2. It did not resemble the other hydraea.
3. There was an open wound on the wrist.
4. Foot and mouth disease was prevalent in the district.

It is interesting to note that a stray collie dog used to frequent the patient's hut for feeding purposes. I made inquiries about this dog, and heard that it had been drowned, because it was suffering from mange of the left ear, and was so thin and weak that it could hardly walk.

Specimens of serum from vesicles and saliva were sent to the laboratory at Millbank, where a rabbit and guinea-pig were inoculated with negative results.

A CLINICAL TEST FOR THE ESTIMATION OF THE PERCENTAGE OF GLUCOSE.

BY

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A QUICK method of estimating correctly or even approximately the percentage of sugar in urine in which it is found to be present by Fehling's test, whether in the consulting-room or at the bedside, is much to be desired. The precipitation of the suboxide of copper with Fehling's test is so apparent, whether a small or large quantity of glucose is present in the urine under examination, that it affords no guide to the estimation of the amount.

I hope to demonstrate that with Moore's test the colours resulting from boiling equal parts of diabetic urine with liquor potassae do vary in direct proportion to the amount of glucose that exists in samples under examination. Not having at my command a sufficient number of urines containing different proportions to verify this, it occurred to me to manufacture them by the addition of anhydrous glucose to samples of healthy urine; and while experimenting with these I found that, whether an equal proportion of glucose was added to healthy urine or to distilled water, and each boiled with equal parts of liquor potassae, the resultant colours were practically the same.

By making separate solutions of $\frac{1}{2}$, 1, 2, 3, and 4 per cent., equivalent to 2, 5, 10, 14, and 19 grains per ounce, and boiling these with equal parts of liquor potassae, five test tubes were prepared, showing a constant and decided difference in the shades of colour. This result having been established, the next step was to ascertain if the colours, corresponding to different amounts in the prepared solutions, coincided with those urines in which the amount of glucose had been previously estimated by Pavy's test.

Through the kindness of Mr. C. H. Wells, of Dr. Adams, and the assistants at the Clinical Research Association in supplying me with many samples, I was able to confirm, after repeated experiments, that this was so. A further step was to obtain coloured glasses to correspond with these results, and Messrs. Powell and Sons, of Whitefriars, London, E.C., carefully produced these, the exact shades of the different solutions containing known amounts of glucose. Upon each glass, the size of a microscopic slide, is marked the percentage, the number of grains per ounce, and the number of parts per 1,000.

To obtain accurate results the amount of diabetic urine or manufactured solutions must be boiled with equal parts of liquor potassae; there must be no guesswork, and all that is required is an ordinary 2-drachm measure, or, better still, a pipette. Each sample must be thoroughly boiled, and this cannot be done without a holder for the test tube of some description. The test tubes should not be larger or smaller than $\frac{5}{8}$ to $\frac{3}{4}$ of an inch in diameter, and the liquor potassae should be fresh. It is not possible to mistake the difference of the shades in the alternate glasses between $\frac{1}{2}$ per cent. to 4 per cent., as they are well marked. Between the colour produced by solutions containing 4 per cent. and 5 per cent. of glucose, although it is slightly deeper in the latter than in the former, an error might arise, so that if the colour produced in any sample of urine under examination should be darker than the 4 per cent. glass, some of the original urine should be diluted with equal parts of water and equal portions of this dilution and liquor potassae boiled. The resultant colour, when found to correspond with any of the test

glasses, will give the percentage, the grains per ounce, or the parts per 1,000, multiplied by 2. Again, should the colour at this examination be found to be still deeper than that of the 4 per cent. glass, the following course should be pursued: Dilute the original urine with two parts of water, boil an amount with the same quantity of liquor potassae, compare the result with the test glasses, and when found to be similar multiply the amounts engraved upon the glass by 3. In like manner, with three dilutions, multiply by 4, and so on. As the correctness of these observations can be verified only by comparison with estimations made with Pavy's apparatus, it is necessary to point out that two or more observers very seldom arrive at the same conclusions in regard to any given sample of urine under examination, owing to the difficulty of noting identically the moment when the decoloration takes place. Even when the apparatus is all ready in a laboratory, and all the reagents fresh, errors may arise from bubbles of air remaining in the burette; from the dropping of its contents being too slow, whereby the boiling is too prolonged, causing the suboxide to fall, in consequence of the dissipation of the ammonia before the examination is complete; or from conducting the experiment in a bad light. How many further errors are likely to arise when analyses are made upon the few cases that occur in the course of an average year's work of a general practitioner! It is therefore unfair to criticize hastily the results of the colour tests by comparison with those obtained by Pavy's method, unless the latter is conducted by an analyst or by some one constantly using it.

I have no wish here to discuss the fallacies that may arise when Moore's test is used alone, as it might lead to the conclusion that the colour test is not reliable. I intend it to be purely a clinical one, not to take the place of Pavy's test, and only to be used after Fehling's test has demonstrated the reduction of the copper. With this evidence, especially if the patient's history points to some glycosuric condition, it is more than probable that glucose is the substance under consideration, and the colour test will then supply some important additional information. I trust it will be found to be of service to those in active practices by saving time—to the analyst by affording him information as to the amount of dilution he is likely to require before commencing an examination with Pavy's apparatus, and to the consultant by enabling him to obtain an approximate percentage of the amount of glucose present in the urine at the first examination of his patient.

I endeavoured to obtain differences in the shades of colours that would have represented smaller amounts than percentages, but so far I have not found them of practical use. By superimposing the $\frac{1}{2}$ per cent. glass on the 1 per cent. glass a colour equal to $1\frac{1}{2}$ per cent. of glucose is produced, and the $\frac{1}{2}$ upon 2 per cent. equals $2\frac{1}{2}$ per cent., but the $\frac{1}{2}$ upon 3 gives no distinguishing colour. The 1 per cent. glass upon 2 does not produce the colour given by 3 per cent.

All the colours produced by boiling high or low percentages of saccharine urines with liquor potassae unfortunately become lighter in shade after remaining in the test tubes for a few days, and therefore cannot be permanently utilized.

It has been pointed out to me since this article was written that the idea of roughly estimating the percentage of glucose by the colours produced with Moore's test was suggested as long as thirty-four years ago. In Russell Reynolds's *System of Medicine* (vol. v, 1879, p. 369) Dr. (now Sir William) Gowers says:

When a lemon-yellow tint is produced with this test, the urine contains about five grains of glucose to the ounce, ten grains give a light sherry tint, fifteen grains a dark sherry tint, and twenty grains or over a port wine colour.

On the same page it is mentioned that Dr. Meymott Tidy proposed to employ the test for quantitative analysis by means of a colour scale, but it is added that the method was not sufficiently accurate to be of use, except as affording a rough approximate indication of the amount of sugar present. Whether the method I have suggested, with the aid of the five coloured glasses, which correspond accurately to known amounts of glucose in prepared samples for comparison, will bring the colour test into a practicable form or not I must leave readers to decide. Should it do so, there can be no question of its simplicity when

compared with other methods of examination for the estimation of glucose in saccharine urines.

Appended for reference are given the parts per 1,000, and the percentages (grains by weight in 100 minims) corresponding to the number of grains per ounce (480 minims).

The former is calculated by dividing the number of grains per oz. by 0.4375. The latter by multiplying the number of grains per ounce by $\frac{1}{48}$, a result of simple proportion.

The coloured test glasses in a pocket-case can be obtained from Messrs. Down Brothers, St. Thomas's Street, Borough, S.E.

Grains per oz.	Parts per 1,000.	Grains per 100 minims.	Grains per oz.	Parts per 1,000.	Grains per 100 minims.
1	2.28	0.208	11	25.14	2.29
2	4.57	0.416	12	27.40	2.50
3	6.85	(say $\frac{1}{2}$ p.c.) 0.625	13	29.71	2.70
4	9.14	0.853	14	32.00	2.91
5	11.42	1.04	15	34.28	(say 3 p.c.) 3.12
6	13.71	(say 1 p.c.) 1.25	16	36.57	3.32
7	16.00	1.45	17	38.85	3.54
8	18.28	1.66	18	41.14	3.75
9	20.57	1.87	19	43.42	3.95
10	22.85	2.08	20	45.71	(say 4 p.c.) 4.16
		(say 2 p.c.)			

A CASE OF CYCLOPIA.

BY

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THE essential features of this malformation are the absence of a well-formed nose in its natural position, the presence of one orbit in the middle line of the face containing a single eye or one showing varying grades of duplicity, and defective development of the upper part of the face and anterior portion of the brain, these abnormalities being the result of incomplete development of the fronto-nasal process with approximation and fusion in the middle line of the two superior maxillary processes.

As regards the frequency of its occurrence, Hannover has collected 109 cases in the human subject, so that it may be regarded as a comparatively frequent type of monstrosity, although sufficiently rare to warrant the publication of any examples which may occur.

The mother of the case here reported was admitted to St. Mary's Hospitals in October, 1912, being then in the seventh month of her pregnancy, and suffering from ante-partum haemorrhage due to placenta praevia. She had previously given birth to eleven children, none of whom presented any abnormal features.

DESCRIPTION OF CYCLOPS.

The child, a male, was stillborn, and weighed $5\frac{1}{2}$ lb. The head was proportionately large owing to the presence of well-marked hydrocephalus; in the centre of the face was a diamond-shaped opening, bounded above and below by the fused upper and lower lids respectively, and enclosing what appeared to be a single eyeball provided with two corneae. Immediately above this opening, and jutting forwards from the middle line, was a cylindrical projection, the proboscis, and running outwards from the base of the latter were two elevations, representing the eyebrows. Beneath the orbit was a deep sulcus running transversely across the face, whilst below this was the upper lip, devoid of any trace of philtrum, but otherwise well developed. The face showed no other abnormality, the ears and lower jaw being well formed.

The Eye.

This organ, contained in a single large orbit, was found to be composed of two globes fused together in the middle

line and having a median groove above and below. All the extrinsic muscles were found to be present with the exception of the internal recti. On the anterior surface of either half of the globe was a complete cornea through which could be seen the iris enclosing a circular pupil, the portion of sclera separating the two corneae was covered with conjunctiva, whilst overlying the middle portion of this was a tough fibrous band half an inch in width and running from the proboscis above to the junction of the fused lids below. A horizontal section of the organ showed that the globes were complete units, and perfect in all component parts except at their juncture, where the sclerotic and choroid were found to be absent, that the retinae were thrown into folds not apparently due to mechanical detachment, and that the optic nerves were fused except at the point of expansion into the retinae, where there was some evidence of separation. As regards the lids, all four lacrimal papillae were present.

The Nasal Apparatus.

The proboscis was situated immediately above the orbit in the position of the glabella, and measured $1\frac{1}{4}$ in. in length by $\frac{3}{4}$ in. in breadth; in shape it was irregularly cylindrical, somewhat constricted at its proximal end and provided with a depression at its free extremity; in the floor of this depression was a small opening leading into a large central cavity lined with mucous membrane and containing a quantity of mucus. The proboscis was somewhat rigid from the presence of a cartilaginous plate beneath the floor of the cavity, and had a covering of skin resembling that of the face. This structure represents the soft parts of the nose, which are in an abnormal position from the approximation of the superior maxillary bones. The following bones normally connected with the structure of the nose were absent: the ethmoid, presphenoid, vomer, inferior turbinate, nasals, lacrymals, and premaxillae.

A mesial section through the skeleton of the face showed the palate bones fused together; in front of this the superior maxillae were separated by a thin membrane, deficient above and below, supposed to represent the nasal mucosa, while further forward they were firmly united to form the alveolar margin. The vault of the palate was narrow and not fissured, the soft palate and uvula were well developed, the latter being notched at its extremity, whilst behind was a rounded cul-de-sac, into which opened the Eustachian tubes. The upper jaw contained six tooth germs.

The Cranium and Brain.

The ossification of the cranium was not deficient, but the sutures were increased in width, owing to the hydrocephalic condition, the anterior fontanelle being much larger than normal. The anterior cranial fossa was very small, the middle fossa deep and narrow, and the posterior fossa well formed.

The brain was not sufficiently well preserved for a careful examination to be made, but there appeared to be a single hemisphere, which was flattened out by the large hydrocephalic sac situated above it; the convolutions and fissures were incompletely marked, and the falx cerebri absent.

No other malformations were found, the child being well developed with the exception of the abnormalities above described.

With regard to the type of cyclopia represented by this specimen, the presence of the proboscis places it in that designated by Saint-Hilaire "rhinocephalus," as distinct from the cyclocephalic type, in which this organ is absent.