

of plant tissues does not remove the substances essential for growth which is contained in butter fat." They further say "owing to the large content of waxes, etc., extracted from plant leaves we have not been very successful in feeding ether extract from these sources." We have, however, obtained potent preparations as follows: Spinach leaves and young clover respectively, dried in a current of air at about 60°, were extracted with U. S. P. ether. The resultant green extract, yielding an oily residue equal to about 3 per cent. of the dried plant, was evaporated upon starch. These preparations, fed in daily quantities equivalent to 1-2 grams of the dried plant, promoted recovery and renewal of growth in rats declining in weight on diets deficient in fat-soluble vitamine. Inasmuch as only 30 milligrams per day of the ether extract of spinach sufficed for this purpose it appears that this product ranks among the most potent of the oils heretofore tested.

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Arsenic penetration of the meninges during the treatment of neurosyphilis.

By **H. G. MEHRTENS** and **C. G. MCARTHUR** (by invitation).

[*From the Stanford Medical School, San Francisco, California*].

It is difficult to estimate from clinical results the relative values of the different methods of treating neuro-syphilis. The amount of arsenic that reaches the cerebrospinal fluid may, however, be estimated quantitatively with reasonable accuracy, and the effectiveness of the treatment may be assumed to parallel this amount of penetration.

Quantitative estimations of arsenic penetrating the meninges was made in about 100 spinal fluids. These were divided into the following groups:

Group A—44 cases in which spinal drainage was performed one hour after simple intravenous injection of 0.6 arsphenamine.

Of this number 43 per cent. gave positive test for arsenic, averaging .036 m.mg. of arsenic per c.c.

Group B—23 cases in which the intravenous injection of 0.6 arsphenamine was followed in half an hour by complete drainage of spinal fluid. One hour later a second lumbar puncture was done to determine if complete drainage tended to increase the amount of arsenic penetrating. In 32 per cent. arsenic penetrated in half an hour; in 23 per cent. it had penetrated following drainage. Quantitatively, the average amount of penetrations in the first half hour was .009 and after one hour, .0043 m.mg. per c.c.

Group C—Of 5 cases in which complete drainage was done one hour before the intravenous injection of 0.6 arsphenamine none showed arsenic penetration an hour afterwards.

Group D—In 40 cases the patient's own serum was injected into the subarachnoid space followed in 6 to 8 hours by an intravenous injection of 0.6 arsphenamine. Of the spinal fluid obtained one hour later 92 per cent. showed positive test for arsenic. Quantitatively, these cases averaged .103 m.mg. per c.c.

From these figures it is apparent that the simple withdrawal of spinal fluid either before or after the intravenous administration of arsphenamine does not increase the amount of arsenic which penetrates into the spinal fluid.

On the other hand after the patient's own serum has been injected into his subarachnoid space, the injection of arsphenamine was followed by the appearance of arsenic in the cerebrospinal fluid in the great majority of the cases and the average amount of arsenic obtained was far greater than after simple arsphenamine injections. That the injection of serum caused meningeal irritation was showed by the subsequent cell count of 100 to 2,300 cells per cm. From these observations it may be surmised that the therapeutic results obtained in the Swift Ellis reaction depend in part, at least, upon a lowering of the barrier between the blood and spinal fluid owing to the meningeal irritation. This lowering allows arsenic freer access to the spinal fluid—a result which is in accord with Flexner's observations on the penetrations of antibodies.

Conclusion.—The intradural injection of serum 8 hours before the intravenous injection of arsphenamine definitely increases the penetration of arsenic into the cerebrospinal fluid.