cordially agree, if I may supplement them thus: "The influence of the strenuous life upon those whose nervous systems have been already considerably taxed by the presence of refractive error." Do we not see many men leading the most strenuous lives possible, and yet whose nervous systems never falter, and, on the other hand, those whose nerves are shattered, but whose lives have been anything but strenuous? As to heredity, its influence is shown in that the *initial cause* of the neuroses—*refractive error*—in one generation is so frequently *transmitted*, and gives rise to similar neuroses in the next. Do we not have instances of two brothers, or two sisters—the one with a normal, evenly balanced nervous system and normal refraction, the other with *inherited refractive error*, and the highly strung *neurotic* temperament?

It is my firm conviction that it is from the more general recognition, both by physicians and ophthalmic surgeons, of what I have indicated as the initial or predisposing cause, and the earlier and more effectual treatment of it, that we must hope for a diminution of this appalling number of suicides, and that relief and happiness may be brought to that vast number, who, victims of insomnia and neurasthenia, or "nervous breakdown," are dragging along a miserable existence.

Harrogate.

EXPERIMENTS ON THE GERMICIDAL ACTION OF COLLOIDAL SILVER.

BY W. J. SIMPSON, C.M.G., M.D. ABERD., F.R.C.P. LOND.,
PROFESSOR OF HYGIENE, KING'S COLLEGE, LONDON;
AND
R. TANNER HEWLETT, M.D. LOND., F.R.C.P. LOND.,
PROFESSOR OF BACTERIOLOGY IN THE UNIVERSITY OF LONDON.

SOME years ago Mr. Henry Crookes[1] observed a peculiar action of some metals in inhibiting the growth of bacteria in their neighbourhood. This was afterwards recognised as being due to a germicidal action brought about by the metals being in a colloidal state. We have recently carried out some experiments on the germicidal properties of colloidal silver in the form of a liquid, collosol, prepared by Mr. Crookes. The experiments were all carried out on the typhoid bacillus by the following methods:—

1. *By the Rideal-Walker or drop method.*—In this the disinfecting power of collosol on the typhoid bacillus in water was compared with that of phenol under identical conditions, the maximum period of exposure to the disinfectant being 15 minutes. We have found that within this period even a 1 : 2000 solution of collosol does not kill the typhoid bacillus (i.e., within 15 minutes), this being only just accomplished by a 1 : 500 solution. This result indicates that collosol would be somewhat slow in acting if used as an ordinary disinfectant. The preparation is, however, too expensive to be employed and is not suggested for this purpose.

2. We next tested collosol by the method suggested by Mr. Crookes—viz., the collosol solution was mixed with nutrient broth so as to give a 500 per 1,000,000 strength. Other dilutions of this were prepared—viz., 100, 50, 25, 10, and 5 per 1,000,000 with nutrient broth, and six tubes, each containing 10 c.c. of these various dilutions, were prepared and inoculated with one drop of a 24-hour broth culture of the typhoid bacillus. The inoculated tubes were incubated at 37° C. and subcultures were made after 24 hours. It was found that no growth occurred in the inoculated tubes except in the weakest dilution (5 per 1,000,000). Subcultures made with three loopfuls from these tubes similarly showed no growth with the exception of the subculture made from the 5 per 1,000,000 dilution.

As the determinations made by the Rideal-Walker method indicated that a greater strength than this—viz., 1 : 500—would be required to be efficient for short exposures, experiments were made as above by the method suggested by Mr. Crookes, but subcultures were made from the inoculated tubes at 15 minutes, 30 minutes, one hour, and two hours after inoculation, in addition to 24 hours. The result was that growth occurred from most of the dilutions after 15 and 30 minutes' exposure, as shown by the following table:—

—	Subcultures made after					Original tubes after three days.
	15 min.	30 min.	One hour.	Two hours.	24 hours.	
500 per million	+	0	0	0	0	0
100 ,, ,, ...	0	0	0	0	0	0
50 ,, ,, ...	+	+	0	0	0	0
25 ,, ,, ...	+	+	0	0	0	0
10 ,, ,, ...	+	+	+	0	0	0
5 ,, ,, ...	+	+	+	0	+	+

+ = growth; 0 = no growth in the subcultures.

This again shows that collosol is somewhat slow in acting, the best results being obtained only after more than one hour's exposure. It was thought that it might be interesting to test mercuric chloride in the same manner for the sake of comparison. A fresh 1 : 500 aqueous solution of mercuric chloride was made and diluted with broth in precisely the same manner as the 1 : 500 collosol, and tested as in the last-named experiment. The results were as shown in the subjoined table.

—	Subcultures made after					Original tubes after three days.
	15 min.	30 min.	One hour.	Two hours.	24 hours.	
500 per million	+	0	0	0	0	0
100 ,, ,, ...	+	0	0	0	0	0
50 ,, ,, ...	+	+	0	0	0	0
25 ,, ,, ...	+	+	0	0	0	0
10 ,, ,, ...	+	+	+	+	+	0
5 ,, ,, ...	+	+	+	+	0	0

Ammonium sulphide was added to neutralise any mercuric chloride carried over. The results obtained with mercuric chloride are therefore very similar to those obtained with collosol, but if anything the mercuric chloride proved more inhibitory than collosol in the original tubes. It is to be noted that in the presence of the peptone, &c., of the broth the mercury is largely transformed into a colloidal state and evinces its great activity.

There can be no doubt from the foregoing experiments that colloidal silver in the form of collosol is an active germicide. We understand that the collosols are non-poisonous and have been administered internally.

[1] See Chemical News, May 8th, 1914, p. 217.

ROYAL INSTITUTION.—The managers have elected Professor C. S. Sherrington, M.D., F.R.S., to be Fullerian professor of physiology for a term of three years dating from Jan. 13th next. Among the lectures arranged to be given at the Royal Institution before Easter are three by Dr. Henry G. Plimmer on Modern Theories and Methods in Medicine: (1) Medicine and Science; (2) Immunity; and (3) Methods and Results. Dr. Chalmers Mitchell will give three lectures on Zoological Studies: War and Evolution. Sir Rickman Godlee is announced to give one of the Friday evening discourses, which will begin again on Jan. 22nd.