the controls), *A. niger* 8 (2), *C. krusei* 7 (1), *T. glabrata* 7 (1), *C. parapsilosis* 6 (5), and *C. zeylanoides* 5 (5). The only species recorded more frequently from the control than from the pathological series was *Aspergillus versicolor* 8 (2), of which six of the isolates occurred in one group of Birmingham schoolchildren. Among all the isolates there was only one of *Abisidia ramosa*, an interesting and striking contrast to the frequency of this species among isolates from animal sources (Ainsworth and Austwick, 1955) and from the sputum of agricultural workers.

When the usual significance tests are applied to the material in Table II, it is clear that there is an excess of *C. albicans* isolates in both angular cheilosis and gingivostomatitis (when they are compared with either the other pathological conditions or the controls) which is very unlikely to be due to chance. This is in agreement with the currently accepted view (see Conant *et al.*, 1954), but, bearing in mind the common occurrence of *C. albicans* in the human mouth, predisposing factors must also operate. Many factors may play a part, such as for angular cheilosis lack of vertical dimension with saliva dribbling.

The similarity between the incidence of *C. albicans* in the other conditions (25.8%) and the controls (27.7%) (see Table III) suggests that the control group is reliable and

TABLE III.—Incidence of *C. albicans*

	No. of Cases	<i>C. albicans</i> Isolates	
		No.	%
Angular cheilosis	24	17	70.8 ± 9.3*
Gingivostomatitis	36	19	52.8 ± 8.3*
Other conditions	89	23	25.8 ± 4.6*
Controls	188	52	27.7 ± 3.4*

* Standard error $\sqrt{\frac{pq}{n}}$

that the presence of *C. albicans* seems to be associated with the two specific diseases and not just with any abnormal pathological condition of the mouth. That the isolation of *C. albicans* from the mouth may have no pathological significance hardly needs reiteration, but it should be emphasized that a clinical diagnosis of moniliasis must be confirmed by culture. This is well borne out by the case of a boy aged 19 months who, on examination, showed extensive curd-like whitish plaques on the inner aspects of the upper and lower lip, floor of the mouth, and anterior third of the tongue. The plaques could be peeled off and left raw bleeding surfaces. A clinical diagnosis of oral moniliasis was made, but the only organisms cultured were *Aspergillus fumigatus* and *A. niger*. *C. albicans* is easily cultured and would appear to have been absent in this case. Unfortunately no microscopic examination was made of the fresh clinical material.

The assessment of 37 cases of lingua nigra strongly suggests that this condition is not mycotic. The number of different fungi isolated was greater than for any of the other conditions. No one fungus was isolated with regularity, and the incidence of *C. albicans* was lower than that in the normal mouth. It would appear that the proliferations of the epithelial cells provide a favourable site for the development of common saprophytic fungi. Lingua nigra is thought to be a dyskeratosis. In support of this view further evidence with full case histories will be published elsewhere.

The similar mycological pattern to that of lingua nigra shown by lingua geographica, coated tongue, and denture sore mouth suggests that fungi are not involved in the aetiology of these three conditions. No evidence was obtained for the claim that monilial infections are very often a cause of denture sore mouth. As can be seen from Tables II and III, the incidence of *C. albicans* was rather lower both in denture sore mouth and in coated tongue than in normal mouths, possibly due to the effects of bacterial competition.

It is interesting to record that during this survey no case of mycotic infection of the mouth which could be wholly

attributed to antibiotic treatment was observed. This is in agreement with Heymer and Doeppfmer (1957), who obtained no evidence of a higher incidence of mycotic disease of the oral cavity at the present time than that found by Knighton (1939) before the introduction of antibiotic therapy.

Summary

From the mycological findings in 149 cases of angular cheilosis, gingivostomatitis, lingua nigra, lingua geographica, coated tongue, and denture sore mouth (see Tables II and III) it is concluded that *Candida albicans* seems to play a primary part in the aetiology of angular cheilosis and has some connexion with the aetiology of gingivostomatitis. The diverse fungi associated with the remaining four conditions are of uncertain aetiological significance.

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REFERENCES

- Ainsworth, G. C. and Austwick, P. K. C. (1955). *Trans. Brit. mycol. Soc.*, **38**, 369.
 Conant, N. F., Smith, D. T., Baker, R. D., Callaway, J. L., and Martin, D. S. (1954). *Manual of Clinical Mycology*, 2nd ed., p. 171. Saunders, Philadelphia and London.
 Cross, W. G. (1949). *Brit. med. J.*, **1**, 171.
 Heymer, T., and Doeppfmer, R. (1957). *Arch. klin. exp. Derm.*, **204**, 374.
 Kennedy, C. B., and Howles, J. K. (1940). *Arch. Derm. Syph. (Chicago)*, **42**, 566.
 Knighton, H. T. (1939). *J. dent. Res.*, **18**, 103.
 Schaffer, J. (1951-2). *Oral Surg.*, **4**, 1287; **5**, 87.
 Swinburne, G. (1939). *J. Laryng.*, **54**, 386.
 Tomaszewski, W. (1951a). *Brit. med. J.*, **1**, 388.
 — (1951b). *J. clin. Path.*, **4**, 393.

HAEMOGLOBIN J TRAIT IN TWO INDIAN WOMEN

ASSOCIATED WITH THALASSAEMIA IN ONE

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Haemoglobin J was first discovered in an American Negro by Thorup, Itano, Wheby, and Leavell (1956). It has since been described in various parts of the world and in people of different racial stock. Raper (1957) found an example in a Gujarati Indian living in Uganda. This paper records the finding of haemoglobin J in two unrelated women belonging to the Gujarati-speaking Lohana. Of particular interest was that one of the two was also carrying a thalassaemia gene, and that it was therefore possible to observe the interaction of thalassaemia and of haemoglobin J.

Techniques

The haematological investigations were carried out by the accepted methods. Osmotic fragility was determined by measuring haemolysis in concentrations varying from 0.1 to 0.7% of Simmell's Tyrode solution, of which 0.4% was

taken as a critical dilution for differentiation (Silvestroni and Bianco, 1945). In more than a hundred normal adults examined haemolysis was found to be 90–100%. Foetal haemoglobin was measured according to the method of Singer, Chernoff, and Singer (1951). Electrophoresis of the haemoglobin was performed with the same haemoglobin solutions that had been used for the determination of the foetal haemoglobin. Paper electrophoresis was carried out by the hanging-strip technique as described by Lehmann and Smith (1954), and starch electrophoresis according to the method of Kunkel (1954). Electrophoresis on agar was performed according to the method described by Robinson, Robson, Harrison, and Zuelzer (1957). The plasma iron was measured after Walker (1938).

The identification of haemoglobin J was based on a comparison with known haemoglobin J samples kindly provided by Colonel W. H. Crosby, Dr. Lie-Injo Luan Eng, Dr. A. B. Raper, and Dr. F. Vella. On paper electrophoresis and starch electrophoresis at pH 8.6 haemoglobin J moves faster than haemoglobin K and more slowly than haemoglobin H (and the recently defined haemoglobin N). At pH 6.5 on paper and on agar electrophoresis haemoglobin J does not separate from haemoglobin A.

Haemoglobin A₂ was determined either by the elution of the separated haemoglobin fractions from starch or after paper electrophoresis by dyeing the dried paper strip with light green and by eluting the stain from the separated bands of haemoglobin.

The P. Family

This family was investigated after an infant had been examined because of severe jaundice 24 hours after birth. There was no haemoglobinopathy, and when the child was seen again nine months later no foetal haemoglobin was found and nothing haematologically abnormal could be demonstrated. It was, however, then noted that the infant was mentally retarded. In the routine investigation of the

FIG. 1.—Comparison by paper electrophoresis at pH 8.6 of the haemoglobin of Mrs. P. (A+J) with a haemoglobin A+K control. At the end of the electrophoresis (hanging-strip technique) the paper was dried and the haemoglobin stained with light green.

parents (Table I) it was found that the mother was a haemoglobin J trait carrier (Fig. 1). No other abnormality was found in either the parents or in the child.

The K. Family

This family came under investigation because of persistent anaemia in a male infant then 15 months old. He was said to have had diarrhoea from the age of 2½ to 3 months. From then on he had had fever off and on, and at the age of 5 months it was first noted that he was unusually pale and inactive. He was then treated with iron by mouth and by injection, with folic acid and with cortisone. At the age of 9 months he had received three blood transfusions.

On examination he was found to be underdeveloped and very pale. The liver was palpable one fingerbreadth and the spleen three fingerbreadths below the costal margin. The haemoglobin level was 3 g. per 100 ml. of blood (Table II), and, although the age of the infant was 15 months, 68.5% of the pigment was foetal haemoglobin. This persistence of haemoglobin F at a high level and the resistance of the anaemia to treatment suggested the diagnosis of thalassaemia major. The appearance of the red cells was typical. There was marked hypochromia, anisocytosis, and poikilocytosis, and target cells were numerous. A striking feature was the nucleated red cells—66,500 per c.mm. of blood. The osmotic fragility of the erythrocytes was increased. When it was found that both parents had thalassaemia minor the diagnosis of thalassaemia major in their infant was made with confidence. A blood transfusion improved the clinical condition for the time being, but the patient succumbed to the disease six months later. The immediate cause of death is said to have been bronchitis.

The red cells of both parents were small, and numerous vacuolated and target cells were seen in the stained smear. Osmotic resistance was increased. As is often seen in thalassaemia minor as opposed to iron-deficiency anaemia the M.C.H. was much decreased whereas the M.C.H.C. was almost normal.

Electrophoresis of the parents' haemoglobin revealed the presence of haemoglobin J in the mother (Fig. 2). As this seemed to be the first occasion on which haemoglobin J had been found together with thalassaemia the mother was examined repeatedly. Though her red cells were hypochromic, her plasma iron level was 125 µg. per 100 ml. There was no evidence for an enhancing effect on the thalassaemia minor by the haemoglobin J, nor was the composition of the haemoglobin noticeably different in the thalassaemic haemoglobin J trait carrier from that which had been found in the non-thalassaemic Mrs. P. Evidence for the thalassaemia gene in Mrs. K. were: the appearance of the red cells; lowered osmotic resistance of the red cells; a low M.C.H. together with a normal or nearly normal M.C.H.C.; a low M.C.H. together with a normal plasma-iron level; the

TABLE I.—The P. Family

	Age in Years	Red Cells per c.mm. × 10 ⁶	Haemoglobin g./100 ml.	P.C.V. %	M.C.V. cubic µ	M.C.H. γγ	M.C.H.C. %	Osmotic Fragility % (0.4% Simmel's Tyrode Solution)	Foetal Haemoglobin %	Electrophoresis of Haemoglobin
Father	30	4.83	14.5	46	91	29	30	90.0	<1.7	A
Mother	19	4.90	12.5	44	94	26	29	97.7	<1.7	A+J (25%)
Baby	½	4.67	13.6	39	83	28	33	70.0	<1.7	A

TABLE II.—The K. Family

	Age in Years	Red Cells per c.mm. × 10 ⁶	Haemoglobin g./100 ml.	P.C.V. %	M.C.V. cubic µ	M.C.H. γγ	M.C.H.C. %	Reticulocytes %	Osmotic Fragility % (0.4% Simmel's Tyrode Solution)	Foetal Haemoglobin %	Electrophoresis of Haemoglobin
Father	32	6.15	12.5	39	63	20	32	1.6	34.6	<1.7	A
Mother { 20/5/57 ..	28	5.61	12	38	68	22	31.5	2.8	38.0	2.8	A+J (25%)
{ 14/12/57 ..	—	5.38	12.5	39	69	23	32	2.2	49.0	2.0	A+J (25%)
Baby	1½	1.61	3	13	84	19	23	10.3	34.3	68.5	A+F

presence of a trace of haemoglobin F; and the family study showing thalassaemia minor in the husband and thalassaemia major in their child.

Haemoglobin A₂ was not increased and the concentration of this haemoglobin fraction was in fact the same in

FIG. 2.—Comparison by paper electrophoresis at pH 8.6 of the haemoglobin of Mrs. K. (above) with a haemoglobin A+J control. At the end of the electrophoresis (hanging-strip technique) the paper was dried and the haemoglobin bands were photographed unstained.

Mrs. K. and in Mrs. P. However, in our experience a rise of the haemoglobin A₂ level may be indicative of thalassaemia, but a normal haemoglobin A₂ level does not exclude this condition.

Summary

Haemoglobin J was seen in two unrelated women of Gujarati-speaking Lohana stock. In one of them the haemoglobin J trait was present together with thalassaemia minor. There was no evidence for a detrimental interaction between the genes for thalassaemia and for haemoglobin J—that is, for a hypothetical haemoglobin J thalassaemia disease.

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REFERENCES

- Kunkel, H. G. (1954). In *Methods of Biochemical Analysis*, edited by D. Gluck, 1, 141. Interscience Publ., New York.
 Lehmann, H., and Smith, E. B. (1954). *Trans. roy. Soc. trop. Med. Hyg.*, 48, 12.
 Raper, A. B. (1957). *Brit. med. J.*, 1, 1285.
 Robinson, A. R., Robson, M., Harrison, A. P., and Zuelzer, W. W. (1957). *J. Lab. clin. Med.*, 50, 745.
 Silvestroni, E., and Bianco, I. (1945). *Pollitcnico. Sez. prat.*, 51, 153.
 Singer, K., Chernoff, A. I., and Singer, L. (1951). *Blood*, 6, 429.
 Thorup, O. A., Itano, H. A., Wheby, M., and Leavell, B. S. (1956). *Science*, 123, 889.
 Walker, B. S. (1938). *J. Lab. clin. Med.*, 24, 308.

The report of the committee of the Scottish Health Services Council appointed to consider the application to Scotland of the major recommendations of the Royal Commission on the Law Relating to Mental Illness and Mental Deficiency has now been published (*Mental Health Legislation*, H.M.S.O., Edinburgh, price 1s. net). The committee recommends the adoption in Scotland of the Royal Commission's two main legislative proposals—the removal of existing formalities for the admission and discharge of voluntary patients, and the removal of statutory distinctions between mental and general hospitals. The committee advises the retention, however, of the present Scottish system of requiring a sheriff's order before a patient is placed in compulsory care, and also the retention of the General Board of Control for Scotland as a body mainly to safeguard patients' interests.

BREAST AND NIPPLE PAIN IN EARLY STAGES OF LACTATION

BY

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It is well known that throughout Great Britain only about one-half of all mothers can breast-feed their babies for more than two months. Very probably the most important reason for this is genetic (Hughes, 1948; Dummer, 1949; Hytten, 1954; Wickes and Curwen, 1957). Other factors known to influence breast-feeding performance are the mother's socio-economic status (Illsley, 1953), her age and obstetric history (Miller, 1952), and her place of confinement. Delivery at home or in hospital (James and Coles, 1955), in towns or in small villages (Hughes, 1948; Royal College of Obstetricians and Gynaecologists, 1948; Westropp, 1953), are all known to have an effect on the mother's willingness or ability to breast-feed her baby. At least 10% of all lactational failures are attributed by most investigators to breast pain or discomfort experienced by the mother whilst suckling her infant.

At present there is no known method of increasing the milk yield of the largest group of women with hypogalactia—namely, those genetically unable to produce an adequate amount of milk. It was therefore decided to investigate what effect, if any, on lactation would be produced by measures designed to decrease the incidence of breast and nipple pain. To this end three types of nipple care were carried out in rotation in each of the three maternity wards of Lewisham Hospital during one year, each method being tried for a period of roughly four months in each ward. The routines employed were: (1) the application to the nipple of a 0.5% stilboestrol cream in hydrous ointment B.P.; (2) the application to the nipple of a water-repellent silicone barrier cream ("releasil 7"); and (3) the avoidance of all "treatment," the mothers being asked merely to wash their nipples with water, but without soap, followed by drying with a towel, as suggested by Newton (1952).

This paper deals with the frequency, type, and duration of breast and nipple pain experienced by 1,027 mothers, the effect of the treatment routines on the breast complications, and the effect of these complications on the infants. There was no selection as to age, parity, social class, or obstetric complications of the mothers admitted to each of the three wards. Table I shows the age and parity of the 1,027 mothers.

TABLE I.—Age and Parity

Age	Primiparae		Multiparae		Total	
	No.	%	No.	%	No.	%
10-19	60	12	8	2	68	7
20-29	345	67	241	47	586	57
30-39	103	19	225	44	328	32
40-49	8	2	37	7	45	4
Total ..	516	100	511	100	1,027	100

Results

Only 31 (3%) of the mothers declared themselves reluctant to breast-feed their infants. Of these, 18 had a "good" reason, such as breast pain, to account for their attitude. Most other investigators report a higher percentage of mothers who for emotional, domestic, or economic reasons prefer to bottle-feed their infants. The Lewisham figures