In order to prevent the occurrence of scurvy in an infant fed upon some scurvy-producing food, it is advised to add some antiscorbutic food to the diet, and for this purpose raw meat juice, orange or grape juice are commonly used. It might seem hardly necessary to point out that the meat juice must be from fresh meat, and probably from uncooked meat; but I have found in at least three instances that some patent meat juice, or one of the concentrated meat preparations which are so widely advertised, was being given with the idea that it would prevent or cure scurvy. As far as I have seen, such preparations are entirely worthless as antiscorbutics. The red gravy from cooked meat was shown to be ineffectual in one of my cases where the child was having one table-spoonful of this red gravy daily as an addition to its diet of Allenbury food No. 2, with one feed of baked flour with water and a little cream. In another case occasional feeds of beef tea had not prevented the onset of scurvy. Even raw-meat juice, unless given sufficiently freely and regularly, may not prevent scurvy. In one of the most severe cases raw-meat juice had been given for five months before the disease began; and in the only case in my series which arose on peptonized milk the infant was having a teaspoonful of raw-meat juice three times a day on every alternate day, then, owing to some looseness of bowels, it was omitted fourteen days, by the end of which time the infant showed well-marked scurvy.

Fruit juice, though probably a more powerful antiscorbutic than raw-meat juice, is not an unconditional safeguard. In the case already mentioned where red gravy of cooked meat was being given with the Allenbury food, the juice of two black grapes had also been given daily for four and a half months before the scurvy began; in another case where scurvy had been recognized the juice of four grapes had been given daily for fourteen days with no apparent improvement (on potato there was definite improvement in two days).

No doubt this failure of fruit juice depends upon insufficiency of dose; but it may be that this insufficiency is relative, not absolute—that it requires a larger amount of fruit juice to prevent the scorbutic tendency of some foods than of others. The superior potency of potato as an antiscorbutic seems to me quite certain, but as I have almost always given also raw-meat juice or orange juice my own results do not illustrate this point, and some of them have shown very rapid improvement on orange juice alone. While, however, potato seems specially valuable in the treatment of scurvy, it is less suitable for prophylaxis, for although it is usually tolerated well for a few weeks during treatment it is more apt to cause digestive disturbance than is fruit juice, and is therefore less suitable for prolonged use as a regular addition to the diet.

The potato is prepared by boiling or steaming in the ordinary way with care to obtain a floury potato; the outer floury portion is then scraped off and beaten up thoroughly with enough milk to make a smooth cream, sufficiently thick to pour out of a jug rather heavily—potato 2 heaped teaspoonfuls (with average 2-drachm teaspoon) to 1 oz. of milk; $1\frac{1}{2}$ to 2 teaspoonfuls of this potato-cream are given three or four times daily; after two or three weeks the dose of this should be gradually reduced, and omitted altogether within four weeks from the commencement of treatment. The mode of giving the potato-cream is of some importance; most infants take it best mixed up with the ordinary feed, but if this is done it should be mixed with a portion only of the feed to ensure the whole of the potato-cream being taken, otherwise if part of the food is left the child does not get the full dose of potato. Occasionally it is taken more readily given separately; in either case it is often disliked at first, but I have rarely had any serious difficulty in getting it taken. In addition, 2 teaspoonfuls of raw-meat juice may be given three or four times in the twenty-four hours, and sometimes $\frac{1}{2}$ teaspoonful of orange juice two or three times a day, but any looseness of the bowels should make us cautious in adding this to the potato-cream, for diarrhoea in infantile scurvy is a serious complication, as Glisson seems to have observed. At the same time, the child is placed on a diet of milk which has been heated just short of boiling point and diluted with water; the scurvy-producing "food" is of course stopped.

The necessity for moving and handling the infant as

little as possible is obvious; the pain caused by pulling on socks, shoes, and tight sleeves, and by bathing is so evident and so piteous to behold that it is only humane to have the infant wrapped in loose clothing and let him lie undisturbed as much as possible; the duration of the tenderness and pain is only a few days after proper treatment is begun, so that all ordinary dressing and bathing and outing may well be in abeyance until all tenderness and pain have gone.

REFERENCE.
¹ *Lancet*, August 13th, 1904.

ERRORS OF REFRACTION AMONG CHILDREN ATTENDING ELEMENTARY SCHOOLS IN LONDON.

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WHILE holding the position of oculist to the elementary schools under the London County Council I took the opportunity during nine months of last year (1905) to gather statistics as to the relative frequency of the different forms of refractive error among the children. In the "provided" schools I saw all those children—except those who happened to be absent at the time of my visit—who had been previously picked out by the teachers as having failed to pass the somewhat rough test which has been in force in order to detect those whose vision is seriously impaired. This test consists—for the upper standards (V, VI, and VII) in reading $\frac{1}{2}$ accurately with both eyes open; for the lower standards (I to IV) in reading $\frac{1}{8}$. It is found that by means of this test, on an average about 10 per cent. of the total number of children in either the boys' or girls' department of any elementary school are picked out as having defective vision.¹ When children already wear glasses the test is made with the glasses on, so that a certain number of children with a considerable refractive error are not included in my statistics. Although, however, in a few schools in comparatively well-to-do neighbourhoods the number of children wearing glasses—more especially myopes in the upper standards—was already considerable, yet the actual proportion with glasses in the whole number of schools that I visited in the two School Board divisions of East Lambeth and Chelsea was very small. In this way 31 boys', 33 girls', and 2 mixed departments, with a total register of 24,095, were dealt with, of whom 1,732—778 boys and 954 girls—of those who were brought under my special notice by the teachers, all between the ages of 7 and 14, were classified by me into the four categories that appear in my tables.

My method was to apply the shadow test to each of the children seen. Usually I was able to take them into the teacher's room, and with the gas lit and blinds drawn, while the child was directed to look at some distant object, to reflect sufficient light into each eye from a plane mirror to at once determine in which direction the shadow moved. If "against" in both meridians I put down the eye as myopic; if the shadow moved "with" in one or both meridians, by employing a trial frame with four convex glasses (+1, +2, +3, +4) I was able quickly to determine to which of the remaining three categories the eye belonged, and to classify the children that I saw according as I found them to have:

1. Hypermetropia of 2 D or more with or without astigmatism not more than 1 D.
2. Hypermetropic astigmatism of more than 1 D.
3. Mixed astigmatism of more than 1 D.
4. Myopia (including myopic astigmatism) if 1 D or more.

A certain number, namely those with H less than +2, with astigmatism not more than 1 D, with apparent myopia below -1, or with emmetropia, I did not classify at all. I also left out those with serious corneal lesions due to interstitial keratitis or phlyctenular disease, in fact all in whom I judged disease and not refractive error to be the main cause of bad vision. On the other hand, cases of slight corneal nebulæ, if these appeared to me to be less important than the refractive error, I included. In all those cases where the refraction of the two eyes was different, I classified the child according to his *better* eye; and in this connexion I considered simple hypermetropia as better than hypermetropic astigmatism, this, again, better than mixed, and mixed astigmatism better

than myopia with or without astigmatism. Of course, it will be understood that none of the children were under a mydriatic, and if my purpose had been to prescribe correcting glasses my method of testing the refraction would have been altogether inadequate. My object, however, was something different. Though in individual cases the true condition of the refraction may have been disguised by spasm, yet, on the average, an allowance of a dioptré or so for the tonic action of the ciliary muscle is found to be correct; my object being, by taking large numbers of children, to demonstrate the general tendency, I believe that my figures are sufficiently large to point out the route by which children who become myopic during school life commonly travel.

The following tables speak for themselves:

TABLE I.—*Number of Boys at Different Ages Examined in 31 Provided Schools with a Total Register of 10,416 Boys, showing the Number found in the Four Categories of Defective Vision.*

Age.	Total Examined.	Hyper-metropia.	Hyper-metropic Astigmatism.	Mixed Astigmatism.	Myopia and Myopic Astigmatism.
7	40	11	12	8	9
8	132	24	35	40	33
9	110	22	37	24	27
10	100	20	24	25	31
11	127	32	26	26	43
12	138	37	27	27	47
13	131	28	25	22	56
From 7 to 14	778	174	186	172	246

TABLE II.—*Boys. Relative Frequency of Different Forms of Ametropia in Provided Schools. The Figures show the Relative Percentage of each Class, compared with all having Serious Refractive Error.*

Age.	Hyper-metropia.	Hyper-metropic Astigmatism.	Mixed Astigmatism.	Myopia and Myopic Astigmatism.
7	27.5	30.0	20.0	22.0
8	18.0	26.5	30.0	25.0
9	20.0	33.6	21.8	24.0
10	20.0	24.0	25.0	31.0
11	25.6	20.0	20.4	33.0
12	26.0	19.5	19.5	34.0
13	21.3	19.0	16.7	42.7
From 7 to 14	22.0	23.9	22.1	31.6

TABLE III.—*Number of Girls at Different Ages Examined in 34 Provided Schools with a Total Register of 11,498 Girls, showing the Number found in the Four Categories of Defective Vision.*

Age.	Total Examined.	Hyper-metropia.	Hyper-metropic Astigmatism.	Mixed Astigmatism.	Myopia and Myopic Astigmatism.
7	51	10	15	14	12
8	135	35	33	40	27
9	132	34	30	30	38
10	139	32	35	31	41
11	155	36	26	48	45
12	190	64	39	30	57
13	152	52	25	35	40
From 7 to 14	954	263	203	228	260

TABLE IV.—*Girls. Relative Frequency of Different Forms of Ametropia in Provided Schools. The Figures show the Relative Percentage of each Class compared with all having Serious Refractive Error.*

Age.	Hyper-metropia.	Hyper-metropic Astigmatism.	Mixed Astigmatism.	Myopia and Myopic Astigmatism.
7	19.6	29.4	27.4	23.5
8	25.9	24.4	29.6	20.0
9	25.7	22.7	22.7	28.7
10	23.0	25.1	22.2	29.5
11	23.2	16.7	30.9	29.0
12	33.6	20.5	15.7	30.0
13	34.2	16.4	23.0	26.3
From 7 to 14	27.5	21.2	23.8	27.2

Before making any remarks on these figures it will be well to supplement them by others. During September and October last I was engaged in examining children in "non-provided" schools. Here the system differed from what had obtained in the "provided" schools in that no preliminary test by the teachers had been made. Failing this, I merely asked the teachers in the various class rooms to pick out for me those children whom they had noticed not to see well, or who themselves complained of bad sight. I then took these children into the best dark room that I could obtain, and proceeded with the shadow test exactly as I had done with the children of the "provided" schools.

It is perhaps worthy of remark that by this method I was able to discover very nearly as large a proportion of children with a serious refractive error as in the "provided" schools, the proportion being in the case of the latter 7.9 per cent., and in the case of the former 7.6 per cent. of the total on the register. This, it will be seen, is about 2 per cent. less than the average who are found to have a serious defect in vision in all the London schools. The difference is partly accounted for by absentees at the date of my visits, who escaped examination—about 10 or 12 per cent. of the whole number of children—partly by the fact that in the provided schools some of the children were wearing glasses, which enabled them to pass the teacher's tests, so that I did not examine them.

TABLE V.—*Boys and Girls at Different Ages Examined in 10 "Non-provided" Schools with a Register (Boys and Girls) of 2,728, showing the Number found in the Four Categories of Defective Vision.*

Age.	Total Examined.	Hyper-metropia.	Hyper-metropic Astigmatism.	Mixed Astigmatism.	Myopia and Myopic Astigmatism.
7	17	7	6	3	1
8	26	8	11	4	3
9	30	6	12	4	8
10	29	9	13	6	1
11	28	7	7	8	6
12	41	7	11	16	7
13	37	5	12	11	9
From 7 to 14	208	49	72	52	35

It will be noticed that the proportion with hyper-metropic astigmatism is considerably greater, and the proportion with myopia considerably less, than in the previous tables. The numbers, however, are so comparatively small that I do not think any safe conclusions can be drawn from them alone; nor would a table of percentages calculated from them prove anything. There are so many disturbing factors in an investigation of this sort that the only percentages of much significance are those calculated from somewhat large numbers. I have therefore added the numbers of children in the different categories from all the schools, boys and girls, and divided

them into three age-periods and calculated percentages the result being set forth in the following table:

TABLE VI.—1,940 Boys and Girls, all having Weak Sight: Relative Percentages at Different Ages of the Four Categories of Defective Vision.

Age.	Hypermetropia.	Hypermetropic Astigmatism.	Mixed Astigmatism.	Myopia and Myopic Astigmatism.
7 to 10	23.3	28.3	24.8	23.4
10 to 12	23.3	22.6	24.9	28.9
12 to 14	28.0	20.1	20.4	31.3

This table is derived from figures large enough to be of real significance, but it requires some interpretation.

(1) *Apparent Increase of Hypermetropia in Children over 12.*

As has been explained, the test by which, in the great majority of cases, children with defective vision were selected by the teachers, was more severe in the higher than in the lower standards, the older children being required to see $\frac{5}{12}$, while the younger ones were let off with $\frac{1}{2}$. In order to find out how this would be likely to affect my statistics, I have picked out from my lists 128 children belonging to the V, VI, or VII standards who were returned by the teacher as seeing $\frac{6}{12}$ (no better and no worse). Of these the number of hypermetropes was 56, or 43 per cent., those with hypermetropic astigmatism 20, or 15 per cent., mixed astigmatism 32, or 25 per cent., and myopes 20, or 15 per cent. The proportion of hypermetropes in this particular set is far greater than the proportion among the whole number with defective vision—that is, a large part of the excess in the proportion of hypermetropes which is found among the older children is accounted for by their having had to pass a more severe preliminary test. This is one factor which accounts for the increase from 23.3 per cent. in the children under to 28 per cent. in the children over 12.

A second factor is the decrease in the power of accommodation. From infancy to old age, the volume of the crystalline lens becomes continuously greater. Either from this cause, as Sir W. J. Collins holds,² or according to the old view, from gradual increase in its density, the work of the ciliary muscle in altering its shape so as to bring near objects into focus, becomes continuously greater. Since the force exerted by the muscle does not vary very much with age, though it may with fatigue, the resulting power of accommodation tends to decrease continuously through life. With very young children it is not feasible to test the power of accommodation, but between the ages of 10 and 15 it is said to decrease from 14 to 12 dioptries³ on the average. This, it must be understood, is the maximum amount, and can only be maintained for a very short time without causing fatigue. Probably about half of the maximum is as much as a well-nourished child can maintain for any considerable length of time together, as in reading. In the case of ill-nourished children the proportion is considerably less (depending on the condition of the ciliary muscle), as is shown by the relief sometimes afforded by low convex glasses to children whose hypermetropia does not exceed 2 or 3 D. With well-nourished children simple hypermetropia not exceeding 3 D does not, as a rule, call for even partial correction before the age of 12, whereas at the age of 14 or 15 it very frequently does.

(2) *Decrease of Hypermetropic Astigmatism.*

The continuous decrease in hypermetropic astigmatism as the children grow older is accounted for by the fact that during school life these children, so long as they are without glasses, are obliged constantly to strain their sight during school hours. Consequently they tend more than others to bring their eyes too near to their books or paper, with the result that their visual axis tends to lengthen. Consequently, as the children grow older many of those who begin with hypermetropic astigmatism, become myopic in one meridian, and later on in both. As there is no tendency for simple hyper-

metropes to become astigmatic, the ranks of the astigmatic hypermetropes become constantly thinner.

(3) *Decrease of Mixed Astigmatism after the Age of 12.*

When we come to mixed astigmatism we find that in the lower standards of boys' and girls' schools the proportion remains remarkably constant. Above the age of 12, however, there is a decided falling off. Just as hypermetropes with astigmatism tend to become myopic in the longer meridian, so those who are already myopic in one meridian tend to become myopic in both. Before the age of 12 the number of children who pass from mixed to myopic astigmatism is just about balanced by the accessions to the ranks of the former from those of the hypermetropic astigmats. After the age of 12 this latter tendency is decidedly overbalanced by the increase of myopia. Consequently the proportion of children with mixed astigmatism diminishes.

(4) *Increase of Myopia.*

As we should expect from the foregoing, the proportion of myopes steadily increases from the age of 7, when the child leaves the infant school, till the age of 14, when he leaves school altogether.

The average age of the children examined under 10 was 9; and at this age 23.4 per cent. of those with defective sight, or 2.34 per cent. of the children on the register, were myopic. Four years later, at an average age of 13, the proportion was 31.3 per cent. of those with defective sight, or 3.13 per cent. of those on the register, an increase of 1 in 125. This result is in accordance with the statistics published by Cohn and Risley,⁴ though the actual extent to which myopia prevails is less alarming according to my statistics of London schools than according to theirs of German and American ones. A point, however, on which I wish to lay special stress is that although of the total number of children who leave our schools at the age of 14, permanently handicapped in the struggle for life by myopia, perhaps half have acquired the condition since the age of 7 years; the other half, probably 1.5 per cent. of the whole number of children in school, were already myopic in the infant school. Nor do I think that any considerable proportion of this infant myopia is accounted for by unsuitable methods of teaching, though these no doubt have existed. There is a tendency among some writers on the subject to attribute all myopia to unsuitable environment. The fact is that a certain not inconsiderable proportion of us are born with such a strong hereditary predisposition to myopia that nothing can stop it. This is a matter which would repay further investigation, but from my observations in infant departments I believe that I am right in estimating that at least 1 per cent. of children of 5 years old (the age at which compulsory attendance begins) are already myopic. Now these are the children, far more than those who develop myopia later on under stress of school work, who tend especially towards high myopia with all its dangers. The following figures are given in support of this view:

Of 174 boys and girls between 7 and 11, all myopic, only 50 were able to read $\frac{6}{18}$ —that is, 28.7 per cent.

Of 288 boys and girls between 11 and 14, all myopic, as many as 172 were able to see $\frac{6}{18}$ —that is, 59 per cent.

This makes the proportion of older children whose myopia was comparatively slight rather more than double that of the younger children. Some of these children were wearing glasses at the time of being tested. If we take only those children who were not wearing glasses, the proportion remains practically the same:

Of 150 boys and girls between 7 and 11, all myopic, and without glasses, only 40 were able to read $\frac{6}{18}$ —that is, 26.6 per cent.

Of 222 boys and girls between 11 and 14, all myopic, and without glasses, as many as 122 were able to see $\frac{6}{18}$ —that is, 54.9 per cent.

Again, the proportion of older children whose myopia is comparatively slight is rather more than double that of the younger ones.

I will conclude this paper with a few practical considerations bearing on the problem of how to deal with errors of refraction in all elementary schools. I assume that the standard of minimum vision requisite for the children adopted by the late School Board for London

and continued by the London County Council is a reasonable one—namely, $\frac{1}{12}$ for the higher standards, $\frac{1}{18}$ for the lower ones.

1. Of the total number of children who need glasses on this basis, about one quarter need simple convex spheres. In the case of these children, since their accommodation is as a rule quite equal to any demands likely to be made on it out of school hours, it is not necessary, except in the case of exceptionally high hypermetropia, to prescribe glasses for constant wear.

2. Excluding cases of myopic astigmatism, nearly half, or including them, more than half, of the children who need glasses at all need cylindrical glasses, or a cylindrical combination. The importance of this fact is sociological rather than surgical. The great expense which seven shillings is to a great number of poor parents has hitherto prevented a large proportion of the children in poor districts from obtaining properly correcting glasses, even when they have obtained the proper prescription at a hospital. This is a matter which has been under the consideration of the education authority, and steps are now being taken whereby through voluntary agency the difficulty may, it is to be hoped, be solved. Meantime, it may be pointed out to the medical men and women who work in our ophthalmic hospitals that in the case of children it is rarely necessary to correct astigmatism which does not exceed 1 D. Those with astigmatism of a higher degree need glasses for constant wear.

3. Myopic children, with or without astigmatism, are about 3 per cent. of the whole number in all elementary schools. For these the constant wearing of correcting glasses is especially important, because of the tendency of myopia to increase.

4. In very young children myopia exists to a greater extent than has hitherto been generally realized. In cases where the tendency is inveterate it is highly desirable that they should be caught while still in the infant school (and the same may be said of a certain number with central corneal nebulae in both eyes, the result of phlyctenular disease, etc.), so that, instead of their being set to do tasks which they are quite incapable of performing without doing still further injury to their eyesight, some suitable curriculum, specially adapted for children with weak sight who are not blind, may be arranged for them.

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- ¹ Report of Medical Officer (Education) to London County Council for 1905, p. 34. ² BRITISH MEDICAL JOURNAL, December 2nd, 1905. ³ Jackson in Norris and Oliver's *Diseases of the Eye*, vol. i, p. 504. ⁴ Norris and Oliver, vol. ii, p. 356.

THE VARIETIES OF RINGWORM AND THEIR TREATMENT.*

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THE object of this paper is to show how far recent advances in therapeutics have solved the difficulties which have hitherto rendered the treatment of the common forms of this disease so unsatisfactory and tedious. We all, no doubt, can recall cases in which remedy after remedy has been tried, and as months passed the cure seemed as far distant as ever. The fact that the peculiarly rebellious variety of the disease is prevalent at the school age has a serious influence upon education, and the enforced quarantine for what, after all, is a comparatively trivial complaint, is exceedingly troublesome to parents and teachers. It is not too much to claim that we are now able to shorten the duration of the disease and that the period of contagion can be reckoned in weeks instead of months and even years.

The diseases classed as ringworm—and with them must be included favus—are caused by several varieties of fungus. In this country the commonest by far is the *Microsporon audouinii*, which is found in nine cases out of ten of the ringworm of the scalp in children. Next in order of frequency come the large-spored *Tricophytons*, and last the favus fungus, the *Achorion schönleini*.

Microsporon Audouinii.

The *Microsporon audouinii* affects the hair of the scalp, and sometimes also other parts of the body. The changes produced in the scalp by this parasite are familiar. The patch or patches are usually covered with a fine scurf, often of an ashen-grey colour, and projecting through this we notice groups of broken hairs standing up like stubble. The margin of the patch (best seen when the head is shaved) is well defined, slightly raised above the surface, and often presents a ring of papules. When extensive this form of ringworm is often mistaken for dandruff, but the diagnosis is at once settled by finding the broken hairs and examining them under a microscope with a little liquor potassae. The hairs removed from a patch of this variety of ringworm are thicker than normal, and the thickened root has a peculiar white sheath which is very characteristic. This sheath is found on microscopical examination to be made up of spores arranged in layers. The spores are closely packed, so closely that they produce an appearance which resembles mosaic. In stained specimens, in addition to spores, short straight or slightly curved rods of mycelium are found inside the hairs. The fungus has a peculiar keratolytic action on the hair, making the shaft brittle, and this is the cause of the broken stumps. If an infected hair be planted in maltose agar a characteristic white ringed culture can be obtained. This variety of fungus is most commonly met with in children between the ages of 5 and 10 years, and in schools or families it spreads from child to child directly, or indirectly by hats, caps, etc. The liability to infection is very slight after the age of 15, and the disease is extremely rare in adults. I have seen it in young infants, and it has been known to occur in babies less than a week old. The disease, if untreated, spreads slowly, and may last for two or three years or more. It is exceedingly difficult to treat because the fungus extends into the hair follicles, and remedies applied to the scalp even under pressure cannot penetrate sufficiently. Where the disease affects parts which are not hairy circular red patches form, and, though the fine lanugo hairs are infected, the fungus is easily reached by parasiticides.

In a few cases the inflammatory condition known as kerion develops. In most of the cases I have examined at the London Hospital I have found a small spored fungus which microscopically and in cultures appears to be identical with the *Microsporon audouinii*.

The Tricophytons.

In a small proportion of the cases of ringworm of the scalp, and in most of the ringworm seen on other parts, parasites differing considerably from the microsporon are found. These are the large-spored tricophytons. On the scalp the patches do not present the scaly character with stubbly hair characteristic of the common variety. The hairs break off short, level with the scalp, and the broken stumps cause an appearance which has been well named the "black-spot" ringworm. On removing the hair the root is found to have no white sheath. Under the microscope the fungus is seen to consist of mycelium in the form of jointed rods, and the spores are arranged in chains like rows of beads. In diagnosis we do not rely upon the comparative size of the spores, though there is an appreciable difference, but upon the fact that they are arranged in chains. The large-spored fungi are of two great varieties—*Tricophyton megalosporon endothrix*, affecting the interior of the hair, and *Tricophyton megalosporon ectothrix*, affecting the outside of the hair. In some cases the fungus is found both inside and outside the hair, and is then called ectoendothrix.

To M. Sabouraud we owe the classification and differentiation of the forms of fungus in ringworm. The tricophytons are of several varieties. They differ chiefly in their cultures, which are usually tinted. Some are of a reddish-brown, some pale brown, others yellow, and occasionally a culture of a pinkish hue has been grown. The pathological effects also vary. Some are more irritant than others, and easily set up an intense inflammation with the formation of pustules in the skin and follicles. The tricophytons may occur at any age; and though they may be conveyed from one human being to another directly or by infected articles, such as shaving brushes and razors, the ectothrix fungus is often derived directly, and in most cases probably originally, from animals, such as horses, cattle, dogs, cats, and birds. With the exception

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