Lesions in the Skin Produced by the Blastomyces.

The lesions in the skin caused by the blastomyces constitute what is generally known as blastomycetic dermatitis. They begin as groups of small, reddish-brown nodules, which increase and coalesce to form irregular patches, which may be dry and hard or moist and soft, and are separated by fissures from which oozes a sero-purulent or sanguineous discharge, which wells out when the patches are squeezed. The borders of the patches are well defined and abrupt, and usually slope gradually down to the healthy skin. The lesions so closely resemble the verrucose type of tuberculosis cutis that they are usually mistaken in the first instance for it, and the diagnosis is only established by the discovery of the fungus.

The patches are usually multiple, are spread by auto-inoculation, and are most commonly situated on the face, hands, back, and legs. Histologically they are verrucose granulomata with minute abscesses in the epidermis and corium, where the fungus can usually be detected. The infection, as a rule, remains local without glandular involvement, but in rare instances it has been known to become generalized and to invade the internal organs, with the production of multiple abscesses.

Under suitable treatment with potassium iodide retrogressive changes may take place, with the formation of red, shiny, smooth cicatrices, which may completely or partially replace the whole lesion.

Coccidioides.

The "*Coccidioides immitis*" of Rixford and Gilchrist is the last of the yeast-like fungi to which I wish to refer.

It is a more highly developed fungus than the blastomyces, belongs to the family of the Endomycetaceae, and forms a connecting link between monilias and true yeasts. It occurs in the tissues as variously sized, rounded bodies, much larger than blastomyces, of 10μ to 30μ or larger in diameter, some of which contain spores. It grows slowly on dextrose peptone agar in the form of a milky white culture, which subsequently becomes cream-coloured. It reproduces itself by endosporulation in the tissues, the spores being small and capable of dissemination through the blood stream and lymphatics, and in culture it shows mycelial threads, which may be branched or straight, and asci.

The fungus is found in the discharge from cutaneous lesions, in the pus from abscesses, and where the infection has become generalized in the sputum, blood, urine, and faeces. In the tissues it may be found in small abscesses or in the midst of the granulomatous infiltration, either free or in giant cells of the Langhans type, in the form of round or oval bodies, sometimes containing a large number of spores. The fungus does not ferment sugars. It is pathogenic in man, and in the lower animals, such as mice, rabbits, and guinea-pigs.

Unlike the blastomyces it usually gives rise to a general infection which only occasionally originates in the skin, and most frequently takes place through the lungs and affects the skin secondarily. Cases of the infection have been described in the past under various headings, such as saccharomycosis, coccidioidal granuloma, and dermatitis coccidioides, and have occurred chiefly in California, where as many as 160 have been reported. Its most marked feature is the presence of multiple abscesses situated in the skin and internal organs.

In the skin it appears as crops of small nodules, pustules, or occasionally verrucose papules about the size of a pea, which become red, enlarge, soften, and break down, forming ulcers with an unhealthy granulated floor, from which oozes a purulent discharge which dries up to form crusts.

The internal abscesses are present chiefly in the lungs, liver, kidney, and spleen, but may be met with also in the muscles and may cause necrotic changes in the bones. The presence of abscesses in the lungs may give rise to symptoms suggesting tuberculosis, and in the kidneys and intestine to albuminuria and diarrhoea, and the neighbouring lymphatic glands are invariably enlarged. As a result of septic absorption an irregular temperature and malaise occur, and death usually supervenes from pyaemia.

CONCLUSION.

These four yeast-like fungi which we have had under review must be regarded simply as types, for just as there are variants of the ringworm fungus, so there are variants of the monilia, blastomyces, and pityrosporon, but the variations which occur are so apt to be inconstant that their precise classification in the present state of our knowledge is almost an impossibility.

SOME OBSERVATIONS ON THE MENTAL DEVELOPMENT OF FEEBLE- MINDED CHILDREN.

BY

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AND

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DURING the last nine years periodic examinations have been carried out to discover what educational progress, if any, is made by children who have attended the special school for defectives in Bath. Under the Education Acts, it is incumbent on local authorities to provide a special school for those children who, in the opinion of the school medical officer, are incapable of benefiting by education in the ordinary elementary school, but are not so deficient in intelligence or adaptability as to be totally unable to fend for themselves. In other words, the school provides for those children who legally come under the category of feeble-minded. In practice the child is referred from the ordinary school as being probably unable to benefit by instruction at that school, and must have reached the age of 7 before he is allowed to be dealt with by certification. He is examined by a school medical officer, using the Terman scale as the criterion, and if in his opinion he can be classified as feeble-minded, he is certified as such, and sent to the special school. In the course of the present investigation it has been found that quite a large number of children admitted to the special school have proved to be imbeciles—that is to say, they are not able to fend for themselves in life, and therefore must be cared for in some way or other, either by being sent to special residential institutions, or by being placed

under the protection of some specified guardian, who may be the parent. This guardian is responsible for the protection of the imbecile against himself and society, and of society against the imbecile. At the age of 7 children may appear likely to turn out to be imbeciles, but where there is a doubt on the subject the child is naturally given the benefit of that doubt, both on humanitarian and economic grounds, and afforded a chance of improvement at the special school. If, as often happens, such children do not improve, it becomes necessary to hand them over to the care of the statutory mental deficiency committee, which is responsible for dealing with imbeciles by sending them to institutions, or putting them under special guardianship, or by supervising them in their own homes.

The special school under discussion contains on an average 45 children—25 boys and 20 girls. They are taught very slowly along ordinary lines up to the level of Standard II or a poor Standard III of the elementary school, and at the same time practical manual work is encouraged. The staff of the school consists of two specially experienced teachers of ordinary school subjects, and of instructors in bootmaking, carpentry, and domestic subjects respectively. The size of the individual classes varies with the number of children being taught in the special departments at any given time. The education authority has power to retain children in a special school until the age of 16.

During the period under review 86 children passed through the school and were discharged as follows: 27 per cent. were passed to the statutory mental deficiency committee as imbeciles—that is to say, they proved unable to fend for themselves in life; 36 per cent. were classified as low grade feeble-minded, probably unable to fend for themselves; and 37 per cent. were considered able to fend for

themselves and not notified to the statutory committee. The actual results up to the end of 1925 are known as regards 52 children, of whom 42 per cent. are at work fending for themselves, 10 per cent. are out of work, apparently failing to fend for themselves, 25 per cent. are at home incapable of work, and 23 per cent. are in institutions. It may be noted that the prognosis of the school medical officer in consultation with the head teacher underestimated the number able to find a position in the labour market.

So far as the present inquiry is concerned 82 children were examined by the Terman method, which aims at discovering not only their intellectual capacity, which is a measure of their power of receptive activity, but also their manual dexterity or power of effective activity, and their general capacity for adaptation to life. Long experience and elaborate statistics show that on the whole this test, if it is carried out by an experienced observer who is prepared to use his judgement in the interpretation of results, does afford a very fair indication of the child's general capacity. The scoring of the test establishes the child's mental age (M.A.), by which is meant the age of the average normal child who might be expected to have the same general capacity as the child under observation is proved to possess, and the intelligence quotient (I.Q.), by which is meant the relationship between the actual age and the mental age of the subject under examination. On this reckoning the normal child will have an I.Q. of 100, the precocious child an I.Q. of 100 upwards, and the backward child an I.Q. of less than 100. Of these 82 children, 78 (32 girls and 46 boys) were cases of primary amentia—that is, they had a developmental defect not due to intercurrent disease or injury—while 4 were presumably cases of secondary amentia, 1 (a boy) having a history of birth injury, and 3 (2 girls and 1 boy) of congenital syphilis. Of the 78 cases of primary amentia, 61 were not complicated by other defects. Of these, 31 boys were feeble-minded and 5 were imbeciles, while 20 girls were feeble-minded and 5 were imbeciles. Of the cases complicated by other defects, 2 might possibly be taken out of the category of amentia altogether. Of these, one was a boy with word blindness and idioglossia—that is, word deafness—and the other a boy with severe cerebellar ataxy.

Definite conduct disorder was noted in 7 cases (4 boys and 3 girls), one of the boys being also a haemophilic. This almost exactly tallies with Cyril Burt's estimate of an 8 per cent. correlation between delinquents and certifiable defectives. One girl had severe heart disease, one girl had severe defective vision, and one girl was a cripple. One boy had a severe stammer, one boy was epileptic, and one boy had a cleft palate. It would appear, therefore, that the correlation of gross physical defect with mental defect is not high, though the incidence of minor ill health among mentally deficient children is high. In children with primary amentia this is usually found to be the case. Two children in this group (one boy and one girl) were of the mongol type of mental defect.

In the investigation Terman tests were performed at more or less regular intervals of twelve months on each child, and naturally the M.A. of these children was considerably below their actual age on the first examination. The I.Q.'s on admission to the school were as follows:

I.Q.	Individuals.
80	2
75+	4
70+	13
65+	16
60+	23
55+	7
50+	11
45+	5
45-	1

In the series, therefore, 69.7 per cent. ranged from an I.Q. of 60 to 75 on admission, so that on the average the children had rather less than three-quarters of the capacity which they ought to have had for their age. On subsequent examinations the progress was neither uniform nor consistent with their age development. If reference is

made to the accompanying graph, which does not include the imbecile children, it will be seen that the theoretical average advances in mental age one year for every year advanced in actual age, although in practice the advent of puberty and other causes are apt to disturb this completely symmetrical progress. The defectives do not gain a year in mental age with a gain of a year in actual age, and consequently their I.Q. always tends to drop, although in one-third of the children the I.Q. actually shows a rise after their admission to the special school, probably because they are taken away from an atmosphere of unfair competition with other children who they cannot but feel are superior

to themselves. Sometimes it was found that there was no progress whatever from one year to another, but this check was only temporary, and on the whole they definitely, though slowly, advance in mental age right on to 15 years and over, thus showing progress for fully as long a period as the normal. It is interesting to note that in only five cases was there ever an actual drop in the M.A. from one year to another. One girl lost two months between 10 and 11—her present age. One girl showed a drop of two months from 11 to 12, regained the loss between 12 and 13, and then gained six months from 12 to 14. One girl lost two months between 14½ and 15½, but at this age tests are perhaps less reliable. One boy similarly lost two months between 15 and 16. One mongol boy lost a year between 13 and 14, but mongols cannot be considered quite in the same category as ordinary defectives, as the causal factor in the genesis of this very specialized type is not known. If, as is sometimes supposed, congenital syphilis is responsible for the mongol, deterioration at about puberty may be expected, for it is by no means uncommon in other varieties of congenital syphilitic lesions.

The exceptions are so slight that they may be neglected in a generalization that these defectives do progress in a slow but definite manner in the acquisition of general capacity with advancing age right on to 16 years of age. As Sherrington has shown, a child is born with his complete complement of neuroblasts. These neuroblasts are potential neurones or nerve cells, which can only function when they acquire their medullary sheaths. The formation of the functioning neurone appears to be the direct result of interest associated with stimuli derived from the body itself, or from the environment through the organs of common sensation, and more particularly through the distance receptors—sight, hearing, and to a less extent smell. The mentally deficient are no exception to this rule, for they also require to have their neuroblasts converted into functioning neurones, and it is only when the requisite stimuli can be provided and the necessary interest aroused that this can occur. It is reasonable to suppose that such stimuli can be supplied and interest aroused to better advantage when the children are put to tasks within their capacity than when they are subjected to the unfair competition of the ordinary school.

The accompanying graph shows the composite results of the inquiry. In this boys and girls are taken together, and they show a flattening of the curve of progress about the years 11½ to 13½, with a continuation of a rising curve from

15 to 16. In boys the flattening starts at 10½ and continues to about 13½, but the rise to 15 to 16 is quite striking. In girls there is a flattening from 9½ to 10½, and again at 12½, but the late rise is not so marked, though sufficiently obvious. The influence of puberty on the slowing-down periods is, of course, purely inferential, but it is at least suggestive; while the continued rise—which appears to go on after the child leaves the school, since the number of successes exceeded expectation—may be due to a variety of causes. It may be that in the later years of training more attention is paid to manipulative work, and that this develops an inherent power for such performances, which has not previously been given a chance, and so gives more opportunity for the reception of stimuli and arousing of interest necessary to convert neuroblasts to neurones. It must be remembered, however, that the Terman tests are by no means purely intellectual in their scope, and should record capacity for manipulative and intellectual advance apart from achievement, though unless neuroblasts have been converted capacity will remain undiscoverable. On the other hand, the continuance of progress is in accordance with the finding of a previous investigation we made into children of slight degrees of backwardness. This showed that while many of these children failed to adjust to the requirements of life during the school period, they made remarkably good adjustments later on in late adolescence and early adult life. The 15 and 16 year olds may be approaching this period of more successful adjustment, and therefore make a better showing in their tests than might have been expected from the common supposition that mental defectives stop short in their development. The following tables show the findings at the various ages exclusive of the imbeciles.

TABLE I.—Boys and Girls together (82 Children).

Age Groups:	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15+
Highest I.Q. found	80	73	82	77	74	71	70	66	62
Average mental age	5	5½	6½	6½	6½	7½	7½	7½	8½
Average actual age	7½	8½	9½	10½	11½	12½	13½	14½	15½
Average I.Q. ...	66	63.9	65.2	61.9	59.4	58.0	55.2	55.5	53.4
Lowest I.Q. ...	46	45	50	47	48	44	42	42	41
No. of tests performed	31	32	39	47	42	44	41	43	47
No. of individuals	27	30	39	46	40	43	39	42	42

TABLE II.—Boys.

Age Groups:	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15+
Highest I.Q. found	78	78	82	77	74	71	70	65	61
Average mental age	4½	5½	6½	6½	6½	7½	7½	7½	8½
Average actual age	7½	8½	9½	10½	11½	12½	13½	14½	15½
Average I.Q. ...	64.0	66.6	64.9	63.1	58.7	56.6	55.6	55.5	53.7
Lowest I.Q. ...	46	45	50	47	48	44	42	42	41
No. of tests performed	21	21	25	23	23	22	20	21	22
No. of imbeciles ...	18	20	25	22	22	22	20	20	20

TABLE III.—Girls.

Age Groups:	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15+
Highest I.Q. found	80	72	75	70	70	67	62	66	62
Average mental age	5½	5½	6½	6½	6½	7½	7½	7½	8½
Average actual age	7½	8½	9½	10½	11½	12½	13½	14½	15½
Average I.Q. ...	67.7	67.6	66	61.1	60.1	58.6	54.9	54.6	53.1
Lowest I.Q. ...	57	64	60	52	50	47	46	45	41
No. of tests performed	10	11	14	18	19	22	21	22	25
No. of imbeciles ...	9	10	14	18	18	21	19	22	22

Certain points in addition to the continuance of progress stand out in relation to these tests. The early improvement in capacity after admission to the special school illustrates the necessity of removing backward children from

competition with normal children of their age, since this always causes them to be discouraged and renders them sullen or mischievous. The low correlation with gross physical defect and conduct disorder is of interest in so far as it fits in with proved statistical records, which are, however, often looked on askance by the medical and lay public because they do not conform with certain preconceived ideas. The whole nature and development of mental defectives is interesting in relation to certain physiological experiments on rats. Mental defect is held to be due to a relative absence of the higher level cortical cells—an amentia. The failure is proved on post-mortem examination to be fairly general in distribution throughout the cortex, and is not localized in any one area. Although these cells are not there to develop, and no new cortical neuroblasts are ever laid down after the period of infancy, the capacity of the child does improve, though slowly, provided he rises to a level above the imbecile. The cells that are present must therefore to some extent assume the functions of those which are missing, for even the conversion of all the neuroblasts present is probably not enough. Professor Lashley and his colleagues have shown that it is comparatively easy to teach rats to find their way through a maze; that when various parts of the cortex are destroyed the rats can still be taught to run the maze, but with greater difficulty. They have, moreover, shown that the difficulty depends not on the localization, but on the extent of the injury, and that, so far as the function of maze learning is concerned, it is a property of the cortex as a whole rather than of any particular part, and that the remaining cells are capable of undertaking, at any rate to some extent, the functions of those which have been destroyed. The analogy between the history of mental defectives and the rats of Lashley's experiments is very striking.

The extent to which it is worth while expending money on the teaching and training of mental defectives is a question which is likely to give rise to a considerable amount of controversy, but the fact that 42 per cent. of the children trained in this particular special school were able to find work, and that only 23 per cent. had to be placed in institutions, is at least encouraging; but even so, there can be little doubt that the colony system on a large scale is the optimum method of dealing with certifiable mental defect in the bulk.

SEPTICAEMIA AND ENCEPHALITIS IN RELATION TO VACCINATION..

BY

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ANYONE who has followed at all closely the history of post-vaccinal fatalities must have been struck by the fact that, until recently, these patients, as a general rule, died from septicaemia, whereas now they die from encephalitis. Much more research than that which has been published is required to determine whether any causal relation exists between vaccination and the encephalitis reported as occurring in such cases, and, if so, what is the nature of such relation.

Of the sixty-two post-vaccinal cases of acute nervous diseases considered by the Ministry of Health Committee in 1925, only six were submitted to post-mortem examination and studied histologically. Meagre details were forthcoming in the majority of cases, and in no case was a blood culture performed either before or after death. It is not surprising, therefore, that the majority of the committee referred to hesitated to find proof of any direct causal relationship between vaccination and the deaths following shortly thereafter. In a minority report, however, the opinion was expressed that there was such a relationship. The medical profession would appear to have ignored the majority report and to have accepted the minority report, for this is the only explanation we can

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