form T.R. In the preparation of B.E., the bacilli are pulverised, but not to the same extent as is the case in the preparation of T.R. The repeated grinding of the latter makes it readily absorbable and thus removes any risk of abscess.

Sterile tuberculous abscesses seem to have no bad effect on the general health of patients. Their formation, however, discredits tuberculin treatment and, especially in an outpatient department, is a cause of great anxiety.

Risk of abscess has led us entirely to discontinue the routine use of B.E. It has also impressed on us the advantages of the finely-ground, and therefore easily absorbed, preparation T.R.

Brighton.

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