cerebri are those chiefly concerned, and a course of treatment with extracts of these glands is suggested. Violent exercise, excessive standing, and constipation should be avoided and attention to general hygiene counselled.

The technical details in the foregoing paragraphs are written with the approval of Professor Sicard and Dr. Gaugier, to whom I again express my thanks and indebtedness for enabling me to place them before their British confères.

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A NEW METHOD OF TREATMENT OF LEPROTIC INFECTION OF THE NASAL MUCOSA.

BY

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THOUGH in leprosy the nasal mucous membrane is no longer held to be a common site of the primary lesion, it nevertheless remains true that, particularly in cases of the so-called systemic type, the nose, either internally or externally, is a region of very great importance with regard both to frequency of involvement and persistence of infection. In pure nerve leprosy, however, nasal lesions are not common, and indeed probably all supposed nerve cases which show infection of the nasal mucous membrane should be considered to belong to the systemic type.

External lesions of the nose show features no different from those of lesions of the skin covering other parts of the face. Internally the nasal mucous membrane may be the seat of a generalized infiltration of the whole mucosa or localized infiltrations of the septal mucosa, which, when they ulcerate, as sometimes happens, are very difficult to treat. The lesion may spread to the cartilage of the septum, leading to perforation or to complete destruction, or it may extend to the skin at the margins of the alae nasi, forming a creeping ulceration, which gradually erodes the skin and underlying tissues. Probably in some cases the accessory sinuses become involved, and in many, generally advanced, cases it spreads backwards with infiltration and ulceration of the nasopharyngeal and laryngeal mucous membrane. A few early cases of the systemic type have been seen in which the first visible lesion was in the skin of the nose. In these the nasal mucous membrane, at first uninfected, later became involved, apparently by direct extension from the skin.

The affected mucous membrane is never insensitive, sometimes it is highly sensitive, and the ulcers which occasionally form tend to become encrusted and to remain so for long periods. The removal of these crusts causes haemorrhage, which may be severe, and one never fails to find numbers of bacilli beneath. If, when taking a swab, the crust is not removed, the smear may be negative. Wade and Solis¹ have stressed the importance of examining the nasal mucous membrane of the "negative" leper. In this country great emphasis has been laid on such examination, probably too great, for cases bacteriologically negative are not segregated and are *ipso facto* deprived of treatment, which is carried out only at the Leper Hospital. These cases at length swell the ranks of the mutilated victims, who still form a large proportion of our segregated lepers. Our experience here is that some 70 per cent. of cases of the systemic type and some 20 per cent. of cases of the nerve type show infection of the nasal mucous membrane before treatment.

Of late years we have been fortunate in obtaining a number of early cases where nodular infiltration has barely commenced, or at any rate is by no means widespread.

In these cases, where nasal infection exists, it tends to persist after the nodules have disappeared. Moreover, in many cases, particularly of the nerve type, this persistence may postpone for some time the conditional discharge of the patient. From these considerations the importance is obvious of a line of treatment which will sterilize the nasal mucous membrane in a few months.

Technique of Treatment.

Ionization appears to bring about the required result. At first we used a 1 per cent. solution of sodium salts prepared in this laboratory by saponification from "hydnoceol," which is pure creosoted hydnoceol oil supplied under this trade name by Messrs. Smith, Stanistreet and Co., Calcutta. Afterwards we used alepol, potassium iodide, and sodium chloride in 1 per cent. solution. The ionization current was obtained either from a galvanic battery or from the main through one of the galvanosets manufactured by the Medical Supply Association, London. Nasal electrodes were improvised from the ordinary small "button" electrodes, wrapped in absorbent wool which had been immersed for a short time in the solution to be used. One electrode was placed in each nostril, pushed well up and kept in position by means of bandages or rubber bands. The patient was told to breathe through the mouth, and a current, whose amperage (usually 20 to 30 ma.) was limited by his capacity of endurance, passed for twenty to thirty minutes.

Type of Cases Treated.

The patients treated may be divided into three groups. (1) Thirteen cases of both systemic and nerve types who had received the usual general and specific treatment for periods varying from nine months to two years, with disappearance of all signs save infection of the nasal mucous membrane. (2) Ten cases, all of the systemic type, under treatment for similar periods, but still showing other signs of activity besides intranasal infection. (3) Two cases of the systemic type before commencing treatment. All these patients were examined once weekly, the whole surface of the nasal mucous membrane being swabbed on both sides to the point of abrasion. The whole slide was examined before being returned as negative or as showing very few bacilli. Five controls, including representatives of the first two groups, were similarly examined week by week.

Results of Treatment.

No lessening of the number of bacilli is apparent until about ten to fourteen days after treatment. Bacilli may disappear after one or two sessions, but frequently there is a relapse, and at least three sessions, generally more, at fortnightly intervals, appear to be necessary for permanent cure. The treatment is somewhat unpleasant, but is readily borne, even by small children, and patients say that nasal breathing is much freer after the treatment. About two weeks after the last of three or more sessions, often after only one or two, the bacilli either disappear or become fewer in number and hard to find on the slide. Later there comes a stage when negative results alternate with positive, a stage which, as the Culion workers have pointed out, often precedes the permanent stage in cases improving under general treatment.

Thirteen of the twenty-five cases treated have been returned at least once as negative, some eight times in succession, though only six had at any time since their admission given a negative result, and then in each case on a single occasion.

Nineteen of the twenty-five have either become negative or show such a reduction in the numbers of bacilli that they have become very hard to find. In the other six cases, all of long standing, it is possible that the sinuses had become involved. The controls showed no such reduction or extreme variability in the results of nasal examination.

It is impossible at present to say whether the cure is permanent, for only two months have elapsed since the conclusion of treatment in many of the cases, but owing to the impending absence of the writer on long leave it was thought desirable to publish these results at once, with a view to confirmation by others who may wish to try the method.

Summary.

Ionization of the nasal mucous membrane with a 1 per cent. solution of certain drugs, especially alepol, produces in many cases an apparently complete cure of leprotic lesions in this site.

It is particularly effective in otherwise negative cases where infection of the nasal mucosa persists, but even cases which have not yet undergone other treatment react.

The ulcers heal and nasal breathing becomes freer after treatment.

Some of the cases have been consistently negative for two months, which is the longest period that had elapsed between the conclusion of treatment and the writing of this paper.

If these results are confirmed it is clear that in a large number of cases the duration of segregation may be considerably curtailed.

REFERENCE.

¹ Wade and Solis: *Journal of the Philippine Islands Medical Association*. Vol. 7, April, 1927, No. 4, p. 111 et seq.

THE COMBINATION OF ANILINE DYES AND RADIATION IN THE TREATMENT OF TUMOURS.

BY

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ANILINE dyes have been widely used in attempts to cure cancer in the human subject, and various claims have been made. Recently Mr. Frank Coke has been using preparations of the fluorescein series. The best results were obtained with sodium fluorescein, and he is of opinion that better results are obtained by a combination of this drug and hard x rays, than with x rays alone. The fluorescein was administered by local external application and by the mouth. Mr. Coke suggested to me that possibly some specific fluorescent action might be taking place. The following experiments have, therefore, been carried out to test this idea.

A slow-growing rat sarcoma was used. Small pieces, approximately 1 c.mm., were exposed to gamma radiation from two radium applicators of 110 mg. $\text{RaBr}_2 \cdot 4\text{H}_2\text{O}$, having an area of 2 by 2 cm. It was found that whereas three hours' exposure *in vitro* killed the tumour cells, exposure for two and a half hours resulted in no more than delayed growth, when inoculated into rats, as shown in Table I.

TABLE I.—Growth of Slow Sarcoma after Two and a Half Hours' Exposure to Gamma Radiation *in vitro*.

	Days after inoculation—							
	5	7	10	12	14	17	19	21
Rat 1	5×4	6×5	8×6	10×6	13×8	16×11	18×12	22×16
Rat 2	3×3	5×4	7×5	11×6	14×7	16×9	19×10	21×13
Rat 3	o	3×3	5×5	6×6	9×8	12×10	15×10	15×15
Rat 4	o	o	o	6×4	7×5	8×6	11×7	15×11
Rat 5	4×4	5×5	6×5	7×6	8×7	10×9	13×12	14×14
Rat 6	3×3	4×4	4×4	5×5	6×6	7×6	9×7	17×3
Rat 7	o	o	o	o	5×5	8×6	10×7	10×7
Rat 8	o	5×5	6×5	11×6	9×8	10×9	12×11	12×12
Rat 9	4×4	5×4	5×4	5×5	6×5	7×5	8×5	8×7
Rat 10	o	o	o	o	o	o	6×6	6×6

In each of the tables the figures represent the size of the tumours in millimetres. o=Small nodule not measurable.

Small pieces were likewise exposed to various concentrations of fluorescein in Locke's solution, and it was found that 1/80 per cent. solution applied for six hours had no decided effect on the rate of growth of the tumours resulting from the inoculations (Table II).

TABLE II.—Growth of Slow Sarcoma.

	Days after inoculation—											
	5		7		10		12		14		17	
	C	E	C	E	C	E	C	E	C	E	C	E
Rat 1	o	o	6×5	9×5	10×6	14×6	14×8	20×8	16×10	24×14	19×14	33×18
Rat 2	8×5	o	9×5	6×5	12×7	10×6	14×8	12×7				
Rat 3	o	o	o	o	4×4	8×4	7×5	10×6	10×10	14×11	18×11	20×12

C=Control. E=After six hours' treatment with 1/80 per cent. fluorescein.

To test whether the combination of the two agents exhibited any specific effect, exposures of two and a half hours to gamma radiation, and of five hours to 1/200 per cent. fluorescein, were used. The exposures were made in the following manner:

- Eighteen pieces for two and a half hours in 1/200 per cent. fluorescein, Locke's solution. Then for two and a half hours in 1/200 per cent. fluorescein, Locke's solution, and exposed to gamma radiation at the same time. Then for two and a half hours in Locke's solution, after washing in Locke's solution to remove the dye.
- Eighteen pieces for two and a half hours in Locke's solution and exposed to gamma radiation at the same time. Then for five hours in 1/200 per cent. fluorescein, Locke's solution.
- Eighteen pieces, control, for seven and a half hours in Locke's solution.

A and B, therefore, had precisely the same exposures to gamma radiation and to fluorescein; the only difference was that in A the radiation was applied *after* fluorescein treatment, and in B *before* fluorescein treatment.

The fifty-four pieces of tumour were inoculated into nine rats, six pieces into each rat, and the resulting tumours are shown in Table III. There it is seen that the two

TABLE III.—Growth of Slow Sarcoma under Conditions given in the Text.

	Days after inoculation—														
	5			8			11			15			17		
	A.	B.	C.	A.	B.	C.	A.	B.	C.	A.	B.	C.	A.	B.	C.
Rat 1 {	—	—	o	—	—	8×7	—	—	12×10	—	—	18×14			
Rat 2 {	—	—	o	—	—	8×8	o	—	12×10	4×4	—	16×14	6×5	—	L. Ts.
	—	—	o	—	—	6×5	o	—	9×9	o	—	14×11	4×4	—	
Rat 3 {	—	—	o	—	—	7×5	—	—	10×7	—	—	12×9			
	—	—	o	—	—	8×7	—	—	13×9	—	—	15×11			
Rat 4 {	—	o	o	—	o	7×7	—	o	11×9	—	9×7	L. Ts.	—	13×10	
		o			o	8×7	—	o	12×9		3×3			5×5	
Rat 5 {	o	—	o	o	—	7×6	o	—	9×8	6×5	o	13×11	9×9	3×3	16×14
	—	o	—	—	o	—	o	—	—	7×6	o	—	9×9	o	—
Rat 6 {	—	—	o	—	—	5×5	—	—	8×8	—	—	12×9			
	—	—	o	—	—	5×5	—	—	7×7	—	—	10×9			
Rat 7 {	—	—	o	—	—	6×5	—	—	8×8	—	—	12×11			
	—	—	o	—	—	4×4	—	—	7×5	—	—	10×9			
Rat 8 {	—	—	o	—	—	6×5	—	—	9×7	—	—	12×10			
	—	—	o	—	—	4×4	—	—	6×4	—	—	9×8			
Rat 9 {	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	o	—	o	o	—	o	o	—	4×3	5×5	—	8×6	8×8	—	12×10