This indicates that the guanidin is chiefly in the form of dimethylguanidin, as it was in the case of adult tetany previously recorded (loc. cit.). In that case the excretion by the urine was 4.8 mg. per kilo a day, against 6.7 mg. in the present case. In the case of active idiopathic tetany in children recorded in 1917² the excretion of guanidin by the urine (determined by the aurichloride method) averaged 0.49 mg. per kilo a day, in latent tetany 0.47 mg., and in a case recovered from tetany 0.12 mg., while in five cases free from tetany the average was 0.116 mg. per kilo a day. In dogs suffering from tetania parathyreopriva the average excretion in the urine (determined by the aurichloride method) was 1.0 mg. per kilo a day.

Later experience has shown that results obtained by the aurichloride method are lower than those by the picrate method, and that the yield depends largely upon the concentration of the solution from which crystallization takes place. While of use in giving comparative results in a series of simultaneous determinations it is somewhat unreliable, and it has been abandoned for the picrate method, which has proved more accurate and much more rapid.

Subsequent observations have shown no excess of ethereal sulphates in the urine when the attacks are frequent. There is no evidence of pancreatic deficiency as tested by Loewi's adrenaline mydriasis test; the amount of diastase in the urine, and the fat, starch, and protein content of the faeces.

Treatment.

A prolonged trial has been made of parathyroid tablets (Armour), gr. 1/20, by the mouth, the dose being increased gradually to three tablets three times daily. No curative action can definitely be ascribed to this treatment, for though remissions have occurred, similar remissions have been seen when the tablets were omitted. The addition of thyroid tablets, gr. v once daily, has so far produced no appreciable effect.

A definite remission followed the week in which the patient was in hospital on a meat-free diet. But in spite of limiting subsequently the amount of meat and meat extracts in the diet, and ensuring regular action of the bowels, the attacks continue to recur at very variable intervals. There is, however, no doubt that their frequency and severity are considerably less than they were. The administration of salol by the mouth has not appeared to influence the attacks. Trial is now being made of calcium salts.

The estimation of the urinary sulphates, and the examination of the faeces for evidences of pancreatic defect, were carried out by G. J. Crawford.

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THE SACHS-GEORGI PRECIPITATION TEST FOR SYPHILIS

AND A COMPARISON WITH THE WASSERMANN REACTION
IN OVER 1,500 CASES.

BY

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THE formation of precipitate in a mixture of syphilitic serum with lipoids or other reagents has been frequently recorded. But it was not until the work of Sachs and Georgi, and Meinicke¹ had defined more precisely the conditions necessary for eliciting the phenomenon that it appeared to compare with the Wassermann reaction in point of specificity and constancy as a test for syphilis. It has been found that with a suitable antigen (alcoholic extract of human heart reinforced by the addition of cholesterol according to the principle for the Wassermann antigen established by Browning, Cruickshank, and MacKenzie), when appropriately diluted and incubated at 37° C. for eighteen to twenty hours, precipitates are produced in the presence of heated syphilitic serums, whereas non-syphilitic serums in similar conditions fail to cause precipitum formation.

Method of the Test.

Antigen.—1 gram of minced human heart muscle (nature of case immaterial), freed from fat, is extracted at room temperature with 5 c.cm. of absolute alcohol for forty-eight hours,

shaking at intervals, and finally filtered; the clear filtrate is kept in the dark at room temperature. To prepare an emulsion for use in the test 1 c.cm. of this extract is diluted with 2 c.cm. of absolute alcohol; to 1 c.cm. of this diluted extract 0.045–0.05 c.cm. of 1 per cent. alcoholic solution of cholesterol is added. Then 1 c.cm. of cholesterolized extract is placed in a 3 by ½ in. test tube and 1 c.cm. of 0.85 per cent. NaCl solution ("saline") is rapidly poured into it from a similar tube (when greater volumes are required correspondingly larger tubes are used); after the mixture has stood for five minutes at room temperature, 4 c.cm. more of saline are added rapidly in the same fashion as before and the emulsion is used for the test after standing for five to fifteen minutes at room temperature. The antigen should appear opalescent, but without flocculi when examined with a hand lens. (When the antigen has stood by itself for a longer time—for example, more than twenty minutes at room temperature, visible precipitation sometimes occurs in the antigen control on incubation.)

Serum (within seven days after withdrawal of blood) is tested after standing for several hours at room temperature, subsequent to heating for thirty minutes at 55° to 56° C.

As controls for a series of tests (1) negative, weak and strong positive serums are used as in carrying out the Wassermann reaction; (2) a tube containing the lipid emulsion and saline is included as the antigen control.

The reagents are measured in the following order into 3 × ½ in. test tubes in the amounts shown. The contents of each tube

Main Test.		Serum Control.	Antigen Control for each Series of Tests.
First Tube.	Second Tube.	Third Tube.	
0.9 c.cm. saline + 0.05 c.cm. serum + 0.5 c.cm. antigen	0.9 c.cm. saline + 0.1 c.cm. serum + 0.5 c.cm. antigen	0.9 c.cm. saline + 0.1 c.cm. serum + 0.5 c.cm. 16.6 per cent. dilution of alcohol in saline	0.9 c.cm. saline + 0.5 c.cm. antigen

are immediately mixed by gentle shaking and then placed at 37° C. for eighteen to twenty hours; the results are read on withdrawing the tubes from the incubator. The antigen and serum controls and also the mixture of known negative serum with antigen should all show no flocculation.

The reading of results is carried out as in the case of bacterial sedimentation tests. In order to detect weak reactions it is advisable to use a hand magnifying lens; but in estimating such weak reactions it is essential to compare carefully the control with a known negative serum, as slight flocculation may occasionally occur in the latter. Provided the negative control and the serum control show no flocculation, then precipitation which is just visible with the magnifying glass constitutes a suspicious reaction, while flocculation visible to the unaided eye constitutes a positive result.

Results Compared with the Wassermann Test.*

In a series of 1,575 serums (including 296 cases already investigated by Taniguchi), comprising cases submitted to the laboratory from the wards of a general hospital, as well as the venereal diseases centre, the following results were obtained:

Parallel results:			
No. of cases	...	...	1418 = 90%
Reaction positive in both tests in	...	...	553
" negative in both tests in	...	...	845
" doubtful in both tests in	...	...	20
Discrepancies:			
No. of cases	...	...	157 = 10%
Positive Wassermann, but negative or doubtful Sachs-Georgi in	...	...	23
Negative or doubtful Wassermann, but positive Sachs-Georgi in	...	...	77

When cases of syphilis which have undergone specific treatment are grouped by themselves it is seen that the proportion of positive results with the Sachs-Georgi test is greater than with the Wassermann reaction.

Results in 316 Serums from Treated Cases.

Parallel results:			
No. of cases	...	...	256 = 81%
Reaction positive in both tests in	...	...	152
" negative in both tests in	...	...	97
" doubtful in both tests in	...	...	7
Discrepancies:			
No. of cases	...	...	60 = 19%
Positive Wassermann, but negative or doubtful Sachs-Georgi in	...	...	5
Negative or doubtful Wassermann, but positive Sachs-Georgi in	...	...	44

* The Wassermann reactions were carried out as described in Browning and Watson's *Venereal Diseases* (London, 1919) using human heart cholesterol antigen.

Points of Practical Importance in Performing the Test.

1. Heated serum should be used; unheated serums from positive cases may fail to cause precipitation in any concentrations (a wide range of concentrations has been tested).

2. The concentrations of serum recommended should not be exceeded, since heated normal serums in large amounts—for example, 0.2 to 0.3 c.cm.—may cause precipitation. No positive case has been met with in which the usual amounts of heated serum employed failed to show precipitate, but the reaction may be more marked with 0.05 c.cm. of serum than with 0.1 c.cm.

3. The mixture must be kept at 37° C., as precipitate may form with non-syphilitic serums at lower temperatures. Sometimes, however, it is advantageous in the case of weak reactions to record the results after the tubes have stood for thirty minutes further at room temperature, but the behaviour of the negative control must be carefully scrutinized.

4. The results should be controlled by including in each series of tests known negative, weak and strong positive serums, just as in the case of the Wassermann reaction.

REFERENCE.

¹ Taniguchi, T. (1921): *The British Journal of Experimental Pathology*, 2, 41.

TYPHOID FEVER IN AN INFANT COMPLICATED BY SUPPURATIVE ARTHRITIS.

BY

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THE following case, in which a double subacute suppurative arthritis supervened in the case of a child, aged 9 months, suffering from typhoid fever, seems to me worthy of recording in some detail:

On May 14th, 1921, I was called to see a baby, aged 9 months, as the mother noticed it was very hot; up to this date it had been quite well. I found the axillary temperature was 102°. Careful examination disclosed no other abnormality. On May 15th the morning temperature was 104.8°, and the evening temperature 104°. The blood was negative as regards malarial parasites. The pyrexia continued, and on May 19th four rose spots typical of typhoid fever appeared, the spleen was palpable, and the abdomen distended. Typhoid fever was diagnosed. The Widal test was not done as the diagnosis appeared to be clear and the mother resented any active interference.

On May 20th slight rigidity of the neck was observed; there was no squint, and Kernig's sign was not present. The cervical rigidity lasted twelve hours only. On May 21st several new rose spots appeared and the spleen was still more enlarged, and on May 23rd there was a further copious crop of fresh rose spots. On May 25th (eleventh day) the pyrexia ranged from 100.2° to 102.2°. It was noticed that the baby made little use of the right arm. The hand grip was normal, and careful examination showed no sign of any epiphysitis or joint trouble.

On May 31st (seventeenth day) the temperature dropped in two hours, from 103° to 95°. The infant was very cold and sweated profusely, but the pulse was only 84. Brandy was administered and hot bottles applied. Perforation was feared, but the abdomen appeared to be normal, and although the necessity for laparotomy was considered I decided not to operate. In a few hours the temperature had risen to 102.2°. From this date the pyrexia showed a tendency to diminish, and the temperature was slightly subnormal on the morning of June 4th. The paresis of the right arm continued, but the hand grip remained firm, and repeated examinations revealed no tenderness or swelling over joints or epiphyses. The infant, however, appeared to be generally hyperaesthetic, and resented movement or handling of any part of the body.

On June 5th severe diarrhoea began with some mucus in the stools; the temperature was 99° in the morning and 100.4° in the evening. On June 7th (twenty-fourth day) the right shoulder-joint was slightly distended; there was no redness of the skin over the joint. On June 8th the right shoulder-joint was explored with a needle and syringe; a considerable quantity of thick greenish pus was withdrawn.

Operation.

On June 9th the baby was anaesthetized. The left shoulder-joint, though distension was scarcely appreciable, was very fortunately aspirated and pus discovered in it. Both shoulder-joints were then opened anteriorly between the deltoid and pectoral muscles. A considerable quantity of pus was removed from both joints. (Incidentally this shows the futility of hoping to empty a joint of pus by aspiration. I had thought I had emptied the left joint completely by aspiration, but on opening the capsule I found more pus remained than I had removed.)

The joints were thoroughly irrigated with mercury biniodide, 1 in 4,000, and the capsules closed with catgut. The skin was sutured with silkworm gut. The infant stood the operation very well and there was no appreciable shock.

After the operation the temperature only once exceeded 95°, on the fifth day rising to 102° in the evening. The skin sutures were removed, and the wounds, which were slightly septic, were dressed with acriflavine and allowed to granulate. From this day the baby caused no anxiety. No extension or splint was applied. By June 26th the wounds were healed. Movement of both joints was quite free in all directions. On July 4th the baby was in excellent condition, taking its food well and using the shoulder-joints freely.

Bacteriology.

From the pus a culture on agar was made. The result was a pure culture of a Gram-positive diplococcus. The pathologist reported that he believed the organism to be the "enterococcus" isolated and described by Thiercelin in 1899. In the *Precis de Bacteriologie*, by Dopfer and Sacquépée, 1914, this organism is described as causing secondary arthritis following tuberculosis, paratyphoid, etc.

The following points appear to me to be of interest:

1. The age of the patient. Osler and McCrae (1907, p. 81) give the incidence of typhoid in the first year of life as 0.013 per cent., and state that in the first year the disease is rare. On p. 176 they state, however, that: "Formerly regarded as rare, we have learned that typhoid fever during the first years of life is not uncommon. . . . Griffith and Ostheimer collected 325 undoubted cases under the age of 2½. Of these, 111 were in the first year. Of those in the first year recovery was noted in about 25 per cent. . . . The mortality of the published cases is high, but the milder cases are often overlooked or not reported." Although blood culture and Widal's test were not done, the course of the illness, the rose spots, and the enlargement of the spleen left no doubt in my mind but that the diagnosis was correct.

2. The sudden fall of temperature on the seventeenth day strongly suggested perforation; Osler and McCrae state that this may denote the onset of suppuration.

3. The disuse of the right arm was first noticed on May 25th (eleventh day), and arthritis was presumably present at that time. Nevertheless, from the seventeenth to twenty-fourth day the temperature came down as in a typical uncomplicated attack of typhoid.

4. Although there was pus in the left shoulder-joint, no limitation of movement and very little swelling of the joint was observed. Had I not known that the right shoulder-joint contained pus I would have seen no indication for exploring the left. As it was, it was more due to good fortune than to accurate diagnosis that I explored the left joint on the operating table. I certainly never expected that unimpaired function of the affected joints would be preserved.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

ANAPHYLAXIS DUE TO ANTISTREPTOCOCCAL SERUM.

MRS. X, aged 23, primipara, gave birth on June 7th to a child, which was born naturally, without any manipulation; the placenta and membranes came away quite intact; chloroform was administered during the birth of the head.

On the third day the temperature rose to 100° F., the breasts were very full of milk; on the fourth day the temperature was 101° F. and the lochia very foul. I gave her 10 c.cm. of antistreptococcal serum, polyvalent (P. D. and Co.), half an hour afterwards an urticarial rash appeared with oedema of the eyelids; this cleared away in a few hours. Next day I gave her 5 c.cm. of serum, the temperature came down and the lochia became less offensive; the vagina was washed out with a solution of mercury perchloride. Everything seemed to go well, the patient ate her food and enjoyed it, until the twelfth day when she suddenly became ill. The rash recurred with generalized intensity, the temperature fell to 96° F., and she became very faint but revived after the administration of brandy. Headache was very bad, and 10 grains of phenalgin were administered; calcium chloride was prescribed, 40 grains being given during the next twelve hours. On the morning of the fourteenth day the rash