(6) Felton, L. D. (1917).—*New York Medical Journal*, cv, p. 1170.
(7) Cruickshank, J. (1920).—*British Journal of Experimental Pathology*, i, p. 71.
(8) Mellanby, J., and Anwyl Davies, T. (1923).—*Ibid.*, iv, p. 132.

The Spatz Test for Iron in the Brain. (1) By J. S. DUDGEON, M.D., D.P.H.Belf., Assistant Medical Officer, County Mental Hospital, Whittingham.

CONSIDERABLE interest has been shown of late in the occurrence of iron in the brain and its relation to certain nervous diseases.

The existence of the iron can be demonstrated by placing a section of brain in concentrated ammonium hydrosulphide solution. After a few seconds the globus pallidus and the substantia nigra become a greenish-grey colour. Later, the red nucleus, the corpus dentatus cerebelli, the putamen and caudate nucleus also darken. Still later, the corpus mamillare, the anterior part of the thalamus and the cortex cerebri, especially in the deeper layers, also become greenish-grey. These centres always follow in the same order, and it is important to watch the process, as at the end of the reaction they have all darkened to more or less the same degree, and the contrast is lost. In diseases of the extra-pyramidal system this reaction may be of considerable interest, and Spatz (2) reports a case with pyramidal lesion in which there was an abundance of iron in the globus pallidus and substantia nigra; in the majority of such cases, however, he did not find any increase of iron. Gans(3) mentions a case showing marked extrapyramidal motor symptoms, in which he found an increase of iron in the globus pallidus, putamen and caudate nucleus.

In general paralysis the cortex of the brain, especially in the frontal region, in addition to showing the greenish-grey darkening mentioned above, shows a number of fine black streaks and dots which, though easily seen by the naked eye, are more fully appreciated when a hand lens is used.

These are due to the presence of iron in the adventitial spaces of the cortical blood-vessels, and they have been demonstrated in two diseases only, *i. e.* general paralysis and trypanosomiasis.(1) As the latter can be disregarded in this country, the test remains a convenient and rapid method for the pathological detection of

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general paralysis in the *post-mortem* room. The best method is as follows: a slice of the frontal portion of the brain is placed in a glass dish and covered with ammonium hydrosulphide for fifteen minutes. The ammonium sulphide is gently washed off without disturbing the section, and the cortex is examined with a hand lens.

The test may be demonstrated microscopically as follows: a small piece of cortex is placed in formalin for three or four days, after which it is dehydrated and embedded in paraffin. Sections are cut and placed in ammonium hydrosulphide for about 12 hours. They are then washed in distilled water and put into a mixture of 1 *per cent.* hydrochloric acid and a freshly made solution of 20 *per cent.* ferrocyanide of potassium, in equal quantities. After washing they may be counterstained by alum-carmine.

A section thus stained shows the iron as small blue granules in the wall of the vessel. Sections which have remained in formalin for long periods do not respond to the test.

I have obtained definitely positive results in twenty general paralytic brains, all of which showed the clinical signs of the disease during life, and I have not had a positive result in any other disease. Apart from the presence of iron in the vessel-walls the general paralytic brains reacted normally in regard to the order of succession of staining of the different centres.

I am indebted to Dr. R. M. Clark, Medical Superintendent, for permission to publish these results, and to Mr. A. H. Fann, Chief Laboratory Assistant, for the photographs.

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(1) Spatz.—*Zeitschr. f. d. gesamte Neurol. u. Psychiat.*, 1922, lxxvii, p. 261.

(2) Hallervorden and Spatz.—*Ibid.*, 1922, lxxix, p. 254.

(3) Gans.—*Brain*, Part 1, v, xlvi, p. 128.

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