the exception of one which was carried out at 16 weeks and proved positive. A further 183 conversions can thus be added to the original 10,893, making a total of 11,076. The corrected conversion rate is therefore 98.9%.

The relation of this corrected conversion rate to the size of the papule at the site of vaccination was then studied. The results, which are given in Table II, show that conversion occurred in all except 0.7% of those with any local reaction, but in only about half of those with no local reaction.

TABLE II.—*Relationship of the Vaccination Reaction to Conversion*

Group	Vaccination Reaction (Width of Indurated Papule in mm.)	No. of Vaccina- tions	Positive Reactors	
			No.	%
Post-vaccination heaf test	0	95	37	39.0
	1-10	8,640	8,434	76.2
	11-20	2,406	2,364	82.6
	21+	58	58	100
Post-vaccination negative reactors retested later	0	50	17	34.0
	1-10	151	128	84.8
	11-20	38	38	100
Corrected totals after retest	0	95	54	56.8
	1-10	8,640	8,562	99.1
	11-20	2,406	2,402	99.8
	21+	58	58	100
Corrected totals condensed	No reaction (0)	95	54	56.8
	Any reaction (1+)	11,104	11,022	99.3

Discussion

In discussing the validity of the conversion rate of 99.3% for those who showed any reaction to vaccination, it might be questioned whether this applied to as small an induration as 1 mm. A detailed analysis of the vaccination reactions shows that this is justified. Whereas only 54 of the 95 children who showed no vaccination reaction ultimately converted, there were 24 conversions in the 25 children recorded as having vaccination reactions of only 1 mm.

It is also worth noting that the conversion rate increased with the size of the papule, eventually reaching 100% for vaccination reactions of 21 mm. or over.

Between vaccination and retesting 5 to 17 months later some natural conversions may have occurred even in non-contact children. Even a 3% yearly natural conversion rate would only have reduced the total number of B.C.G. conversions from 11,022 to 11,015. On the other hand, there were 67 negative reactors who escaped retesting; in the absence of evidence to the contrary, these have been left in the negative-reactor group. If in fact 76.6% of these had become positive reactors, the total number of conversions

would be increased from 11,022 to 11,075. As the latter would only make an increase of 0.3% in the conversion rate and the former a decrease of 0.06%, these sources of error have little influence on the findings.

The relationship demonstrated between the local reaction to vaccination and the conversion rate is striking; only 0.7% of children with vaccination reactions failed to convert. Provided the Glaxo freeze-dried vaccine maintains these standards, it seems reasonable to suggest that where evidence of successful vaccination is required inspection of the vaccination site 6 to 10 weeks after vaccination could replace conversion testing. A test would then be required only for those vaccinations that have no local reaction.

Summary and Conclusions

In the school year 1960-1 the B.C.G. Control Centre vaccinated 11,199 13-year-old schoolchildren with Glaxo freeze-dried vaccine. A post-vaccination Heaf test 6 to 10 weeks after vaccination gave a conversion rate of 97.3%. Retesting of 239 of the 306 non-converters 5 to 17 months after vaccination added a further 183 late reactors, giving a corrected conversion rate of 98.9%.

Children with no local reaction to vaccination had a conversion rate of 57%: children with a local reaction, however small, had a conversion rate of 99.3%.

The presence of any local reaction to intracutaneous vaccination with Glaxo freeze-dried vaccine may be regarded as an indication of successful vaccination. Only children with no local reaction to vaccination require a conversion test.

The figures for the school year 1960-1 and the subsequent retests are the work of the Medical Officers of Health of the County Boroughs of Oxford and Reading and of the Counties of Berkshire, Gloucestershire, Northamptonshire, Oxfordshire, and Wiltshire, together with their school medical officers. These formed the B.C.G. Control Centre at this period. This paper is the collation of their findings; without their willing co-operation, conscientious work, and careful records these results could not have been obtained. We thank them all sincerely. We also thank the staff of the records and statistics department of the Oxford Regional Hospital Board for their co-operation, and the Ministry of Health, who set up the B.C.G. Control Centre and gave grants to one of us (K. N. I.).

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Medical Memoranda

Herpes Gestationis

Brit. med. J., 1964, **1**, 1425-1426

An annotation in the *British Medical Journal* (1963) suggests that the following notes on three recently observed consecutive cases of this rare skin disease of pregnancy may be of general interest.

CASE I

A para-5 aged 42 was admitted to the Rotunda Hospital, Dublin, at 21 weeks' gestation on 12 May 1960. For six weeks she had

had an intensely itchy rash with large blisters, mainly on her limbs and lower trunk. Examination revealed a typical polymorph bullous rash of herpes gestationis. A biopsy was reported as showing "subepithelial eosinophil accumulations; epithelium shows intra-epithelial vesicles containing eosinophil leucocytes." Corticosteroids, either triamcinolone 24 mg. daily or prednisolone 20 mg. daily, gave good control of itching and fair control of the rash.

On 22 August, at 35 weeks, she was delivered of a macerated foetus. An exacerbation of the rash followed at once, and was again controlled with triamcinolone. This was gradually withdrawn and finally stopped one month later, by which time the rash had almost cleared. A severe recurrence soon followed and triamcinolone was again resumed with good response.

Six weeks after delivery she was discharged home with no irritation and no active rash but a good deal of residual pigmentation. She

was still taking triamcinolone 12 mg. daily and "anatsol," as she had become depressed. Three weeks later she was readmitted because of severe itch and depression and a recurrence of the rash, mainly on her limbs. Prednisone 20 mg. daily combined with dapsone was administered for three weeks and then overlapped and replaced by corticotrophin. She was discharged after six weeks with odd patches of erythema. Almost five months after delivery the rash and itch were still present.

CASE 2

A para-4 aged 31 was admitted to her local hospital at about 34 weeks' gestation in October, 1960, because of an itchy rash which began on her abdomen and lower limbs and then formed large blisters and spread to her arms and chest. Three weeks later she was delivered of a stillborn boy. This was followed by an exacerbation of the rash.

On admission to a Dublin hospital on 11 November she had a low irregular fever and a pulse rate varying between 100 and 120. Her general appearance was that of Graves's disease, for which she was treated during the previous year. She had a profuse rash from her neck to her feet, sparing only the face. This was an irregular erythema with bullae up to 3 cm. in diameter in all stages of evolution. Biopsy was not performed, but the blister fluid showed "many eosinophils and a few polymorphs." There was a mild hypochromic anaemia (Hb 10.5 g.), and of 10,000 white cells 38% were eosinophils.

Triamcinolone, starting with 16 mg. daily, and promethazine hydrochloride 50 mg. daily seemed to control the itch and perhaps the rash. After two weeks triamcinolone was replaced by corticotrophin, without any great effect. Seven weeks after delivery the herpes gestationis was still active.

On 21 February 1961 her husband wrote: "My wife is in good form now. The skin has cleared up, but the irritation is still there at times."

CASE 3

A housewife aged 31 was delivered of her ninth baby on 12 March 1962 at 38 weeks. When she was four months pregnant incision of a septic finger had been followed almost at once by an eruption on the hand which spread to involve both hands and arms. The rash disappeared in about three weeks on treatment with tablets prescribed by her doctor.

She had had a rash after delivery of all her previous babies except the first. It was centrifugal in distribution, starting as itchy red patches, with considerable swelling, affecting mainly the backs of both hands and forearms. The rash progressed to huge blisters which were burst by her doctor. Treatment with "white cream and red capsules" was effective on each occasion in about three weeks.

Five days after her ninth delivery the rash appeared again about the time of her discharge from hospital and was much more severe. It was mainly centrifugal in distribution, with large areas of brownish discoloration over both arms and legs. At the onset she had gross swelling of her hands and arms with some blisters, but this subsided and she then had only oval slightly scaly erythematous patches $\frac{1}{4}$ in. (6 mm.) in diameter which were most pronounced over the exterior aspects of the elbow-joints.

On admission to the general hospital she had abscesses in both axillae. She was treated with oral iron, antibiotics, promethazine, 50 mg. daily, and prednisolone, 15 mg. daily, and the abscesses were incised. After a few days new bullae appeared on the ankles with many erythematous lesions on the legs. Another abscess was present in the axilla, which was incised. Soon afterwards the rash

became more severe and the temperature rose to 104° F. (40° C.). A hard palpable lump had now appeared in the right loin, and x-ray examination showed a large right-sided perinephric abscess, which was drained.

After the operation her condition greatly improved, blisters and irritation ceased, and the rash faded, leaving a brown discoloration. Prednisolone was reduced to 10 mg. daily and she was discharged after five weeks in the general hospital and 11 weeks after the birth of her baby.

About two weeks later she returned to the hospital with a mild recurrence of the rash, despite her still being on prednisolone. It was not until another three months—that is almost seven months after delivery—that the rash disappeared completely.

DISCUSSION

A severe attack of herpes gestationis is distressing to the patient and she will obviously be anxious to know when the rash is likely to clear. Although it may be more common for a spontaneous cure to take place within a month of delivery, with or without an acute exacerbation in the puerperium (Russell and Thorne, 1957; Barnes, 1962; *Brit. med. J.*, 1963), the histories of these patients and of the patient described by Hadley (1959) demonstrate that this is not always so. In Hadley's case the rash did not clear up till 10 weeks after delivery, and in these three cases it persisted for five months, seven weeks, and seven months respectively after the end of pregnancy. Two other features in this series may be noted. The first patient suffered from depression which was severe enough to require specific treatment. In the third case the rash was associated with septic foci—a septic finger, axillary abscesses, and a perinephric abscess—and only when these were successfully treated were other measures effective.

In these three cases only small doses of corticosteroid were used—30 mg. of prednisone or prednisolone daily, or 24 mg. of triamcinolone daily at most. It may be that much larger initial doses would have been more successful in the first two cases and might have resulted in no greater total dosage being given. In the third case the close association of the infection with the occurrence of the rash would probably have been considered by most physicians to have been a contraindication to anything more than minimal corticosteroid dosage.

We are grateful to Dr. Alan Browne, Master of the Rotunda Hospital; Dr. P. B. B. Gatenby, Professor of Clinical Medicine, Trinity College, Dublin, and Consultant Physician, Rotunda Hospital; and Dr. H. C. Moore, Pathologist, Rotunda Hospital, for their co-operation.

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