

**Ringworm and alopecia areata : their pathology, diagnosis and treatment /
by H. Aldersmith.**

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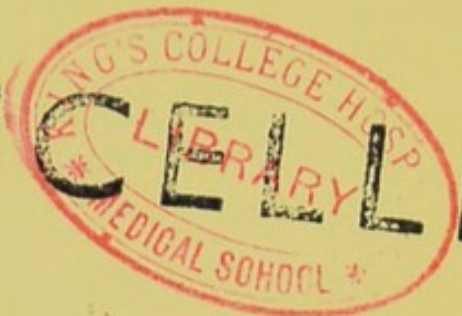


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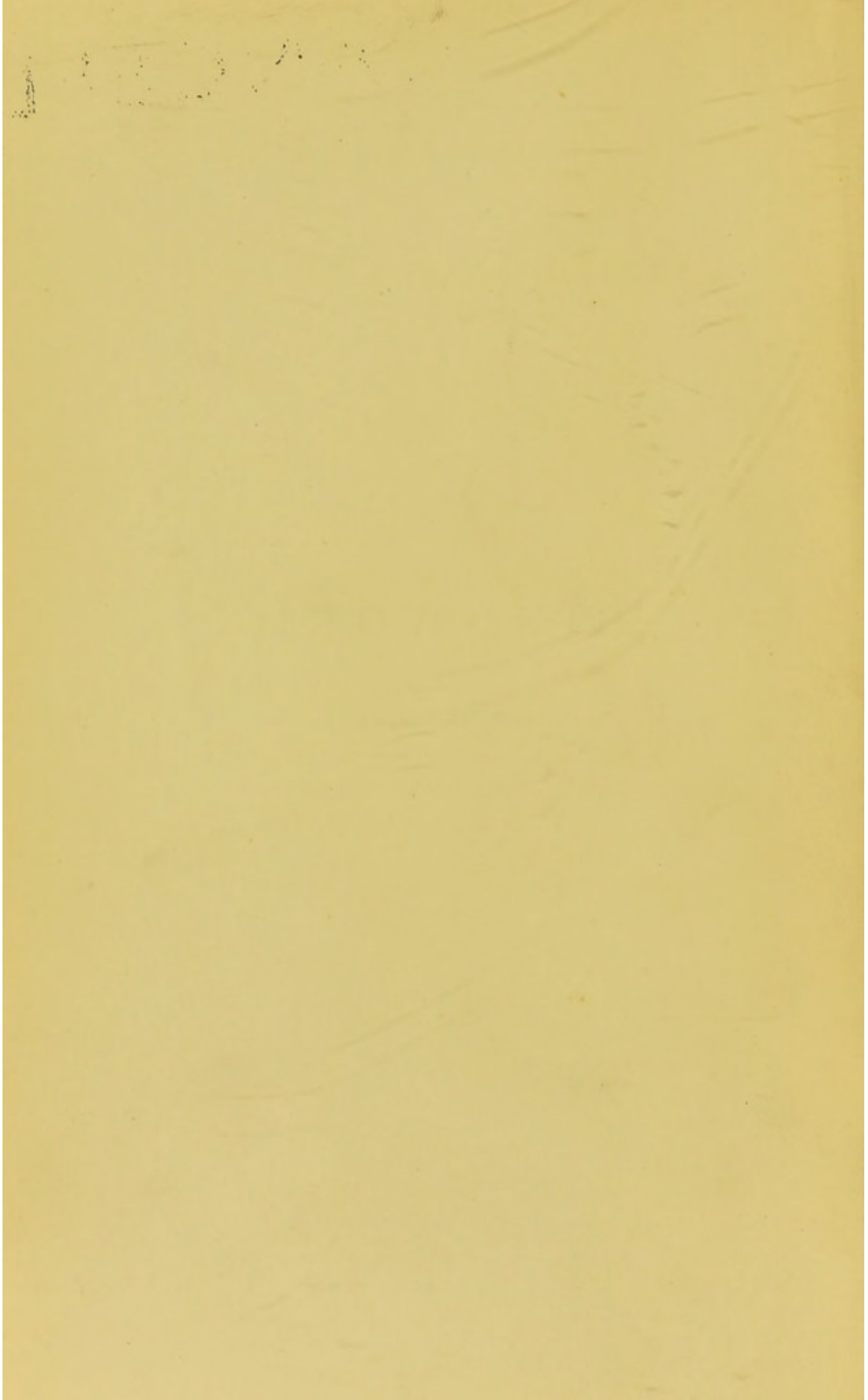
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A L O P E C I A A R E A T A



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RINGWORM

AND

ALOPECIA AREATA

*THEIR PATHOLOGY, DIAGNOSIS
AND TREATMENT*

BY

H. ALDERSMITH, M.B. LOND., F.R.C.S.

MEDICAL OFFICER, CHRIST'S HOSPITAL, LONDON

FOURTH EDITION

ENLARGED AND REWRITTEN, WITH NEW ILLUSTRATIONS

LONDON

H. K. LEWIS, 136 GOWER STREET, W.C.

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PREFACE TO THE FOURTH EDITION.

THIS work has been entirely rewritten, so that it forms a new book rather than a new edition. It is considerably larger than any previous edition.

Although the last edition has been out of print for some years, it has been necessary to defer the publication of a further one, to allow time for the fair consideration and corroboration of the discovery by M. Sabouraud of "the plurality of fungi causing ringworm." The different varieties of *Tinea* (which are as distinct from each other as favus is from ringworm) are now separately described, both clinically and microscopically.

The treatment of ringworm is discussed in three chapters. The first chapter details the remedies for small places, the second those for extensive places, while the third describes minutely the "croton-oil treatment," and "croton-oil needling," first suggested by me in 1880.

The chapter on *Alopecia areata* contains a *résumé* of the opinions of many dermatologists as to whether it is, or is not, contagious; and presents also the recent views of Sabouraud, who contends that this disease is due to the

same micro-bacillus as is found in seborrhœa and in ordinary baldness.

The plates (except Plate IV.) I have drawn from typical specimens of the fungi. As this book is especially intended to be a practical guide for medical men, both as to the diagnosis and the treatment of ringworm, I believe these plates will be found more useful than if micro-photography had been employed. By the latter process, no great detail can be obtained, as the fungus lies at different levels ; and it is only when the fine adjustment is freely used that the appearances seen in the plates are observed. It is, however, essential to see this detail, in order to diagnose one form of fungus from another.

My long practical experience of this disease, gained in its daily treatment for over a quarter of a century, must be my apology for any apparent dogmatism, and especially for the observations as to medical certificates.

I take this opportunity of thanking the many friends who have given me leave to quote from their publications ; and especially Drs. Thin, Crocker, Colcott Fox and Blaxall, for permitting me to reproduce some plates.

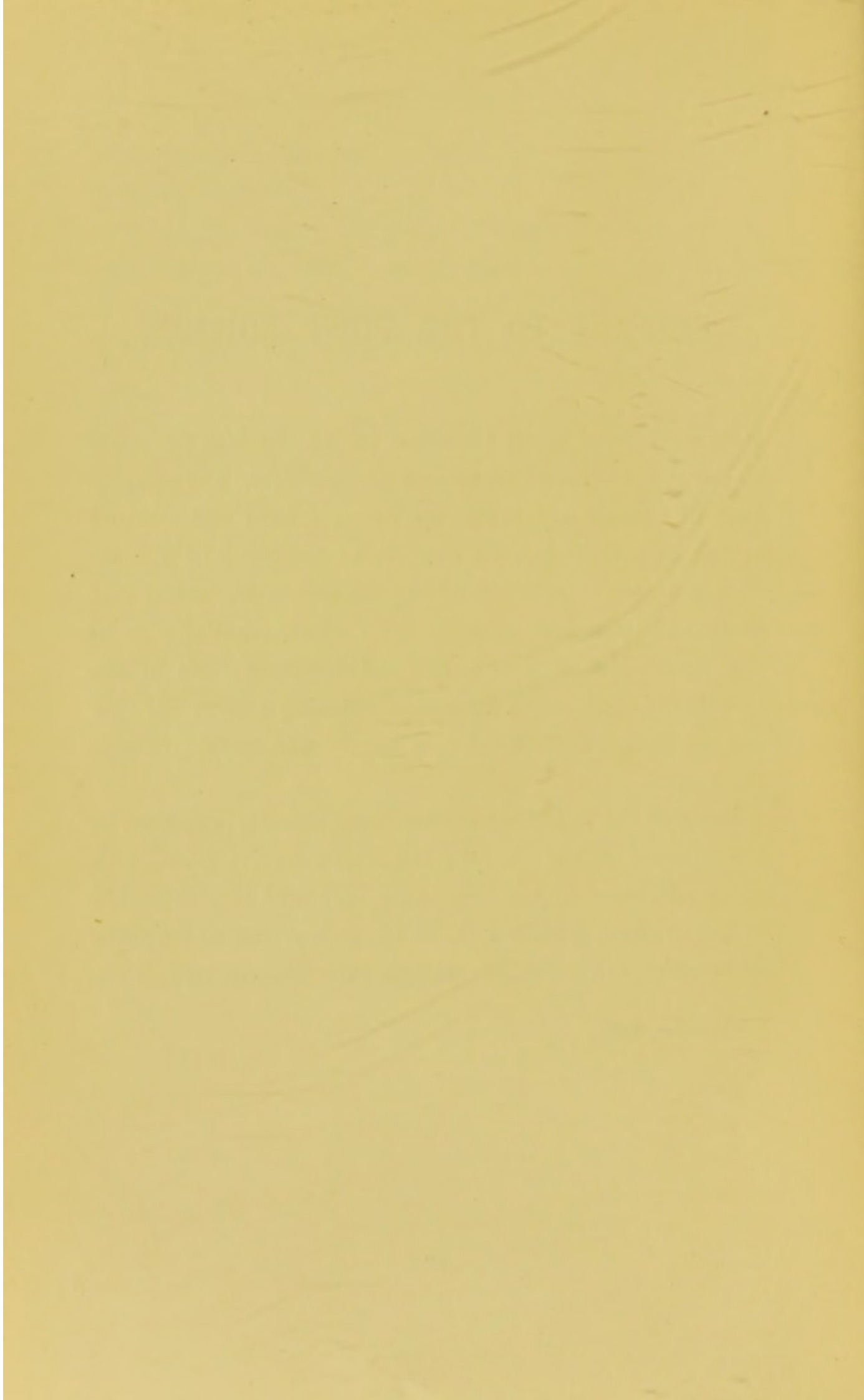
CHRIST'S HOSPITAL, LONDON,
July, 1897.

PREFACE TO THE FIRST EDITION.

HAVING devoted much attention during the last ten years to the diagnosis and treatment of ringworm, and particularly of chronic and inveterate cases, I have endeavoured in the present little work to give, as the result of a more than ordinary experience of the disease, some useful and thoroughly practical hints on the subject, especially as to the production of *kerion*, the inflammatory form of the affection, and Nature's method of effecting a cure. If this can be produced artificially, a speedy and certain cure is the result.

Some of the following observations recently appeared in the columns of *The Lancet* ; and I now reprint them, with many additions, in the hope that they will be serviceable to the medical practitioner, in his endeavours to diagnose and eradicate this insidious and very troublesome complaint.

November, 1880.



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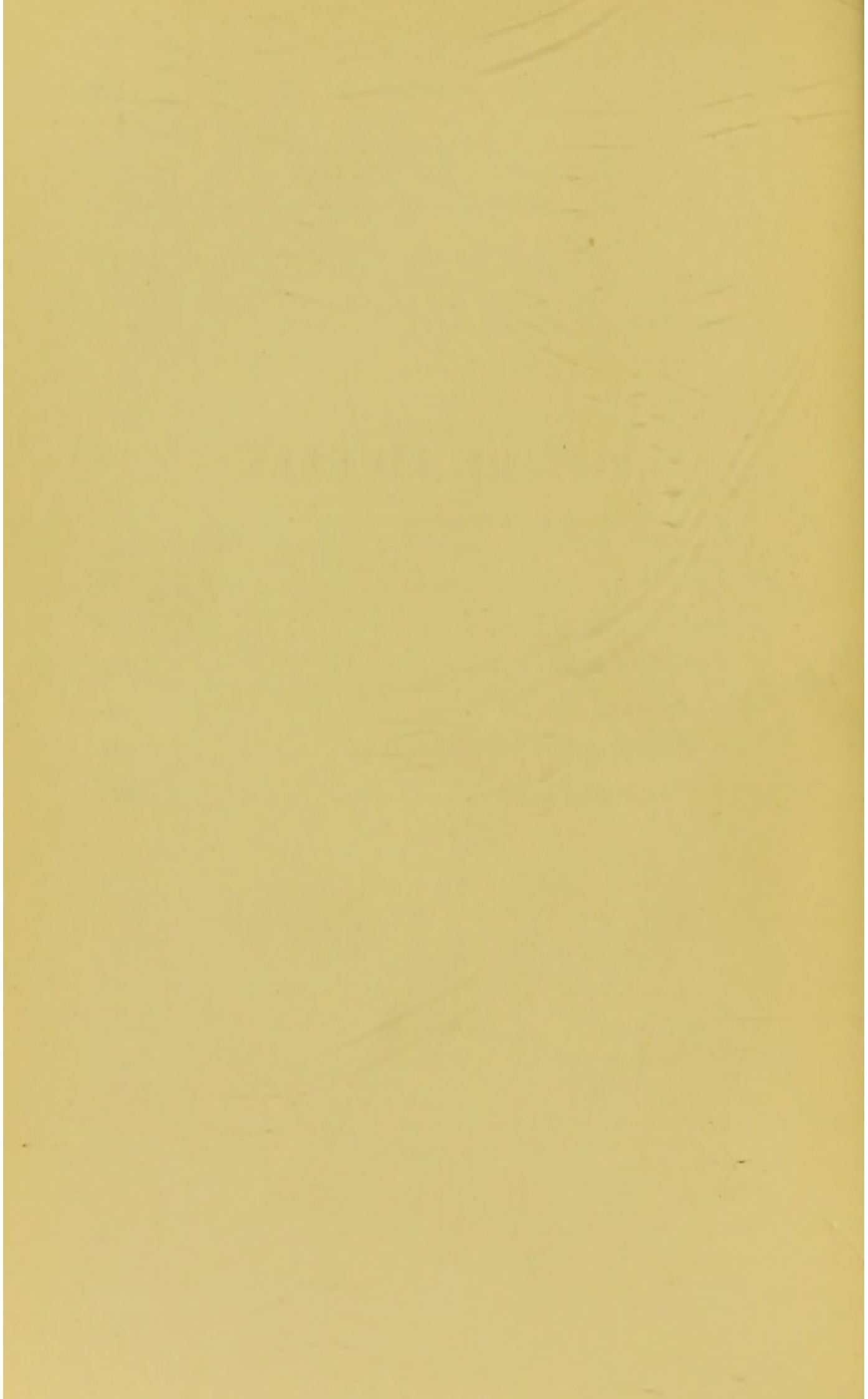
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DESCRIPTION OF THE PLATES.

PLATE I.—SMALL-SPORE TINEA (*Microsporon Audouini*). Magnified about 600 diameters.

- (I) The upper part of a stump, with most of the conidia removed, showing the mycelium *on* and *in* the hair (see p. 78 for description).
 - (II) The ordinary appearance of the intra-follicular portion of the shaft, surrounded by the circumpilar collarette, with innumerable circular, circumpilar conidia, compressed by mutual pressure into a form resembling a mosaic (see p. 77).
 - (III) The neck of the bulb, showing the long terminal fringe, with ovoid endings (see p. 78).
- A few air bubbles are shown, and some detached pieces of mycelium.

PLATE II.—LARGE-SPORE TINEA (*Trichophyton megalosporon endothrix, resistant*). Magnified about 600 diameters.

- (I) The upper part shows the shaft with the epithelium intact, and the "ladder-like" rows of mycelial spores *inside* the hair (see p. 85).
 - (II) The lower part exhibits the terminal fringe (see p. 86).
- A few strings of mycelial spores are shown outside the hair.

PLATE III.—LARGE-SPORE TINEA (*Trichophyton megalosporon endothrix, fragile*). Magnified about 600 diameters.

- (I) The upper part shows the broken-off end with numerous spores floating about, disintegrated by liquor potassæ. The shaft is broken by the pressure of the cover-glass, so that the spores appear to be outside the hair. On one side the hair is bulged from the pressure of the glass. The mycelial spores look like so much "fish-roe," or a "bag of nuts" (see p. 90).
- (II) The lower part shows the appearance of the shaft when it is not closely packed with mycelial spores. The "bead-like" arrangement of the spores is easily seen.

PLATE IV.—LARGE-SPORE TINEA (*Trichophyton megalosporon ectothrix*).

Magnified about 420 diameters. (These plates are taken—by permission—from Fox and Blaxall's paper.)

FIG. 1.—The hair was dissolved in liquor potassæ, and the sporulated mycelium is seen *in its substance*.

FIG. 2.—The shaft from a case of kerion. The wide border of the massed spores on each side of the hair marks the situation of the fungus between the hair and the root-sheath. Both these specimens were taken from the same case, and show the fungus to be *endothrix* as well as *ectothrix* (see p. 93).

PLATE V.—Figs. 1, 2, 5, and 6, magnified about 600 diameters.

FIG. 1.—Mycelium ramifying between the epidermic scales from a recent case of *Megalosporon endothrix* (see pp. 87, 124).

FIG. 2.—This shows the pigmentary deposit often seen in *atrophied* hairs when a case has been under treatment for some time (see p. 108).

FIG. 3.—*Megalosporon endothrix, resistant* fungus, magnified about 1,250 diameters, showing the "ladder-like" arrangement of the quadrangular mycelial spores (see p. 86).

FIG. 4.—*Megalosporon endothrix, fragile* fungus, magnified about 1,250 diameters, showing the "bead-like" arrangement of the rounded spores (see p. 90).

FIG. 5.—*Megalosporon ectothrix* fungus. This shows a large plain mycelium running outside the hair; it was taken from a young child with kerion (see p. 93).

FIG. 6.—*Megalosporon ectothrix* fungus, from a recent case of tinea sycosis, showing the sporulated mycelium both outside and inside the hair-shaft (see p. 93).

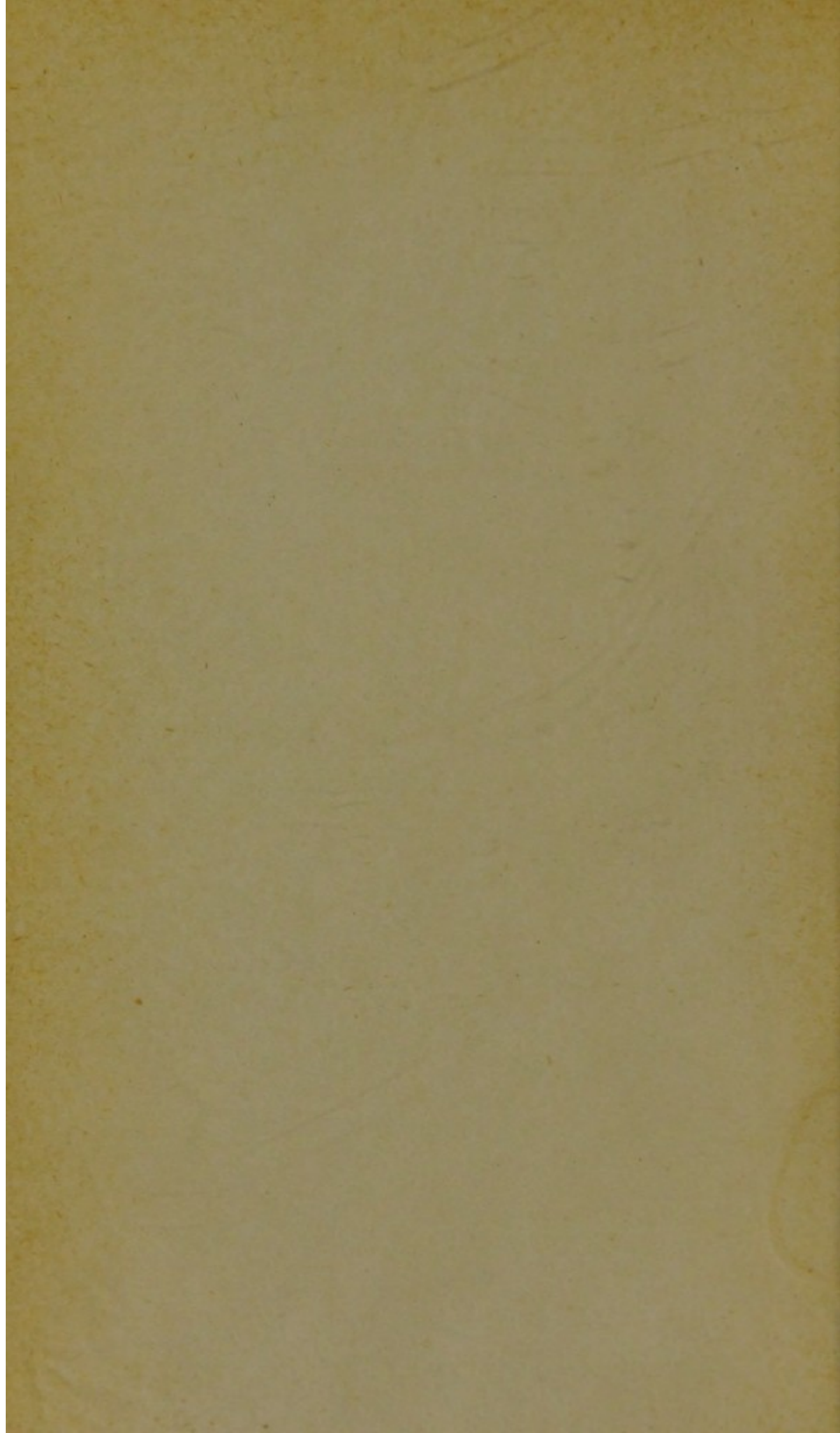
PLATE VI.

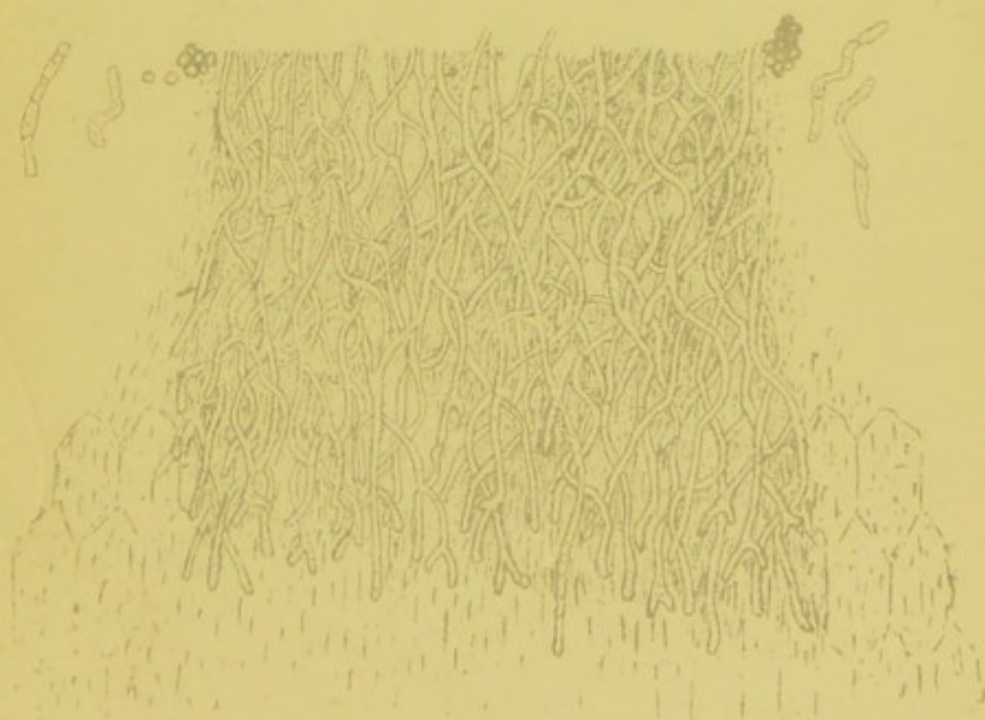
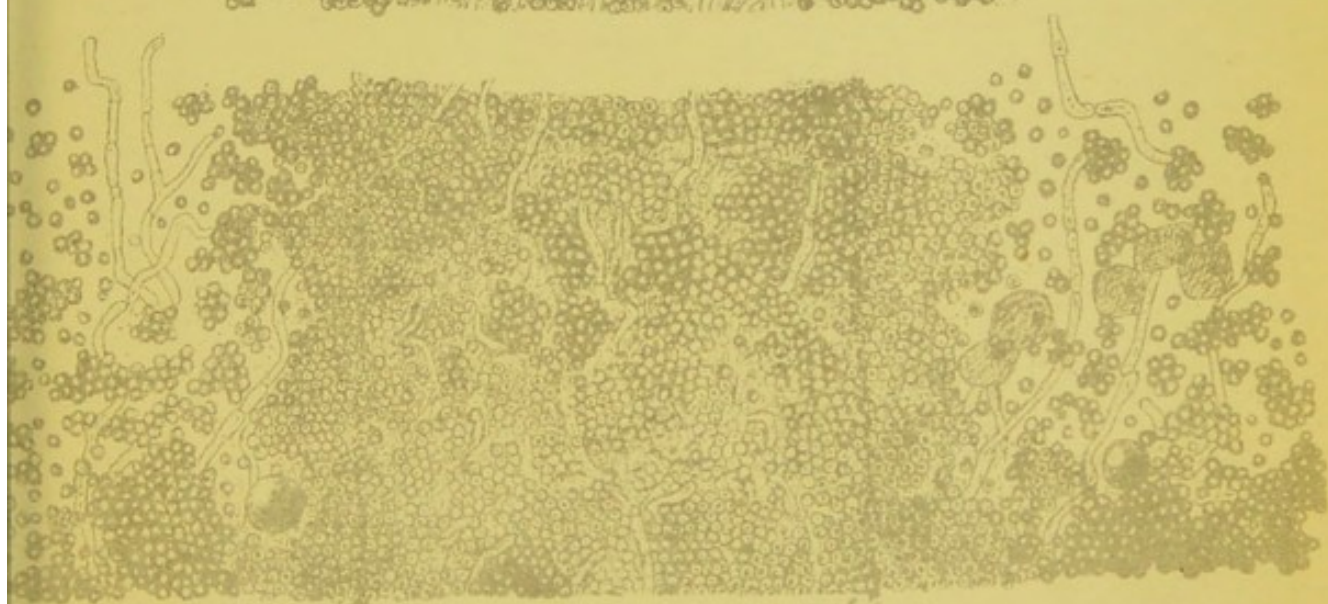
This plate was published in the second edition in 1882, and was drawn from a stump taken from a chronic case of Tinea. It shows the strings of mycelial spores in the substance of the hair, and is evidently the *Megalosporon endothrix, resistant* form. The cover-glass must have been pressed down, so that the shaft was ruptured, and some of the fungus appears to be outside the hair.

PLATE VII.—ALOPECIA AREATA.

Two stumps (shortened to save space), taken from a case of *Alopecia areata*, showing the entire atrophied roots, and the shaft dilated and darkened in places, forming bulbosities, which are deeply pigmented in the centre, with a large amount of dark granular matter. The free end is observed to be club-shaped, more opaque and pigmented, and exhibits a cluster of fibres radiating outwards in a brush-like form. One of the stumps is seen to be half broken, and bent over, at one of these pigmented bulbosities (see p. 306).

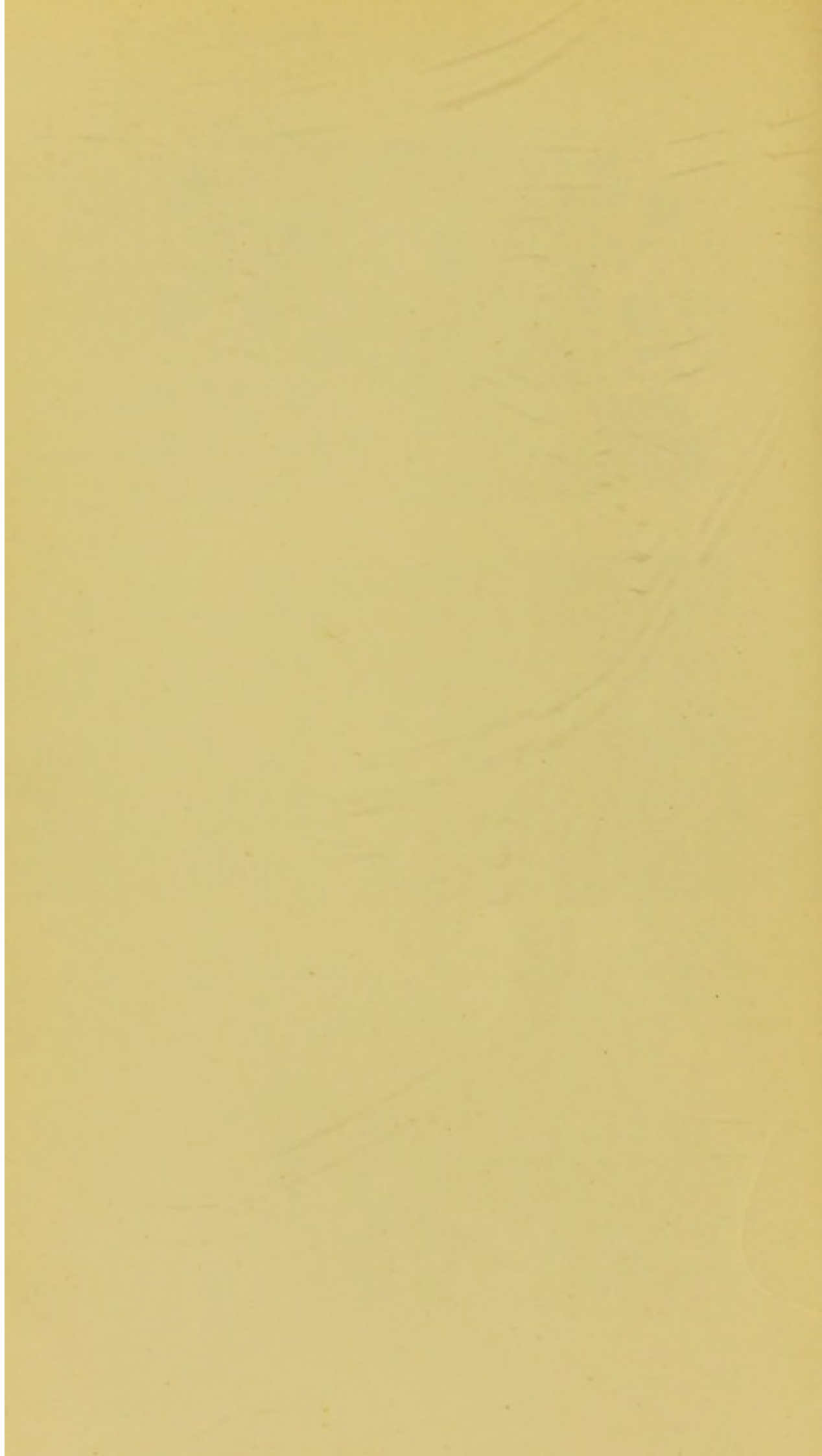




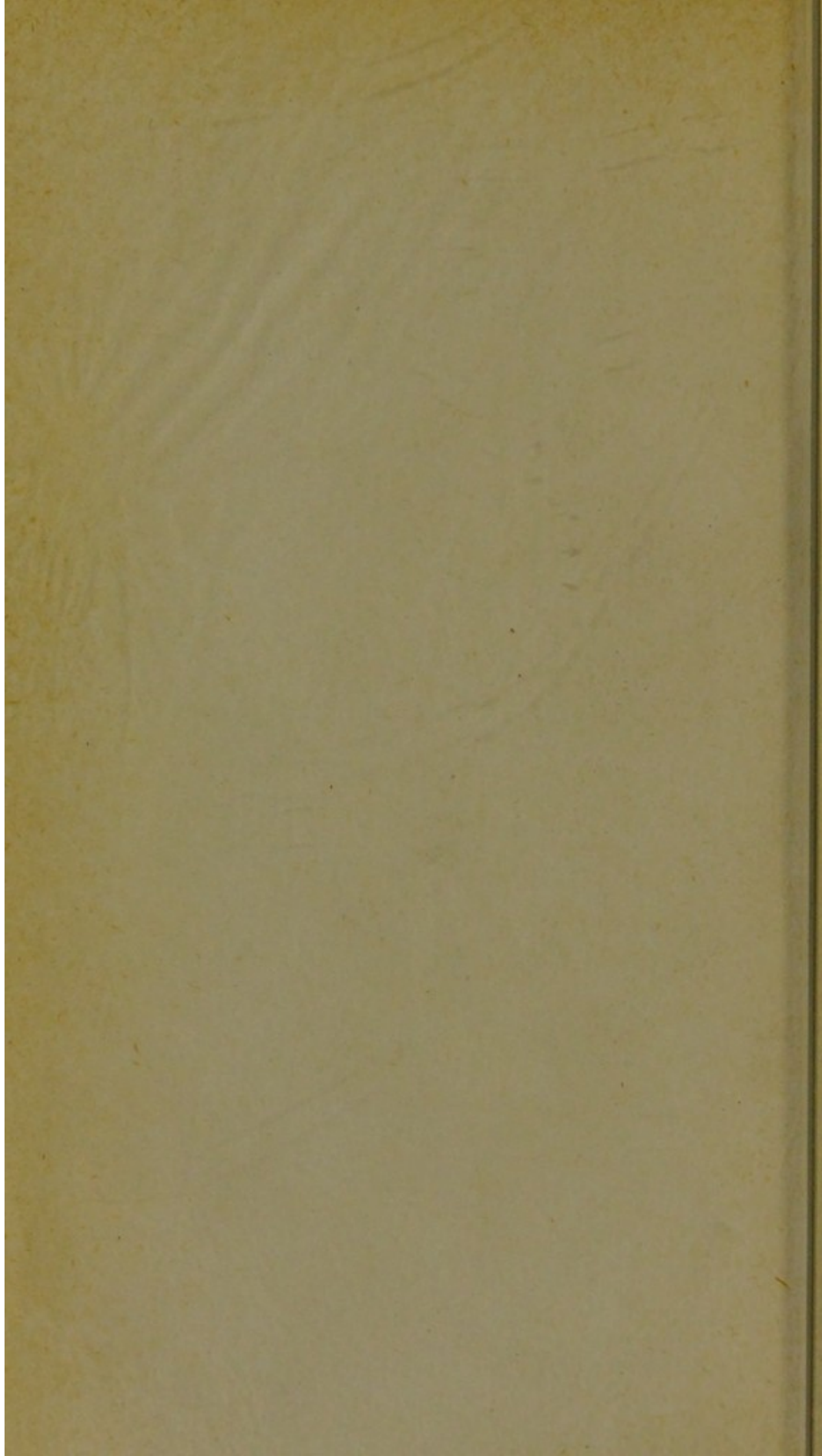


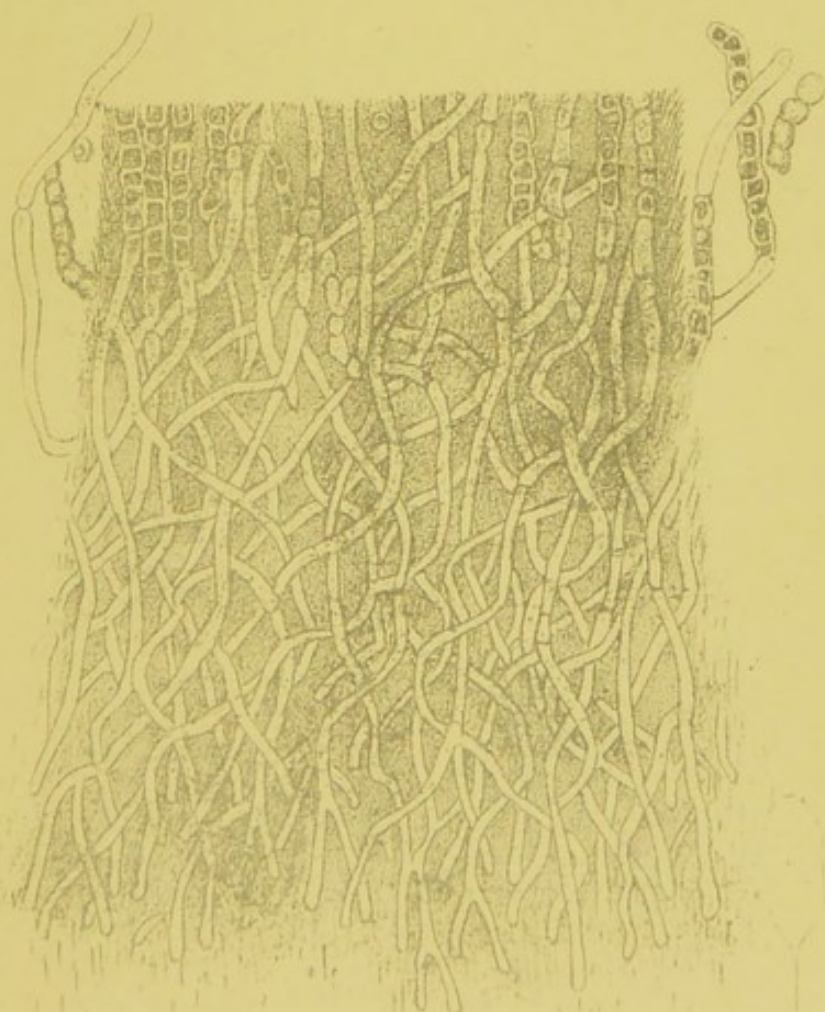
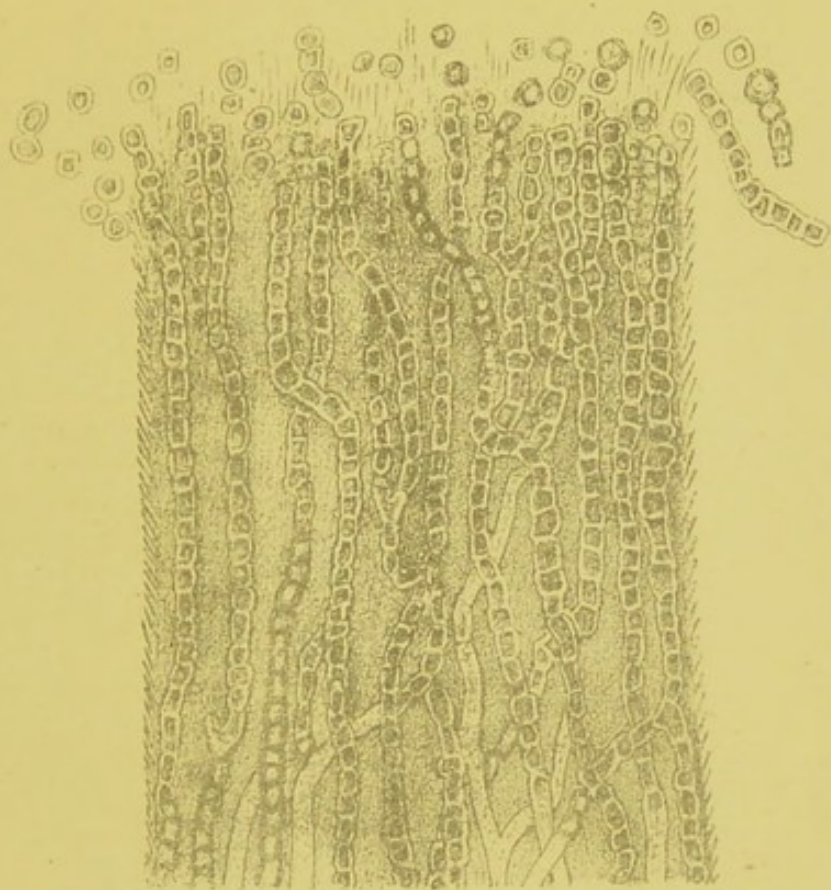
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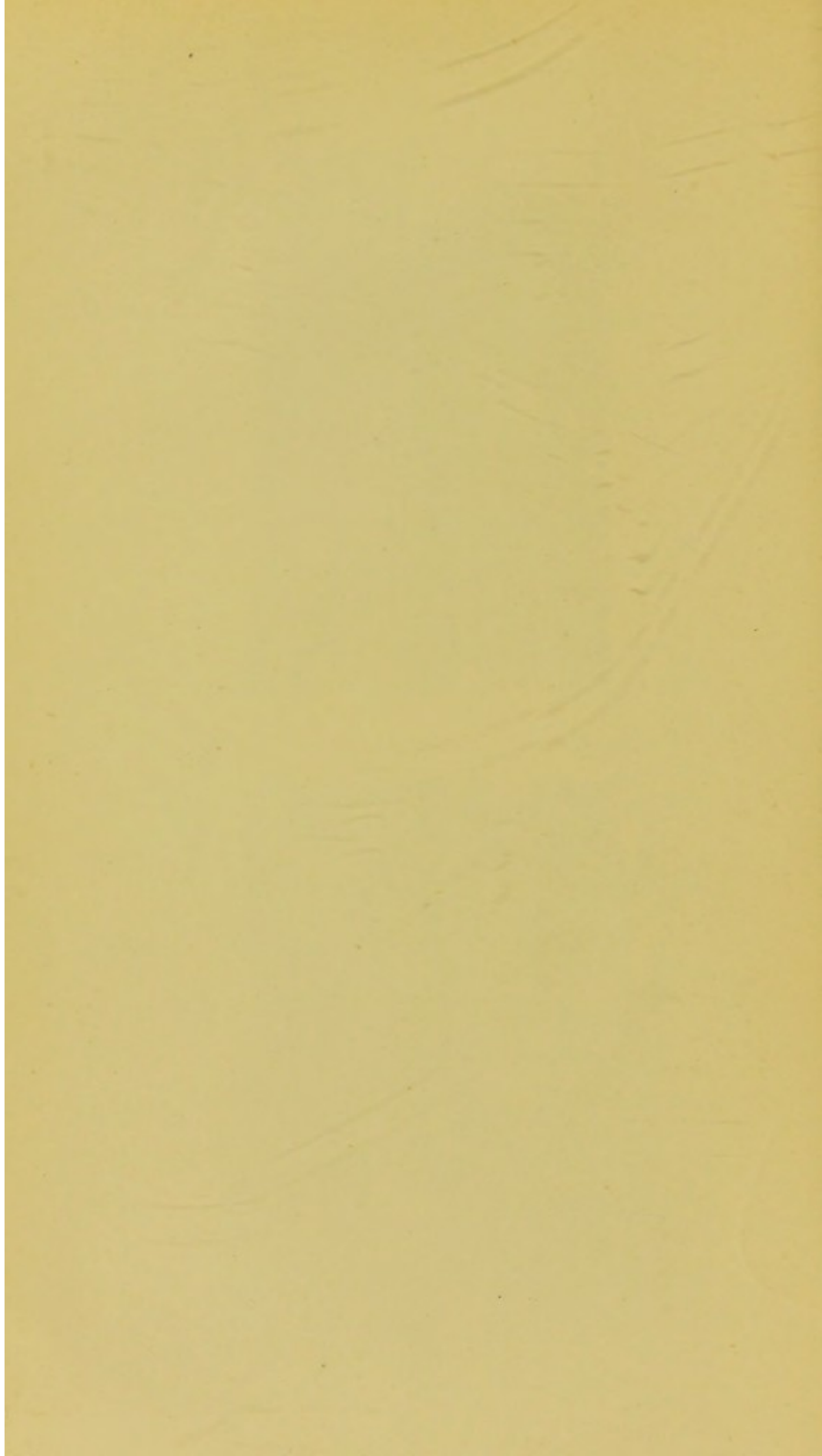
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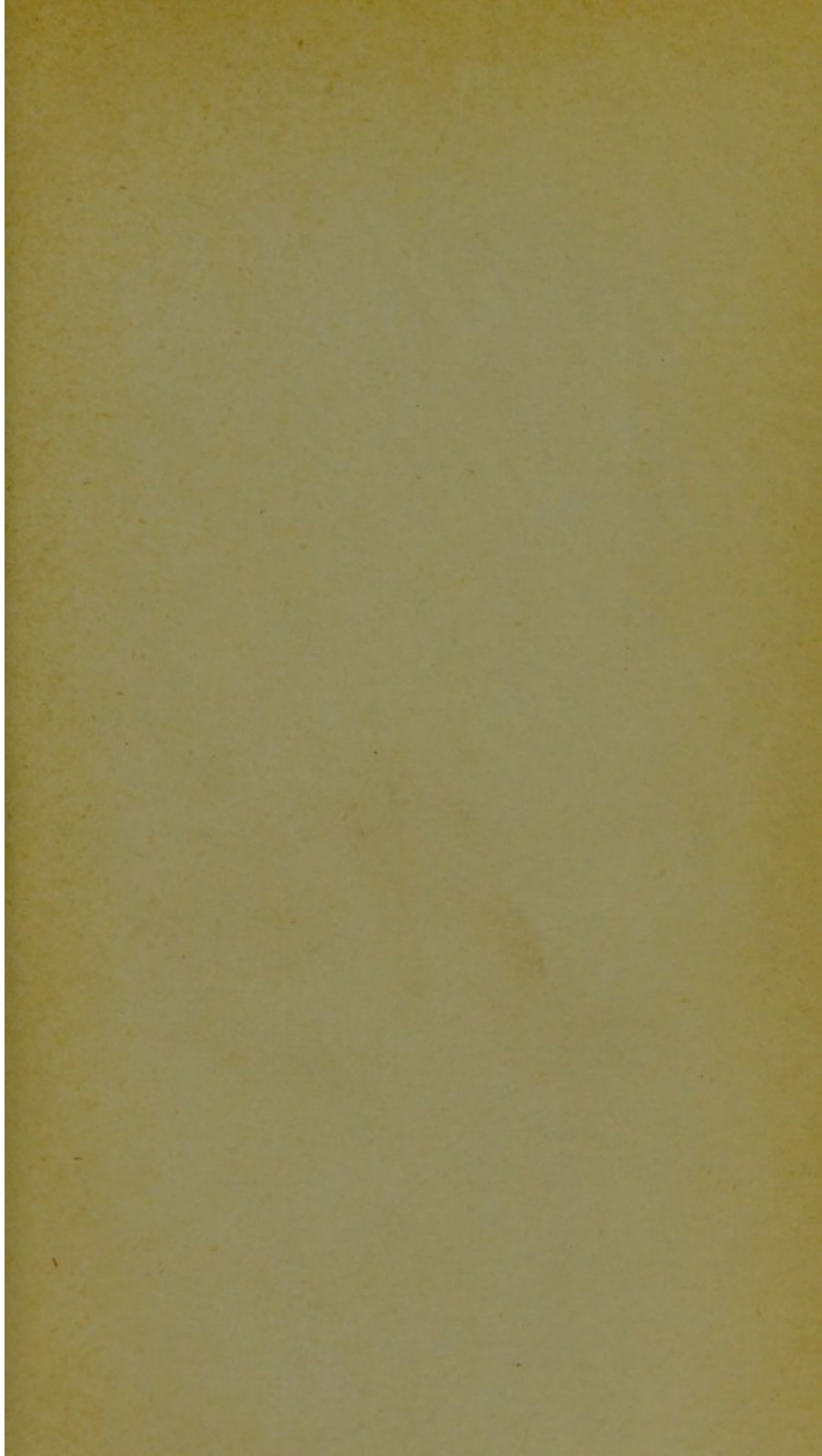


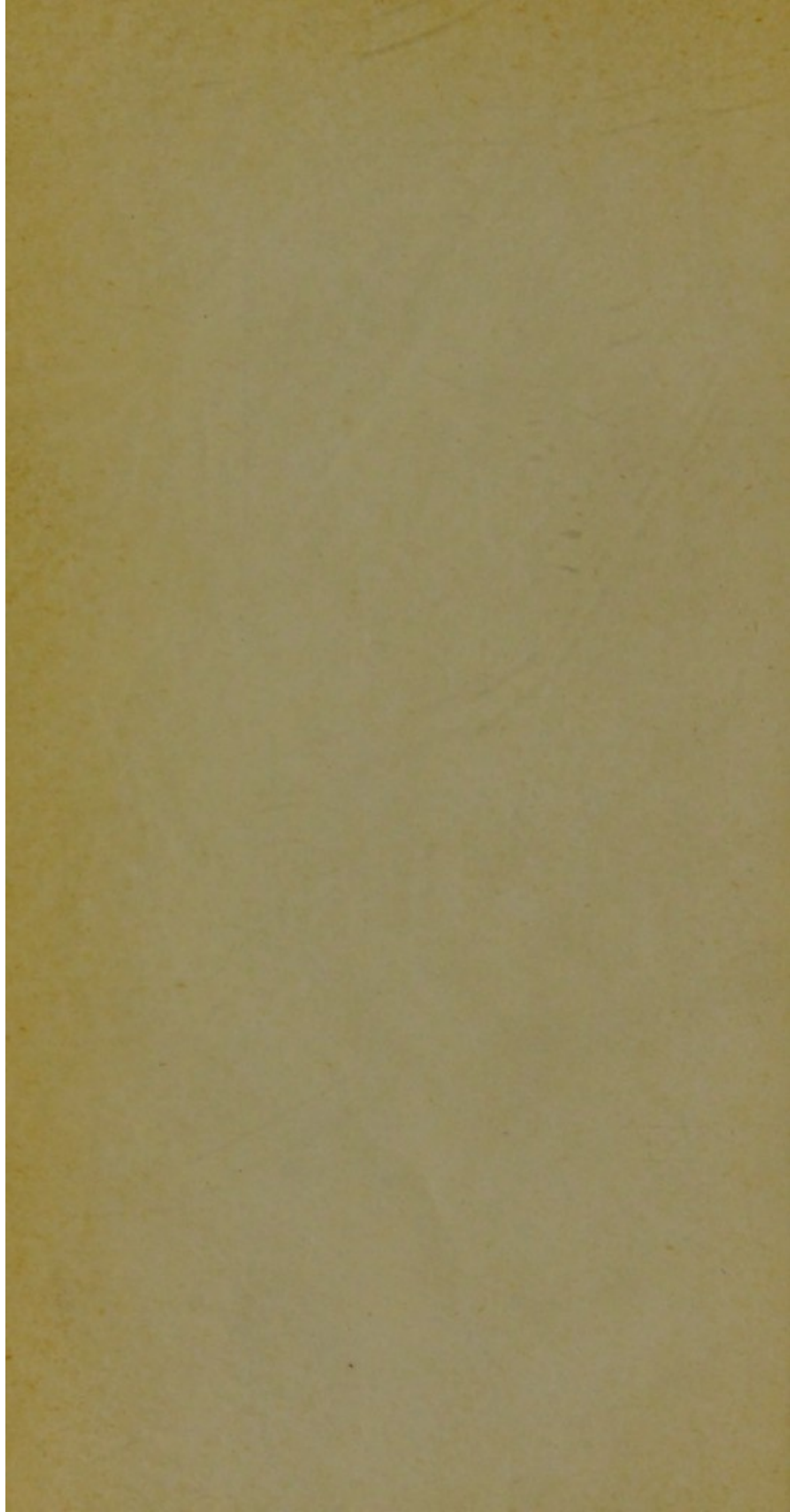


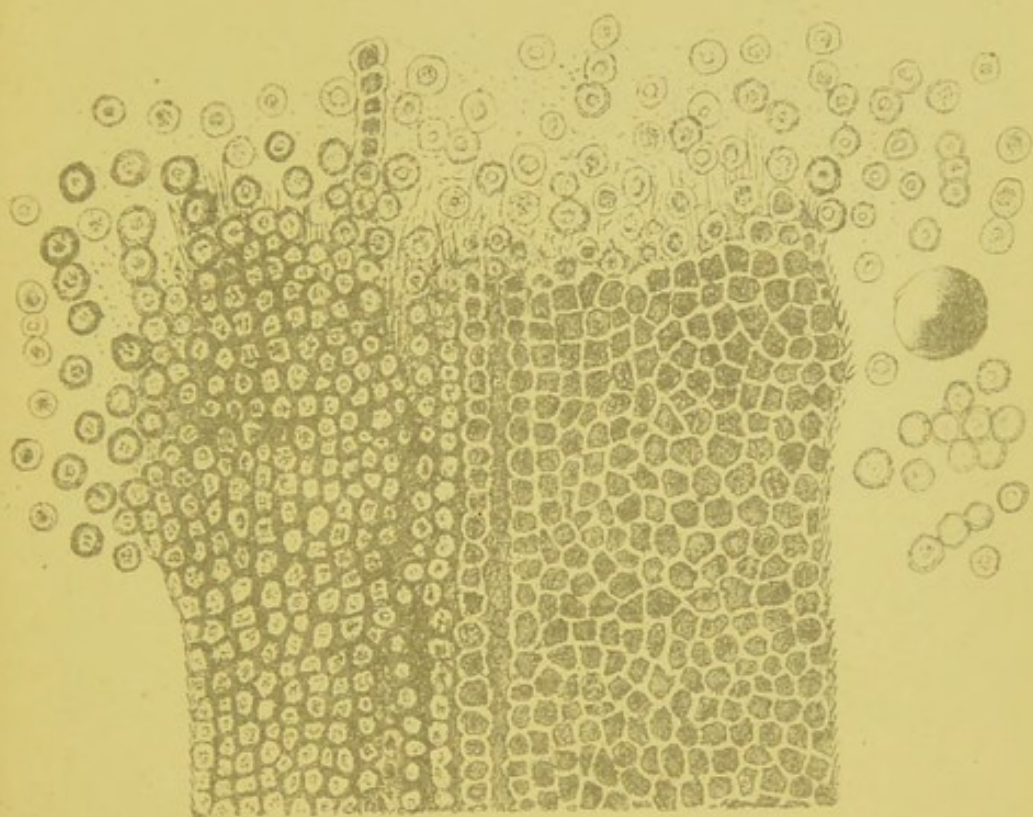






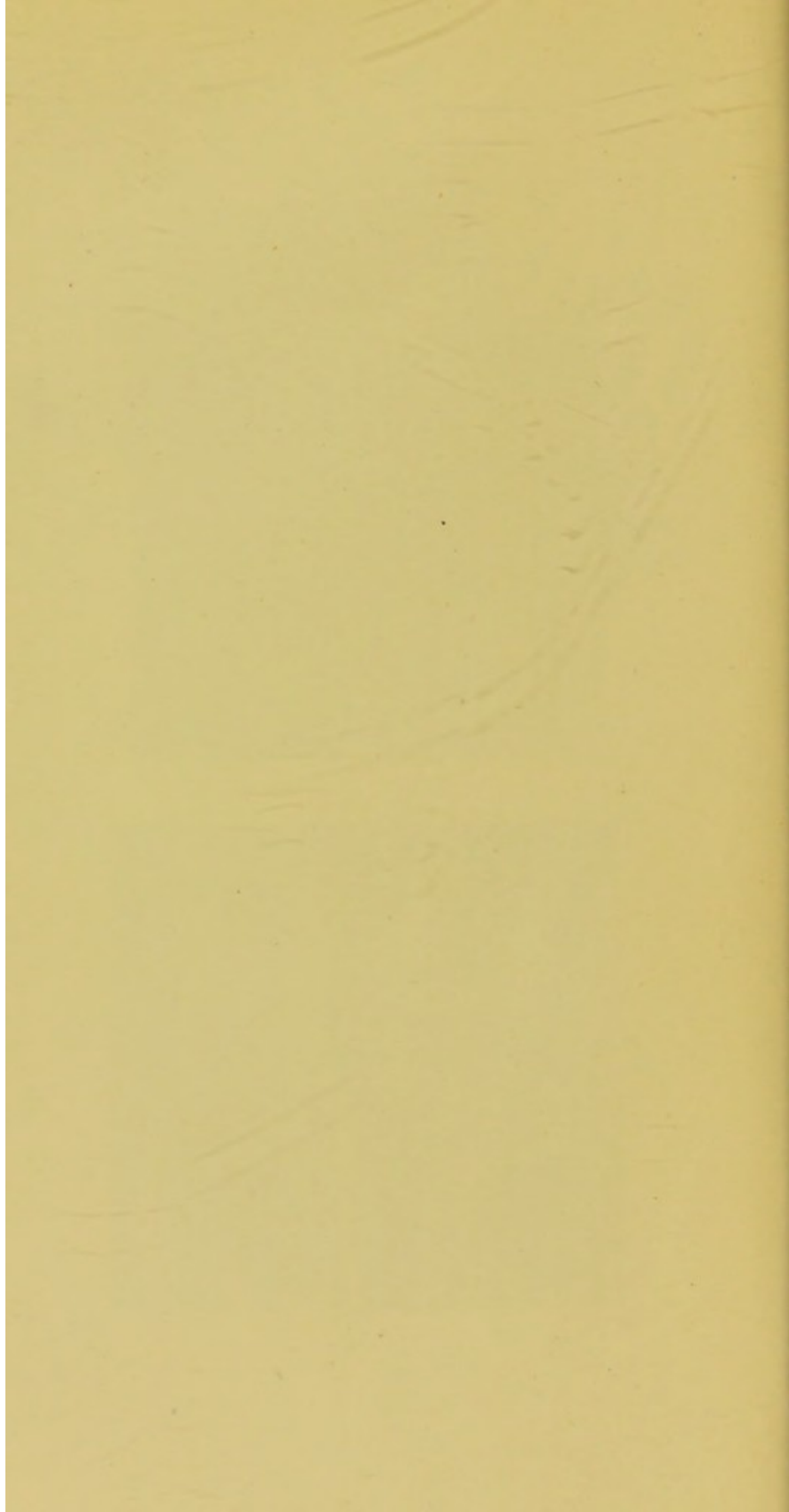


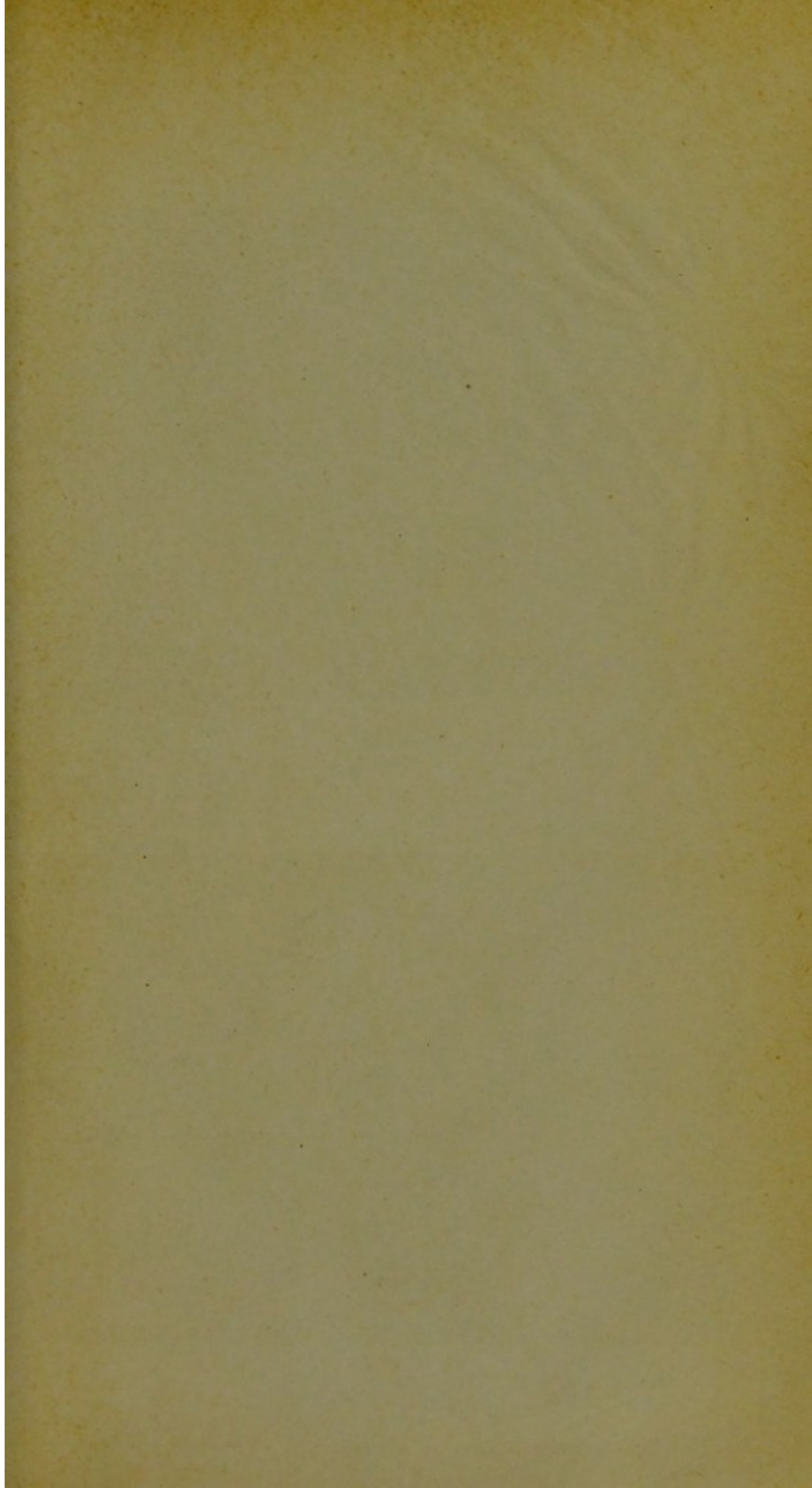




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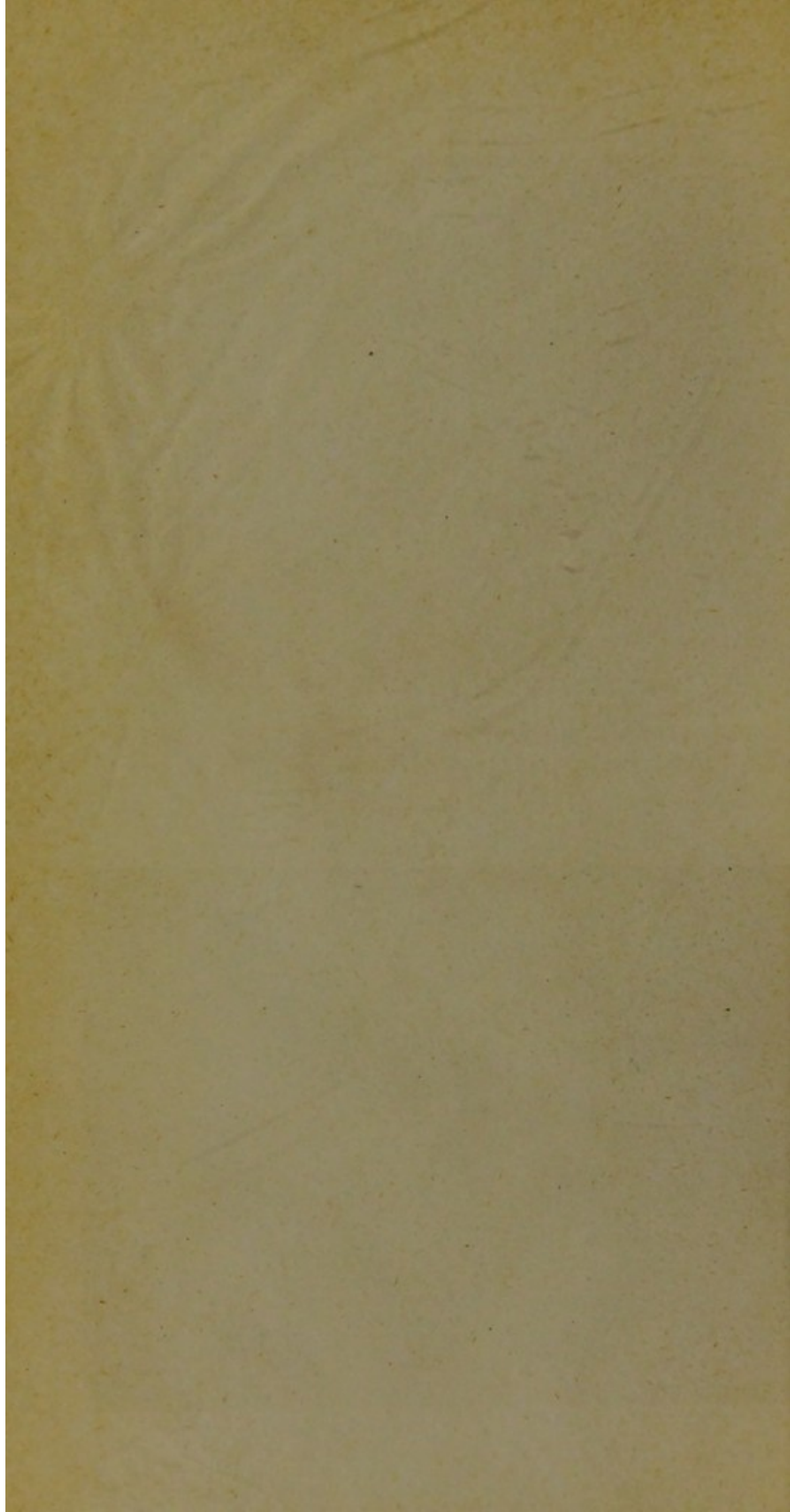


Fig. 1.

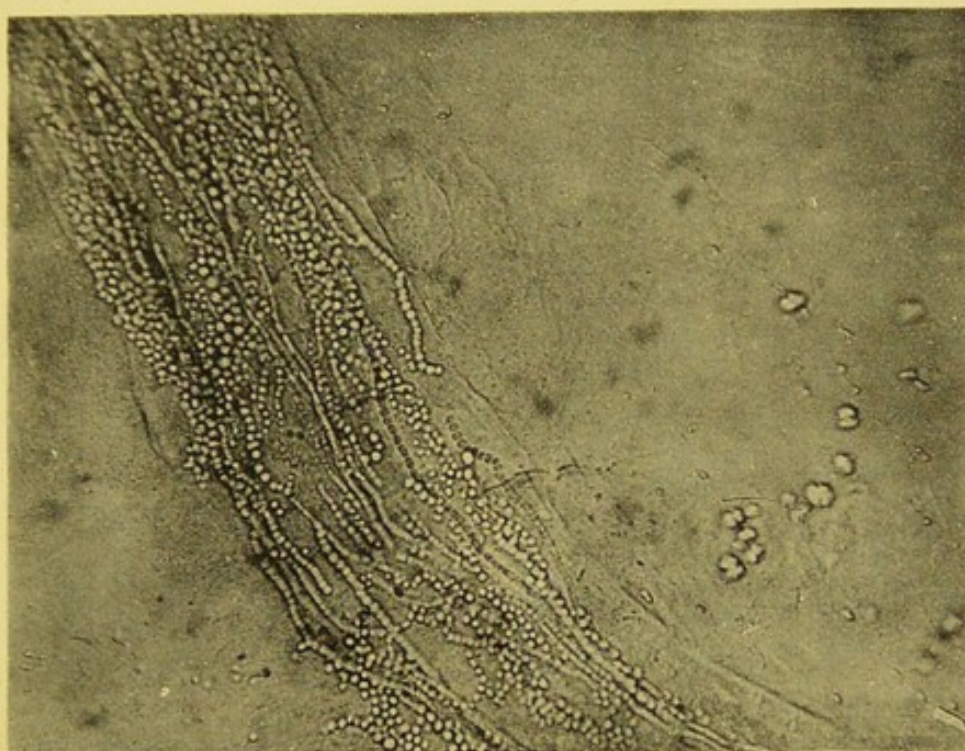
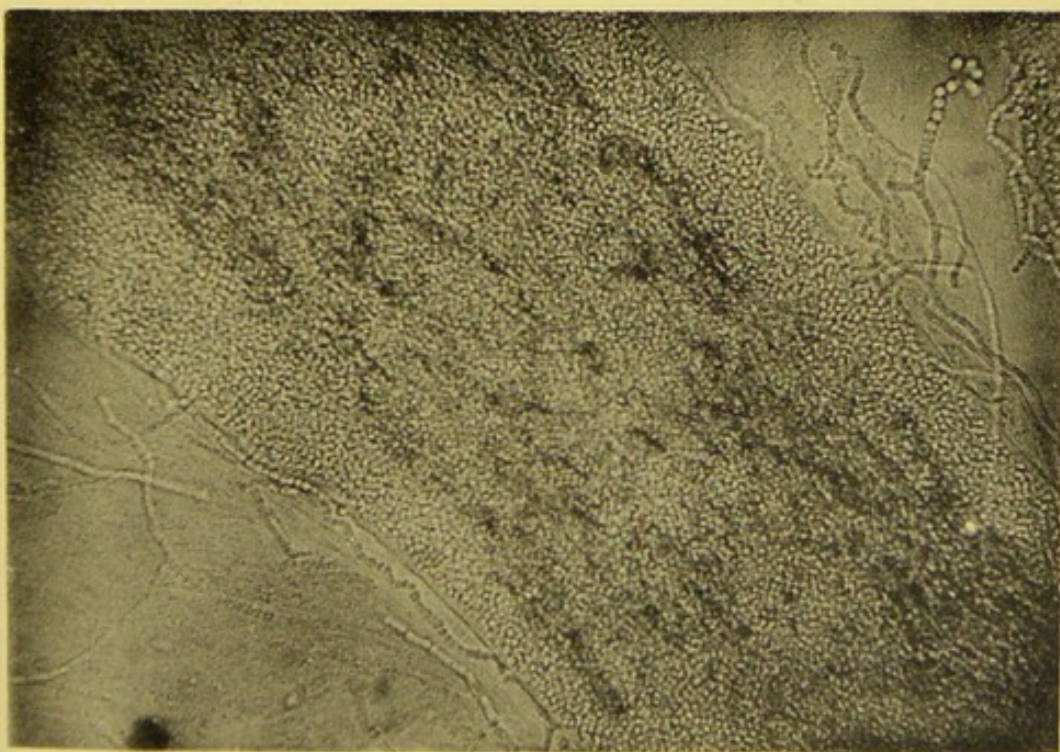
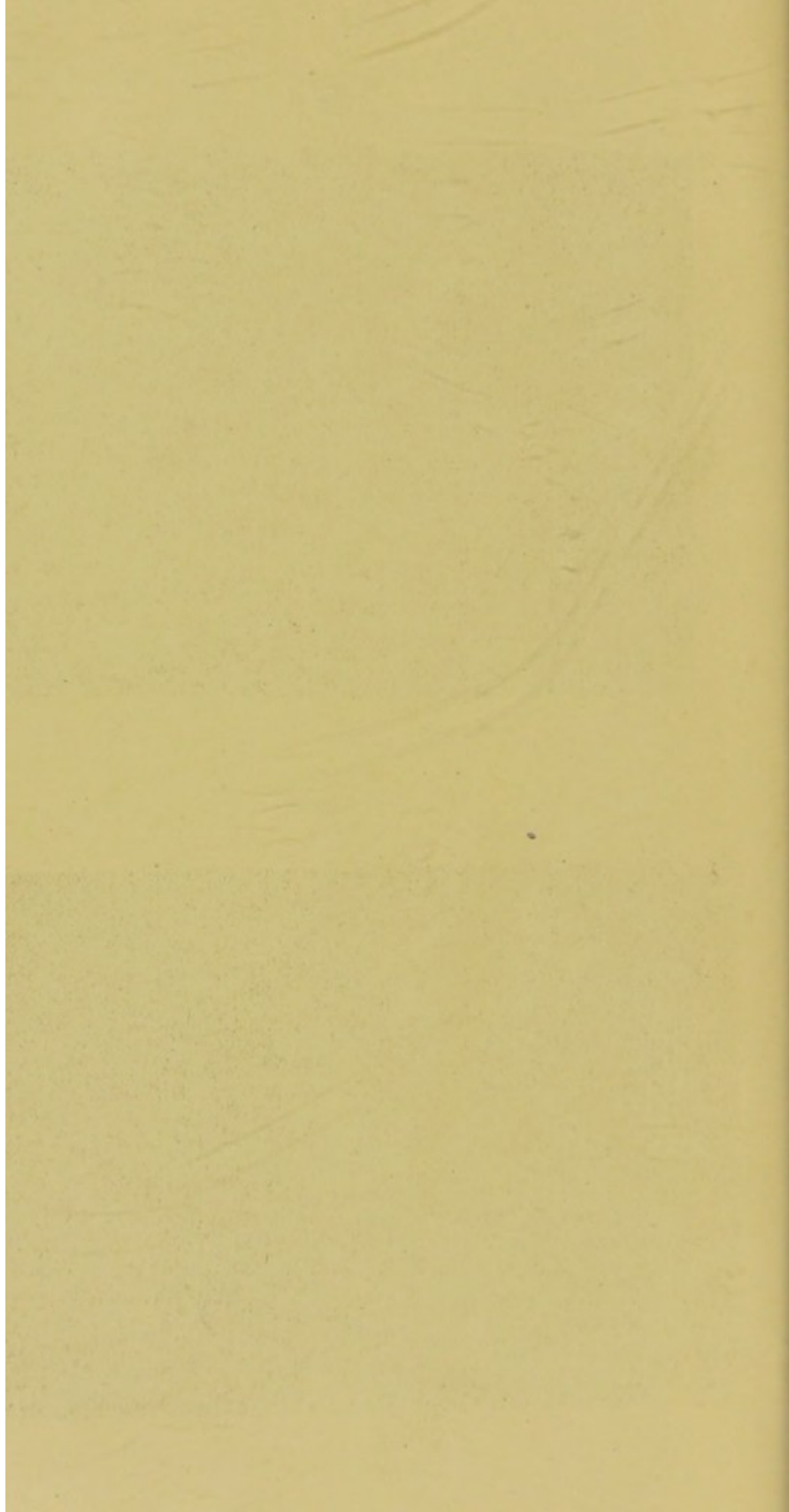
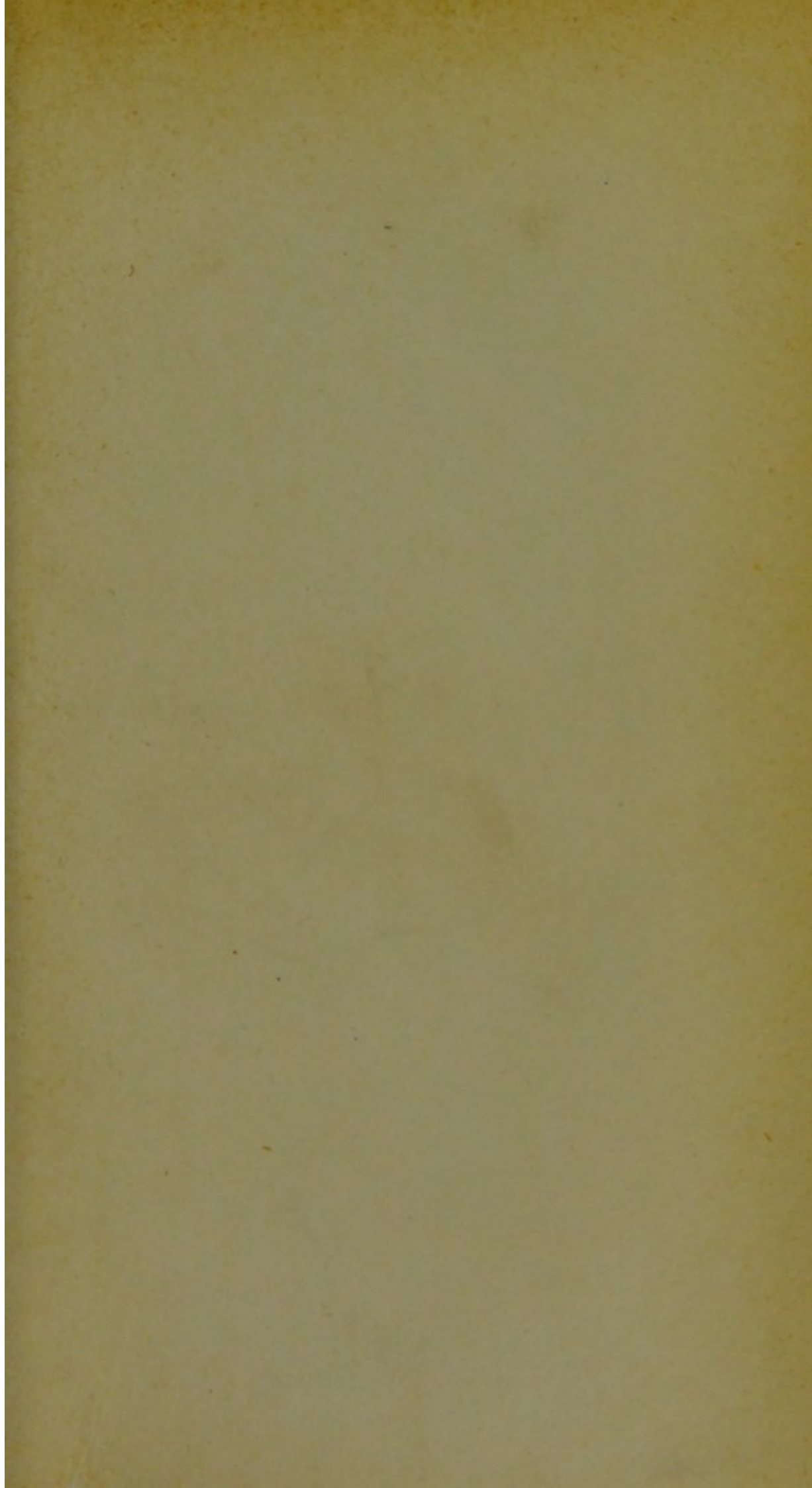
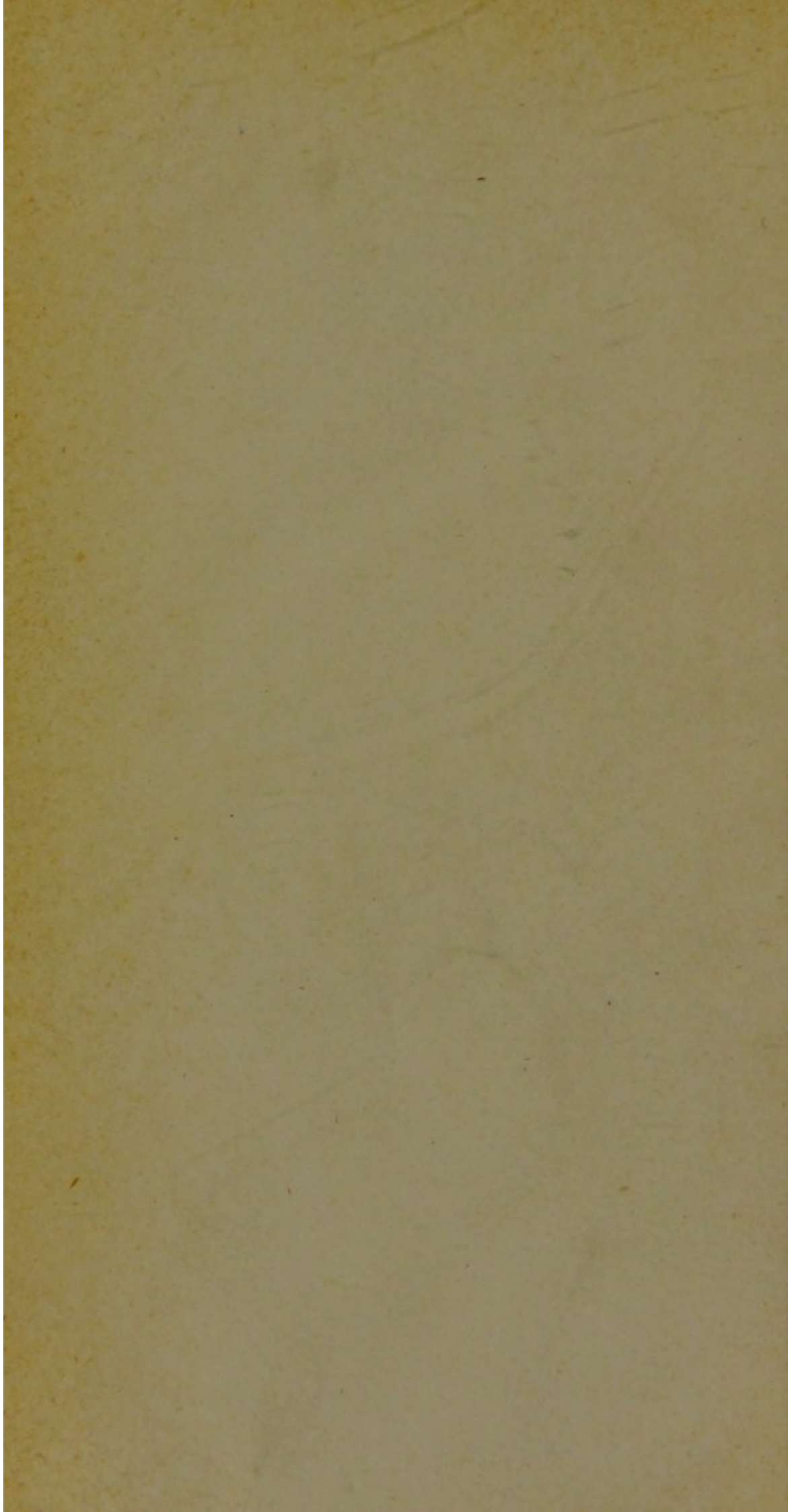


Fig. 2.









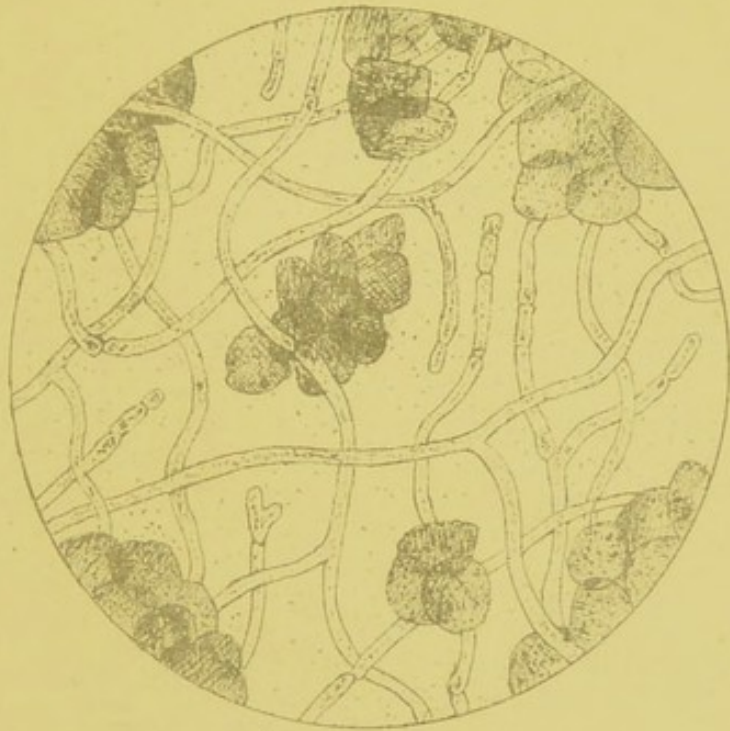


Fig. 1. 600 diam.



Fig. 2. 600 diam.



Fig. 3. 1250 diam.

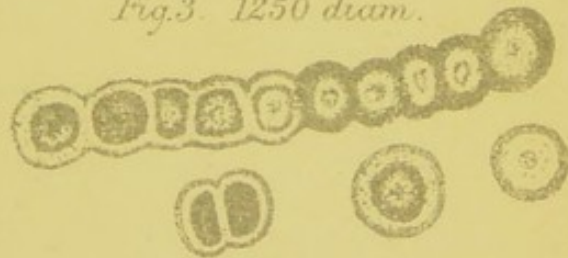


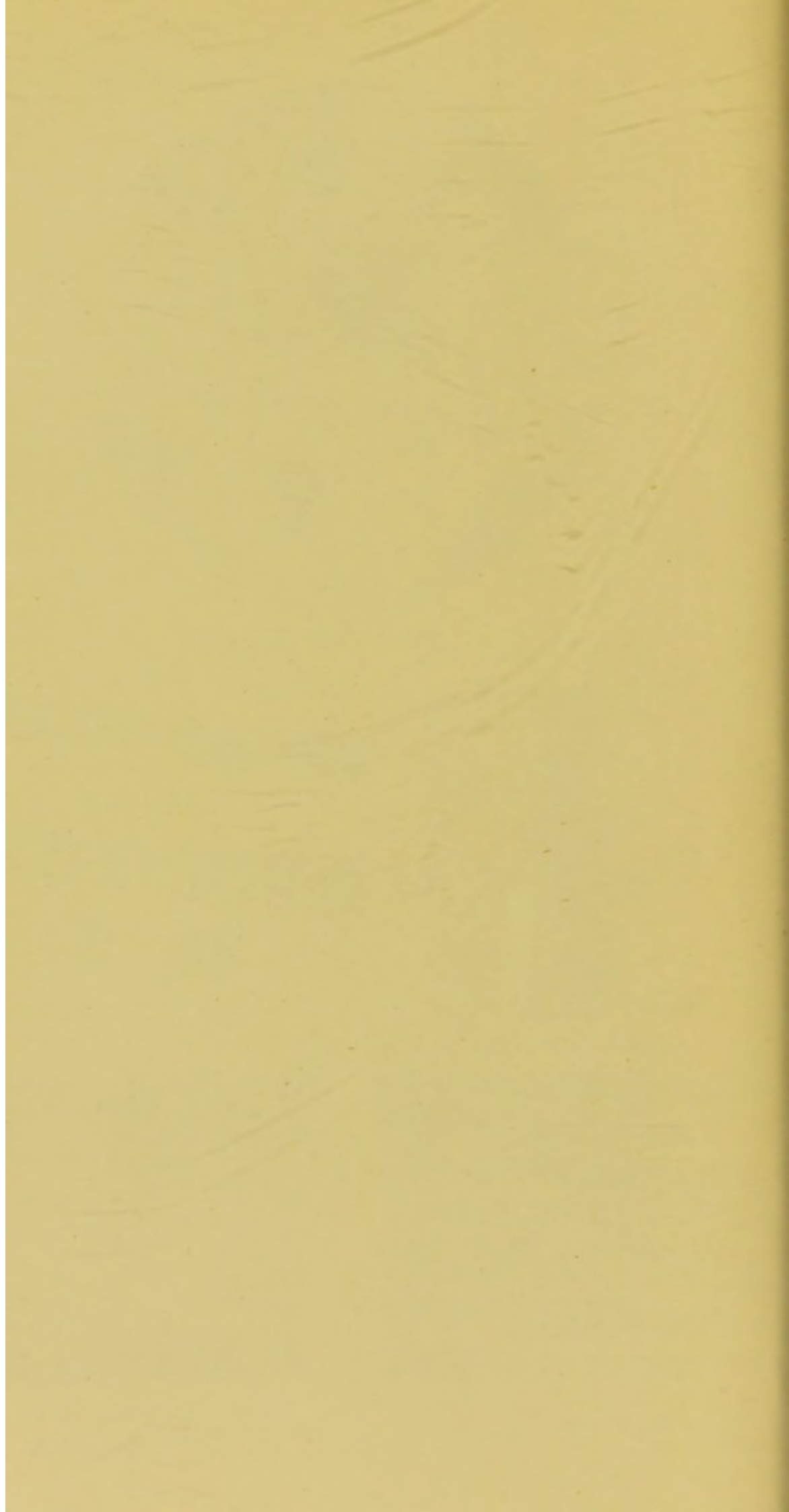
Fig. 4. 1250 diam.

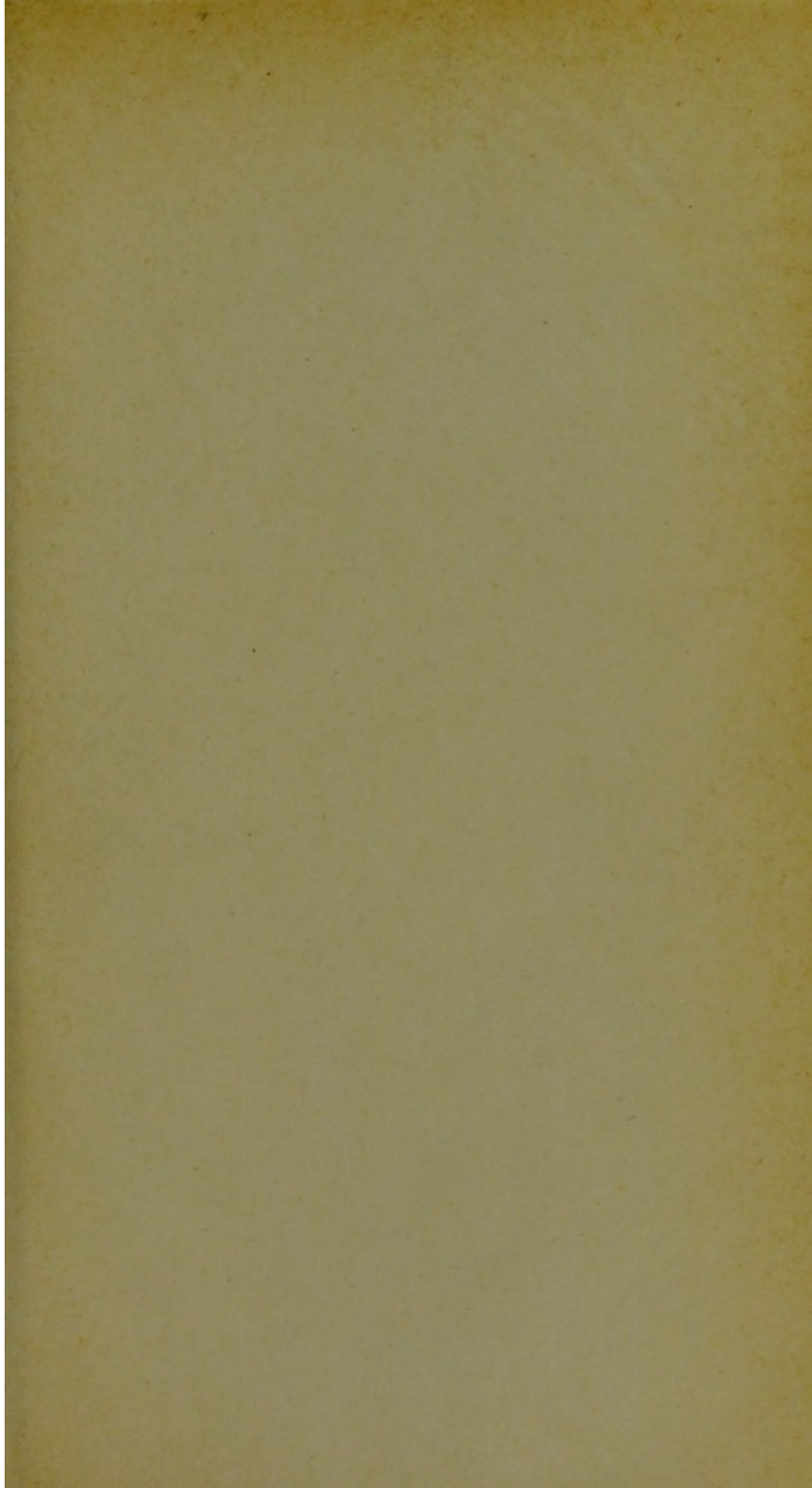


Fig. 5. 600 diam.



Fig. 6. 600 diam.





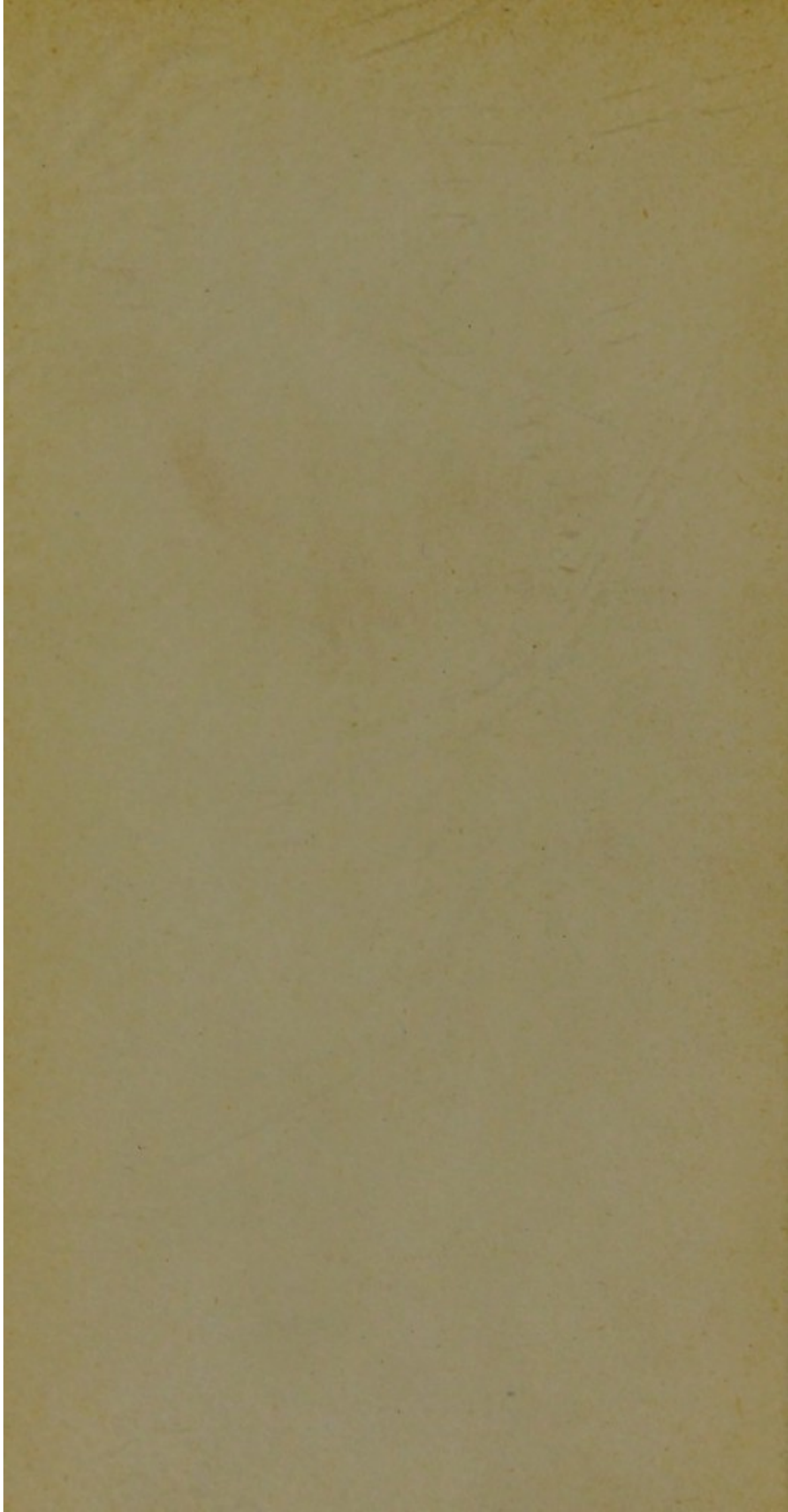
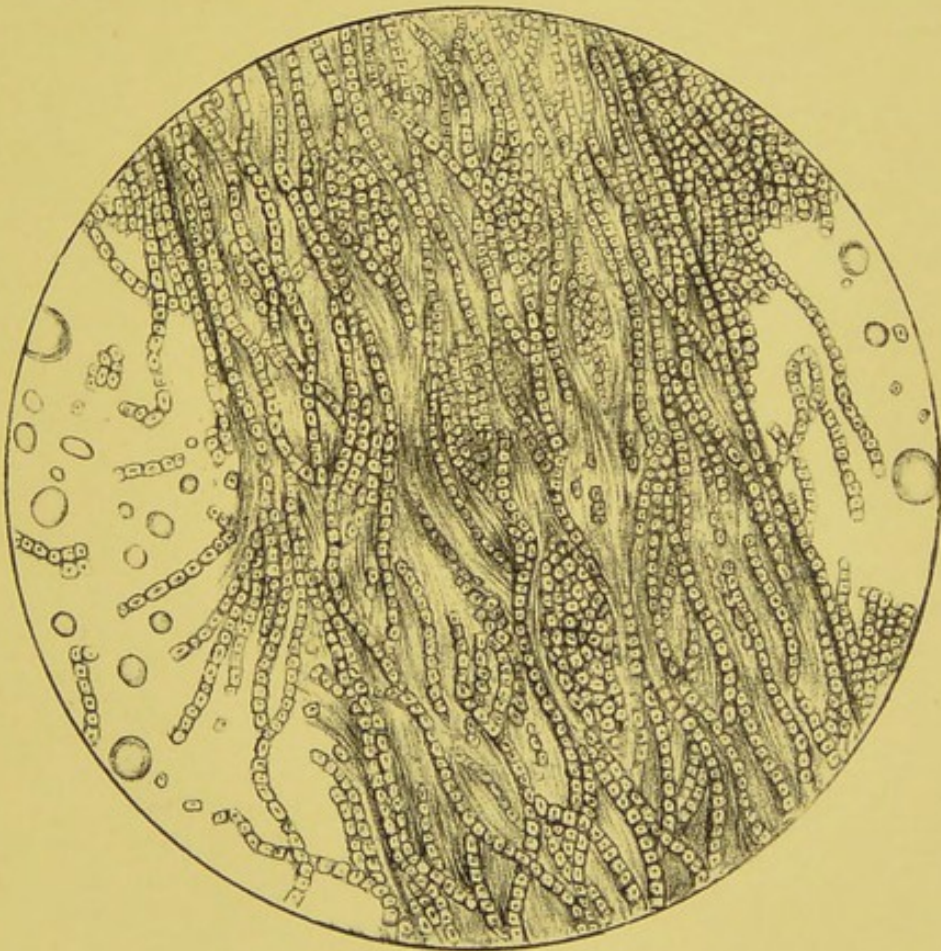


PLATE VI.

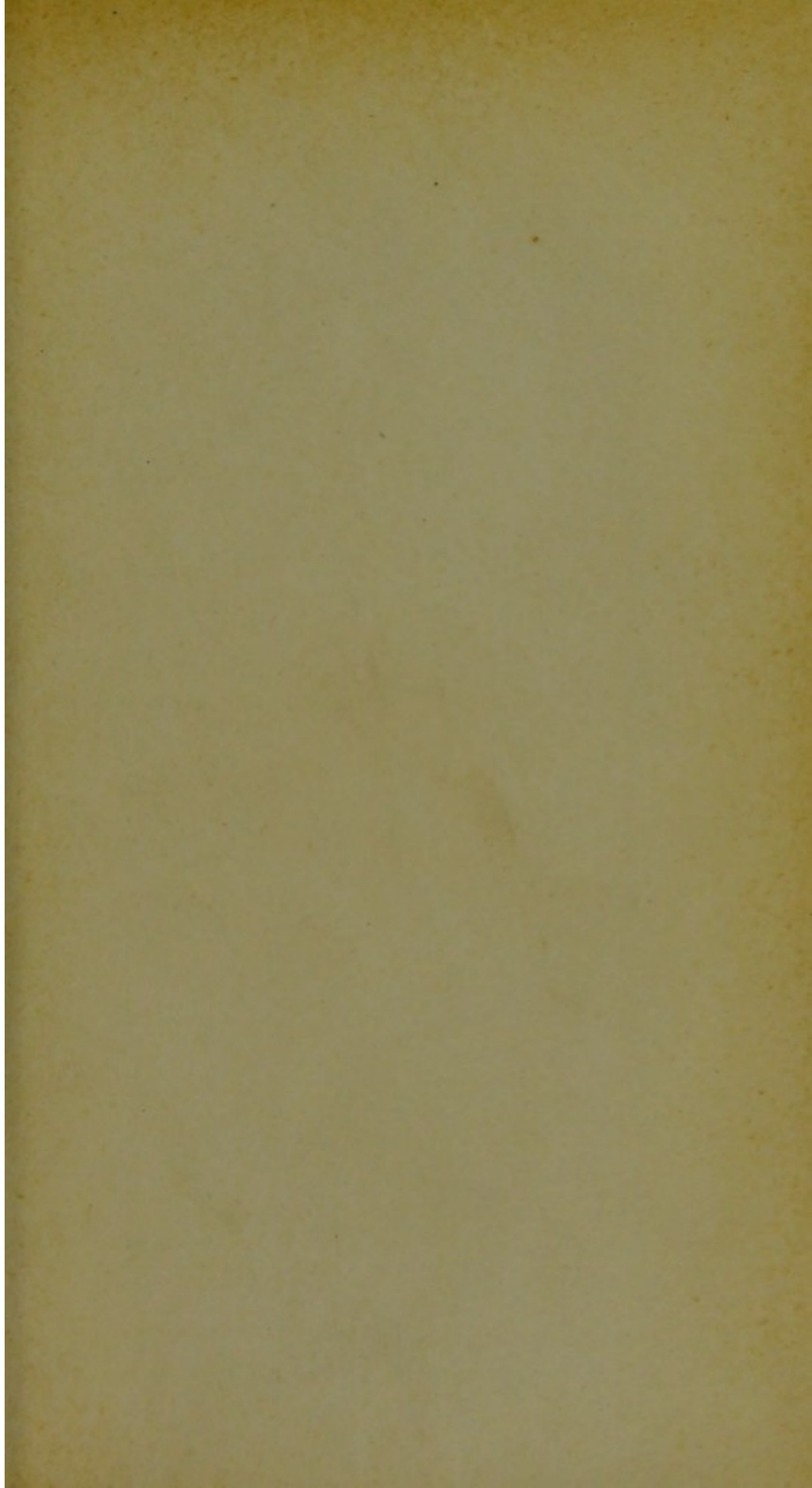


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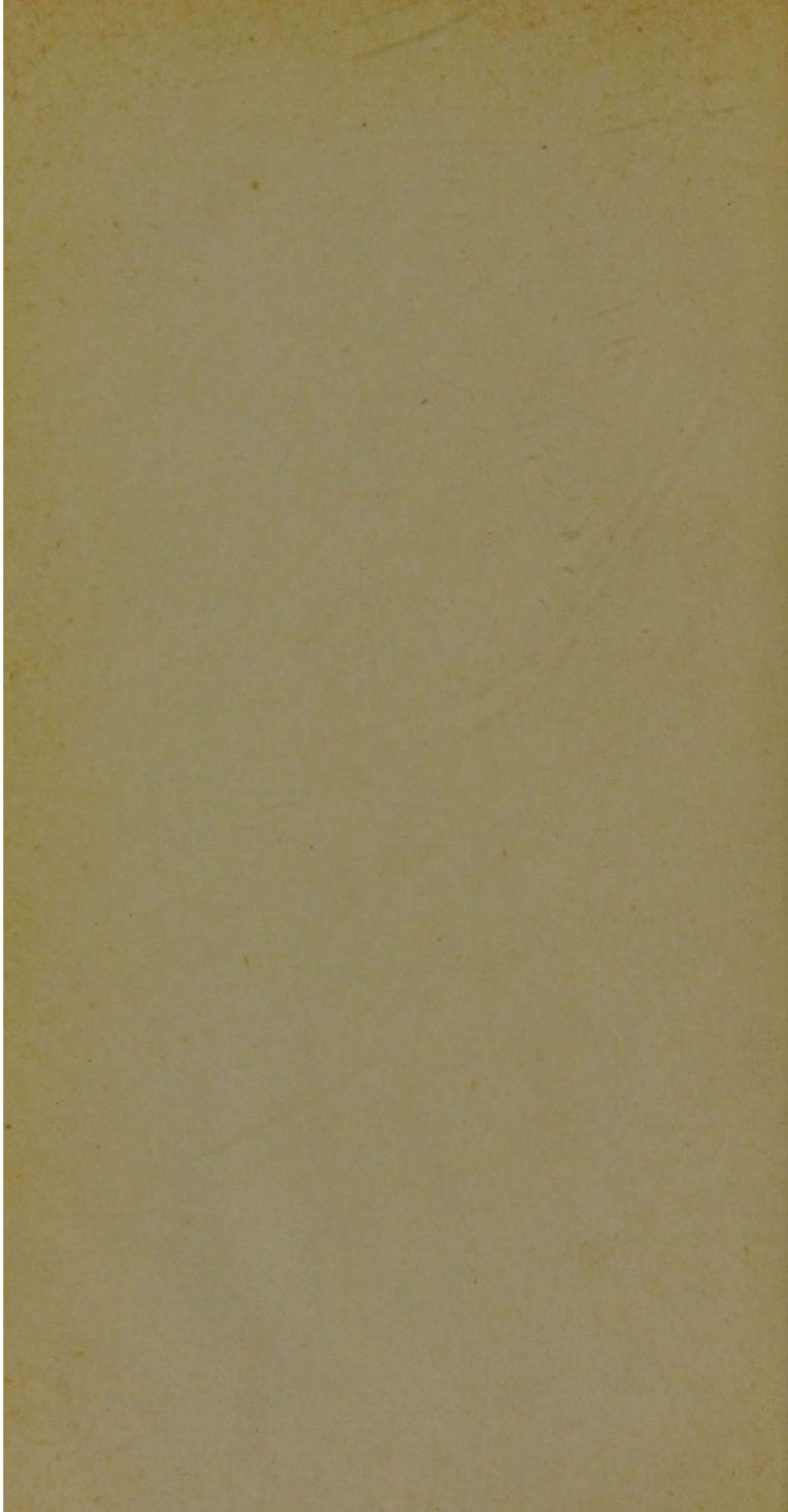
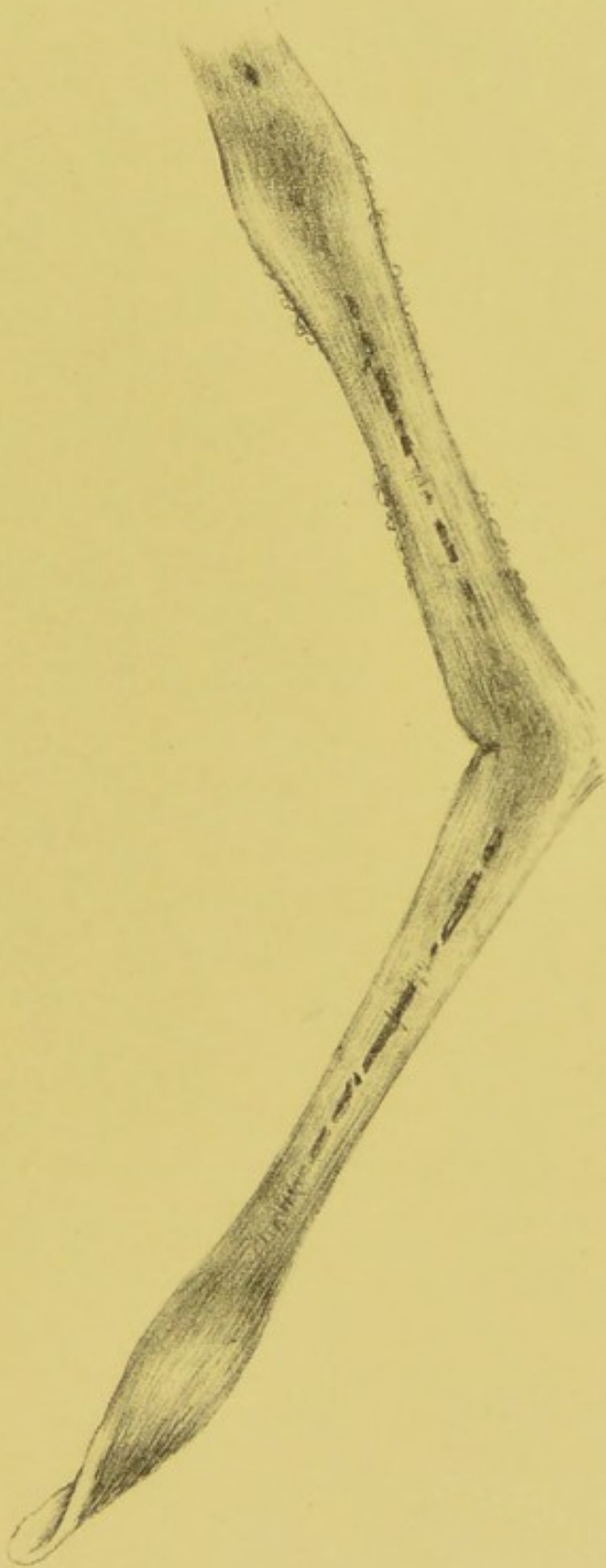


PLATE VII.



T. Godart del. et lith.



West, Newman imp.



RINGWORM AND ALOPECIA AREATA.

THEIR PATHOLOGY, DIAGNOSIS, AND TREATMENT.

CHAPTER I.

RINGWORM: PATHOLOGY.

DEFINITION—VARIETIES—HISTORY—LIFE-HISTORY OF THE FUNGUS—DIFFERENT SPECIES OF FUNGI—PATHOLOGY—ACTION OF THE FUNGUS—INVASION OF THE HAIRS—SITUATION—THE PLURALITY OF THE FUNGI IN RINGWORM—SABOURAUD'S DISCOVERIES—THE DIVISIONS—MICROSPORON AUDOUÏNI—MEGALOSPORON ENDOTHRIX, MEGALOSPORON ECTOTHRIX—GENERAL CHARACTERS, AND PATHOLOGY, OF THE VARIOUS FORMS—BACTERIOLOGICAL CHARACTERS—BIOLOGY.

Ringworm is a well-defined, distinct, and contagious affection of the skin, caused by different varieties and species of a microscopic parasite; each characteristic lesion is due to some one form of this minute fungus invading the epithelial layers of the skin, the hair-follicles, and the hairs.

Ringworm is liable to attack all classes, the rich and cleanly, as well as the poor; but, when seen on the scalp, it is almost entirely confined to children.

Its occurrence is a very serious matter, as it is highly contagious; and, when occurring on the scalp, if not properly treated in the early stages, it may rapidly spread,

become very obstinate and rebellious to treatment, and thus seriously interfere with a child's education—especially in the present day, when most large schools have their own medical officers, who will not permit children who have had ringworm to enter, or return to, school until they are quite free from the disease.

Varieties.—*Tinea tonsurans*, ringworm of the scalp; *Tinea circinata*, ringworm of the body; *Tinea barbæ*, or *Sycosis parasitica*, ringworm of the beard; *Tinea unguium*, ringworm of the nails; *Eczema marginatum*, body ringworm of a special form.

The Fungus which causes ringworm belongs to the lowest order of plant life—the hyphomycetes, or moulds. It was formerly taught that all the varieties of ringworm were due to one distinct species of fungus, which was called the *Trichophyton tonsurans* (though considerable variations in the size of the spores, and the mycelium, had long been observed), but now it is known that there is a plurality of fungi causing the different forms of *Tinea*.

HISTORY.

The history of ringworm is complicated, as certain varieties of form of the disease have received a number of designations from the older authors.¹

¹ *Viz.*, Porrigo scutulata, *Willan*; Herpes tonsurans, Herpes squamosus, *Cazenave*; Herpes circinatus, *Bateman*; Porrigo tonsoria, Dartre furfuracée arrondie, *Alibert*; Tinea tonsurans, Squarus tonsurans, *Mahon*; Phyto-alopecia, *Malmsten*; Rhizo-phyto-alopecia, Trichophytie, *Gruby*; Dermatormycosis tonsurans, *Köbner*; Tinea trichophytina, Tinea circinata, *Anderson*; Trichonosis furfuracea; Porrigo furfurans; Lichen herpetiformis, *Devergie*; Lichen circumscriptus, figuratus, gyratus, Impetigo figurata, etc.; *Germ.*, Scheerende Flechte; *Fr.*, Herpès tonsurant, Teigne tondante, Teigne tonsurante.

Willan described this affection in 1817, and Plumbe in 1821. In 1829, Mahon again drew attention to it; but it was not understood, and was confounded with other affections of the scalp, such as alopecia, eczema, seborrhœa, favus, etc. In 1840, Cazenave noted an affection of the scalp (attended with loss of hair and broken-off hairs), extending at the periphery, and evidently spreading among the boys in a school. But it was Grûby, in Paris in 1843, who found a fungus in the broken-off hairs, and he gave it the name of *Microsporon Audouïni*; but, most unfortunately, he called the disease *porrigo decalvans*, a term which had already been used by Bateman to describe the affection we now call *Alopecia areata*. In fact, Colcott Fox and Blaxall, in the most recent contribution "On the Plurality of Fungi causing Ringworm," say: "This error has been the source of the greatest confusion ever since, and effectually obscured for all these years the value of Grûby's work. To Sabouraud's discoveries we are indebted for the clearing up of all this confusion."¹

The fungus of ringworm was described by Malmsten, in Stockholm in 1845, and named by him the *Trichophyton tonsurans*. After this, the significance of the newly found parasite was generally acknowledged, and the fungus, as it was thought to be one species, was universally called the *Trichophyton tonsurans*.

LIFE-HISTORY OF THE FUNGUS.

The exact nature of the fungus (fungi) was formerly difficult to determine; but, owing to the great advance made within the last few years, especially by Sabouraud, there is now little doubt save as to a few points. It is

¹ *Brit. Jour. of Derm.*, Nos. 93-96, vol. viii., 1896.

still disputed, for example, whether the two main divisions of the fungus (the *small-spore* and the *large-spore*) belong to two different botanical families or not. This will be noted further on.

Neumann, referring to *Tinea tonsurans*, remarked in 1871: "The results of my experiments in the generation of this parasite confirm the observations of Hebra in so far that *herpes tonsurans* and *favus* can be produced by one fungus, and that the *Penicillium*."¹

Grawitz in 1877,² Atkinson in 1878,³ made and recorded experiments on the cultivation of the fungus.

In 1880, Liveing wrote, concerning Neumann's theory: "An able English botanist confirms this view, and tells me that he is quite unable to distinguish the parasite of ringworm from *Penicillium glaucum*."⁴

Kaposi said in 1880: "We must, for the present, regard the fungi met with in the dermatomycoses as specific individuals."⁵

In 1880, when the first edition of this book was published, no plurality of fungi was even suspected; but, at that time, the specific nature of the fungi in the different parasitic diseases was established.

In 1883, a paper was read "On the Cultivation and Life-history of the Ringworm Fungus" by Malcolm Morris and Henderson, recording numerous experiments both of their own and of previous investigators.⁶

¹ *Arch. f. Dermatol. u. Syph.*, 1871; *Lehrbuch der Hautkrankheiten*, 1871.

² *Virchow's Archiv*, LXX., 1877, and LXXXI., 1881.

³ *New York Med. Jour.*, December, 1878.

⁴ *Handbook of Skin Diseases*, p. 307, 1880.

⁵ Hebra, *Diseases of the Skin*, Kaposi, vol. v., pp. 114-138 (New Syd. Soc., 1880).

⁶ *Jour. of the Royal Micro. Soc.*, Ser. II., vol. iii., 1883.

Investigations in England (especially those published by Thin in 1881 and 1887¹) conclusively proved that Neumann's theory (*viz.*, that the fungus of ringworm is identical with *Penicillium glaucum*) is incorrect.

Thin showed that the former mistakes were due to foul cultivations, and said: "If hairs from the head of a perfectly healthy person are cultivated in any ordinary media, unless special precautions are taken and carried out by the skill of the expert, many of the hairs will be found to have their roots enveloped in a thick mesh of fungus, which, microscopically, it is hard, and perhaps impossible, to distinguish from *Trichophyton tonsurans*. A distinction, however, is to be made by crucial cultivations. The *Penicillium*, *Aspergillus*, *Mucor*, etc., which observers have found in their cultivations, did not come from the *Trichophyton tonsurans*, but their spores fell into the media of cultivation from the air, or were introduced into them by the instruments employed."²

Again, the *Achorion Schönleinii* (the fungus of favus) is a distinct species, and can give only the same disease—*i.e.*, favus. In the present day, it would be mere waste of time to adduce proof (as in former editions) that the fungi of favus and *tinea versicolor* are distinct from that of ringworm; for it is universally accepted that the fungus of ringworm is a fungus *sui generis*, and that, when successful inoculations are made, the parasitic disease produced is always the same as that from which the parasite was taken. The *Microsporon Audouïni* and the *Trichophyton megalo-
sporon* always produce *Tinea tonsurans*, or *Tinea circinata*;

¹ "On *Trichophyton tonsurans*," *Proc. Roy. Soc.*, No. 217, 1881; *Pathology and Treatment of Ringworm*, 1887.

² *Pathology and Treatment of Ringworm*, 1883.

the *Achorion Schönleinii*, *Tinea favus*; and the *Microsporon furfur*, *Tinea versicolor*.

Duclaux, in 1886, first grew the *Trichophyton* in fluid media, and produced aërial fructification¹; and these experiments were confirmed by Leslie Roberts in 1889.²

In 1894, Sabouraud published a work, and an atlas, on the nature of the *Tineæ*, in which he maintained that the ancient *Tinea tonsurans* could be divided into two distinct groups: *viz.*—

I. *Tinea* with Small Spores, which is due to the fungus called *Microsporon Audouini*³; and—

II. *Tinea* with Large Spores, which is due to diverse forms of the *Trichophyton megalosporon* (*endothrix* and *ectothrix*).

This important discovery—*viz.*, the plurality of the fungi in ringworm, with Sabouraud's definite conclusions—has now been generally confirmed in England, with certain slight modifications,⁴ to be noted later on.

These new views have completely revolutionised all the older ones, and necessitate the separate description of the different forms of ringworm, and their microscopic appearances; but many points, such as causes, percentage, general diagnosis, and treatment, may still be grouped together.

¹ *Soc. de Biologie*, January 16th, 1886.

² *Brit. Jour. of Derm.*, September, 1889.

³ First named by Gruby.

⁴ See *Über die tieferen ceternden Schimmelerkrankungen der Haut*, by Rosenbach, Göttingen, 1894; "Observations on the Parasite of Ringworm," by Adamson, *Brit. Jour. of Derm.*, July, 1895; and "An Inquiry into the Plurality of Fungi causing Ringworm," by Colcott Fox and Blaxall, same journal, July—September, 1896.

PATHOLOGY.

The Fungus¹ consists of branching hollow tubes, called *mycelium*, and of *conidia* or *spores* (see Plates I. to VI.). The spores may grow into mycelium-tubes, first by a protrusion of the cell-wall, and then, by an increase in this projection, a tube is formed. The walls of the mycelium-tubes are formed of a very delicate sheath, containing protoplasm. These tubes, which branch at times, become transversely divided by septa at variable intervals.

The mycelium is large, and very abundant, in ringworm of the body (*Megalosporon ectothrix*), and the septa are long; but, both in the *Microsporon* and the *Megalosporon endothrix*, the septa are much shorter, and in the latter variety are often about the same length as the diameter of the tubes. Thus the mycelium in the *Megalosporon* separates into short fragments, which have been called mycelium-spores, but they are, in fact, short portions of mycelium² (Plates II. and III.).

Action of the Fungus.—When the conidia are first brought into contact with, and effect a lodgment on, the surface of the glabrous skin, if the soil be suitable, and the conditions of growth favourable, they develop into mycelium-tubes. These pass between the superficial cells of the epidermis, and, finding their way into the deeper layers, develop, as before described, and cause irritation, hyperæmia, and a certain amount of inflammation. At first, a ring of minute papules is often formed. These

¹ See Chapter III. for the microscopical description of the mycelium and conidia.

² See *Mould Fungi Parasitic on Man*, Leslie Roberts, 1893.

are followed, if the irritation be severe, by minute vesicles, and even some slight crusting. As the ring spreads, the hyperæmia in the centre disappears, and some exfoliation or desquamation follows.

The irritation, which is necessarily set up in the epidermic strata of the skin by the growth of the fungus itself, as well as by the new products formed during this growth,¹ causes the usual symptoms of ringworm, presently to be described.

If the scalp be involved, and the fungus one that causes *Tinea tonsurans*, the hairs are quickly involved, and the characteristic appearances of scalp ringworm are produced. The red ring and vesiculation are but rarely seen on the scalp.

Invasion of the Hairs.—The method by which the fungus gains access to the hair-substance is now fairly decided. The discrepancies in the recorded observations may arise from different species of fungi having been reported on.

The old view is that the mycelium enters the orifice of the hair-follicle, insinuates itself between the hair-shaft and the inner root-sheath, and, passing down till it reaches the softer cells of the bulb, enters the hair. Then it multiplies and ramifies between the fibres of the hair. In 1883, Balzer confirmed this view; and Crocker says: "I have also seen conidia at the very bottom of the follicle prior to the invasion of the shaft."²

¹ Leslie Roberts remarks: "Every individual fungus modifies the soil it thrives in, and every soil may impress some variation on the fungus it nourishes."—*Introduction to the Study of the Mould Fungi Parasitic on Man*, 1893.

² *Diseases of the Skin*, 1893.

Thin remarks: "The fungus enters the hair-shaft near the hair-root well under the surface of the skin, and grows upwards into the shaft, and at the same time with great luxuriance between the sheaths of the hair and the shaft."¹ On the other hand, Unna says the conidia pass into the hair-shaft a short distance down the follicles, and then extend to the bulb.

Jamieson examined some hairs from a case of *Tinea barbæ* in a very early stage, and remarks as follows: "One or two were found in such an early stage of invasion that the mode in which the fungus insinuates itself into the hair could be satisfactorily studied. In such the fibrous structure of the hair was as yet quite healthy, and the medulla unchanged. The imbricated epithelial cells which cover the hair and bind together the fibrous structure were alone involved. The bulb of the hair was natural." . . . "Above the bulb and for a short distance the root was also unchanged, but then the regular tile-like overlapping of the sheathing-cells became disturbed. Here and there cells were raised up and projecting a little from the surface of the hair. In one part a number of these cells seemed loosened, as if pressed outwards by something which had forced itself between them and the proper fibrous structure of the hair. Higher up the regular imbricated arrangement of the cells became again natural. On careful focussing, and especially when a power of eight hundred diameters was employed, it was seen that beneath each cell raised from its place was a spore or spores of the fungus; and where the cells had been raised up *en masse*, a thread of mycelium was seen making its way downwards obliquely into the hair. When the outer surface, instead of the edges, of the hair was now brought into focus, the mycelium

¹ *Pathology and Treatment of Ringworm*, 1893.

was seen ramifying freely over the surface immediately above the part where the cells were displaced, and groups of spores were seen disposed near the mycelium."¹

The correct solution probably is that the fungi attack the hairs in different ways. Sabouraud says, the fungus in the *small-spore* variety commences its attack near the top of the hair-follicle, grows from above downwards, and only involves the epidermis of the scalp secondarily. He also writes that the *Megalosporon endothrix* variety attacks the root of the hairs, and grows upwards.

I cannot agree with Sabouraud on this point; for, in a case of very recent invasion of the hairs in the *M. endothrix, resistant* form, I first noticed the scurfy places when a day or two old. At that time, there was mycelium amongst the epithelial cells, but I could not find any hairs involved. Two days later, I found some hairs just invaded, but there were no broken-off hairs.

On examination, I found two or three threads, or even one in some hairs, of large plain mycelium passing into the hairs in the middle part of the follicular portion, and running downwards toward the bulb, branching dichotomously at times, and divided here and there by septa. There were very few chains at this stage, and the mycelium was like that amongst the epithelial cells.

In a few more days, the hairs were fully invaded, stumps formed, and in a week the places were just like ordinary patches, with broken-off stumps. This invasion of the hairs went on, even though the places were soaked three

¹ *Diseases of the Skin*, 1891. This observation is of great importance, when it is considered in connection with the statement that the fungus in *Tinea sycosis* is the *Megalosporon ectothrix*, for in this instance it was seen entering the shaft of the hair, showing that the fungus in the *Megalosporon "ectothrix"* may be "*endothrix*" as well.

times a day with sulphurous acid, and oleate of copper ointment rubbed in at night.

Fox and Blaxall also remark: "We cannot subscribe to this sharp description [Sabouraud's]. If a number of comparatively healthy hairs are carefully extracted from one of the earlier satellite furfurations of the scalp (*small-spore form*), some of them will almost certainly show the beginnings of the attack, and remarkable specimens will be obtained, displaying an extraordinary diversity of appearance. Sometimes a quantity of the fungus ramifying amongst the epithelial cells of the skin, and growing down into the follicle even to the root, will be brought away." . . . "The earliest feature is the formation of giant spores on the shaft of the hair, as figured by Adamson, and these give rise to the following changes. Firstly, a huge, more or less segmented, delicate-walled mycelium is formed, which gradually gets smaller and smaller, and branches and interlaces into a network. Some of the threads insinuate themselves beneath the cuticle, which they progressively strip off, and then grow up and down the hair to form the mycelium already described. The portion which remains on the surface does not altogether send out rectilinear threads, but forms a close lacework of high curved segments, much branched, and often ramifying across the hair. This large early mycelium has been called ghost-like." . . . "The giant spores also gradually break up into the dense mosaic circumpilar sheath covering over and hiding the mycelium. This description has been given here, as it affords the explanation of many puzzling appearances met with in examination of hairs at later stages of attack. Thus, it is not uncommon to find the spore-sheath in an incomplete condition, exhibiting groups of large spores. Not infrequently traces of the early ghost-like mycelium

are met with in breaks in the spore-sheath, and towards the root-end, and again just beyond the sheath towards the free end. It often gives rise to a peculiar watered-silk appearance."

"After a careful study of the early stages of infection, we affirm that there is no rule to be laid down as to the exact spot where the fungus first attacks the hair. It is always in the follicular portion, and often towards the root-end, but sometimes in one place, sometimes in another, and on occasion in several."¹

Adamson says: "In the *small-spore* form, the mycelium can be seen piercing the cuticular covering from the outside at the upper part of the follicular shaft, and passing downwards as long wavy threads towards the root. It lies immediately beneath the cuticle, and terminates as a fringe just at the neck of the soft bulb."²

With regard to the *Megalosporon endothrix* variety, Fox and Blaxall remark: "The root-end is certainly attacked very early, and usually before other parts of the hair, for chains could generally be seen coursing up the hair from the direction of the root. We have, however, seen threads entering beneath the cuticle higher up in the intra-follicular portion, and we believe the shaft can be attacked at several points, as with *Microsporon*."

Again, Adamson says: "The observations on the manner of attack support the view (the so-called 'direct theory') of Unna and Jamieson. These writers state that the fungus invades the hair by passing through the cuticular covering of the shaft, and extending downwards in the hair-substance. They are opposed to the theory *de détour* of

¹ *Brit. Jour. of Derm.*, July—September, 1896.

² "Observations on the Parasities of Ringworm," *Brit. Jour. of Derm.*, July, 1895.

many of the older writers, that the fungus grows downwards between the follicular wall and the hair-shaft until it reaches the soft bulb, here piercing the hair-substance, and returning upwards in the hair itself."¹

With regard to the *ectothrix* variety, Fox and Blaxall say: "We have obtained very early specimens conclusively demonstrating a primary attack of the hair from the root-end." But see Jamieson's statement on p. 9.

Epidermis involved first.—In the *Trichophytos*, the epidermis is always invaded before the hair, but this invasion is not well marked, and it soon passes away; but Sabouraud teaches that in the *Microsporon* the hairs are involved first. I cannot agree to this statement, as the fungus at first affects the epithelial layer of the skin, and then involves the hairs.

Again, Fox and Blaxall say: "We have to express our disagreement with Sabouraud on another point. He believes that the scalp is implicated secondarily to the hair [in the *Microsporon*], and in this contrasting with the *Trichophytos*. If the skin of a ringworm patch be examined in the early spreading stages, there is always a quantity of mycelial feltwork present, even before the hairs are appreciably affected, and this *Tinea circinata* character disappears *pari passu* with the infection of the hairs."²

Adamson remarks: "The earliest lesions on the scalp are those mentioned as small scaly patches. These correspond exactly in appearance with the lesions found on the

¹ "Observations on the Parasites of Ringworm," *Brit. Jour. of Derm.*, August, 1895.

² "The Plurality of Fungi causing Ringworm," *Brit. Jour. of Derm.*, July—September, 1896.

body, and, as will be seen, *the fungus at this stage is confined to the epithelial scales, as in body-lesions*. It is only after the scaly patch has reached the size of one-third of an inch or so in diameter that the hair is invaded. From this time the hairs begin to break off, and the patch gradually enlarges until the typical stump-covered areas are produced.”¹

Whatever way the hairs get involved, the fungus rapidly grows in and on them (this will be described later on under “Microscopical Characters”), and renders them more or less swollen, lustreless, opaque, and brittle. Therefore, they easily break off near the surface of the scalp, as if “nibbled,” forming the so-called “stumps.”

These peculiar changes take place over more or less circumscribed areas, varying from the size of a split pea to that of the palm of the hand; and, what is most important, these areas are *non-symmetrical* (see Chapter III.).

Situation.—The fungus does not penetrate beyond the epidermic strata. In fact, it does not flourish in living tissue. Frederick Taylor, describing a microscopic specimen, says: “Laterally, the spread of the fungus was limited by the inner root-sheath, with which, in advanced stages, the spores were in contact. The integrity of this sheath was maintained, even when the follicle was choked with spores. The outer root-sheath never showed any traces of fungus, nor did the follicle-walls, the subcutaneous tissue, cutis, and mucous layer of the epidermis.”²

Thin remarks that he has not been able to discover any

¹ “Observations on the Parasites of Ringworm,” *Brit. Jour. of Derm.*, July, 1895.

² “On the Condition of the Skin in *Tinea tonsurans*,” *Med. Chir. Trans.*, vol. lxii., 1879.

spores in the rete mucosum, or in the corium, but that they are invariably found between the hair-shaft and the inner root-sheath. He also says: "The *Trichophyton tonsurans* only lives amongst epithelial cells which have more or less undergone the horny change, and it cannot exist in living tissue."¹

THE PLURALITY OF THE FUNGI IN RINGWORM.

SABOURAUD'S DISCOVERIES.

In 1894, after many preliminary papers,² Sabouraud published his justly celebrated work on the nature of the Tineæ, with an atlas,³ containing a magnificent series of one hundred and seventy-four photogravures. His extensive investigations covered entirely new ground, for he described different *species* of fungi, and maintained that they are absolutely separate and distinct forms, not passing from one into the other.

Since these primary papers were published, some slight modifications in Sabouraud's first descriptions, and conclusions, have been found necessary, and have been published

¹ "On the Condition of the Skin in Tinea tonsurans," *Med. Chir. Soc.*, March 26th, 1878; and *The Pathology and Treatment of Ringworm*, p. 46, 1887. For further information on this subject, *vide* Hebra, *Diseases of the Skin*, Kaposi, p. 210 (New Syd. Soc., 1880).

² "Contribution à l'Étude de la Trichophytie humaine," *Ann. de Derm.*, November, 1892; "Sur les Trichophytons à grosses Spores," *Ann. de Derm.*, February, 1893; "Sur la Folliculité agminée trichophytique et son Origine animale," *Ann. de l'Inst. Pasteur*, June, 1893; "Sur les Trichophytons de la Barbe," *Ann. de Derm.*, July, 1893; "Trois Points de l'Histoire micrographique des Trichophytons," *Ann. de Derm.*, November, 1893; "Sur une Mycose innommée de l'Homme," *Ann. de l'Inst. Pasteur*, February, 1894.

³ *Les Trichophyties humaines, avec Atlas*, par R. Sabouraud, 1894; and *Diagnostie et Traitement de la Pelade et Desteignes de l'Enfant*, 1895.

in *The British Journal of Dermatology*¹; and those who desire to study this subject, and the bacteriological characters of the different forms or species of fungi, should consult these papers, especially the latest by Fox and Blaxall, as well as Sabouraud's work.

I shall give the clinical and microscopical characters of the different forms, as I have found them, since Sabouraud's discoveries. In doing this, I most fully acknowledge the very great help I have received, in preparing this edition, from studying Sabouraud's works, and the other papers before referred to. In many instances, I shall quote (by permission) from the most recent (Fox and Blaxall's) paper.

Wickham refers to Sabouraud's conclusions as follows: "It is important to note that nothing has been advanced which has not been founded on very numerous histological and bacteriological preparations, easily controlled and openly placed at the disposal of all, in M. Sabouraud's laboratory." . . . "Moreover, the very basis of his works had been controlled and confirmed by various authors, both in France and elsewhere."² "The differential characters . . . are only manifest in their entirety in *pure* lesions—*i.e.*, lesions which have never been treated, or not treated for a long time. In cases where the clinical characters have been

¹ "The Present Position of the Tinea Question," L. Wickham, October, 1894; "The Ringworm Fungus," and "Presence of Mycelium in the Hairs in Microsporon," Aldersmith, March, 1895; "Observations on the Parasites of Ringworm," Adamson, July, 1895, with plates; "Cultures of Ringworm Fungus," Adamson, January, 1896; "Note on the Microsporon of Ringworm," Frederick Taylor, April, 1896; "An Inquiry into the Plurality of Fungi causing Ringworm in Human Beings," Colcott Fox and F. Blaxall, July—September, 1896, containing many excellent plates of the fungus.

² Bécclère, *Ann. de Derm.*, June, 1894; Wickham, "An Epidemic of Tinea tonsurans," *Ann. de Derm.*, June, 1894.

modified by recent treatment, the histology of the lesions retains its characters more exactly, and in every case bacteriological examination easily decides any difficulty."¹

As before mentioned, Sabouraud divides *Tinea tonsurans* into two distinct groups—

I. Microsporon Audouïni, or small-spore ringworm;
and

II. Megalosporon endothrix and **ectothrix**, or large-spore ;

and these two groups are caused by fungi as distinct, botanically, morphologically, culturally, and clinically, as the fungus of favus is from that of ringworm.

This is now generally accepted, but Sabouraud considers that the fungi in the two main groups belong to two distinct botanical families.

This is disputed by Colcott Fox and Blaxall, who say : “*The Mycology of the Ringworm Fungi*.—Sabouraud has divided the ringworm fungi into two groups, according to their mycology. In the *endothrix* and *ectothrix* varieties, he has described a fructification, consisting of spores mounted on short pedicles. These spores have a great tendency to aggregate into masses compared to bunches of grapes. In the *Microspora*, on the other hand, he finds nothing of this sort, but describes short pectinations, situated always on one side of the hyphæ, as the reproductive organs.”

“Sabouraud relates the *endothrix* and *ectothrix* varieties to the family *Botrytis*, or to the *Sporotricha*, because of the tendency to form irregular masses of spores (grape formation), and calls them *Trichophyta*. The fructification of the *Microspora* he considers peculiar, and cannot attach them to any particular family.”

¹ *Brit. Jour. of Derm.*, October, 1894.

“To this classification we cannot subscribe. We believe that the *Microspora* and so-called *Trichophyta* belong to one and the same family; in other words, we find that the fructification of the *Microspora* and *Trichophyta* is developed on a precisely similar plan, and that in reality they belong to the same family, and are nearly related members. Further, the appearance described by Sabouraud as fructification in the *Microspora* we do not consider to be a true fructification.”

Any one desiring to go into this subject should consult the paper by these authors.¹

¹ “An Inquiry into the Plurality of the Fungi causing Ringworm,” *Brit. Jour. of Derm.*, July—September, 1896. See, also, the report of the “Ringworm Debate,” *Third Intern. Cong. of Derm.*, 1896, when C. Fox and Blaxall said:—

“We differ entirely from Sabouraud upon the mycology of ringworm. We find in the *Microspora* spore-bearing hyphæ, and spores exactly similar to those seen in the *endothrix* and *ectothrix* groups. We find the characteristic pectinations described by Sabouraud, but they are met with only on the submerged hyphæ. The aërial hyphæ in all the groups show the same fructification. We always find, also, in the *Microspora* chlamydo-spores; generally in the *ectothrix*, but never in the *endothrix* groups.”

“These mycological differences do not, we believe, arise from comparing distinct species, but from the use of different methods of examination. In spite of the points in which we do not agree with Sabouraud, we are convinced that the species we have investigated are in the main identical with those discussed in Paris, though here and there there may be some slight variational difference.”

“The Continental method of examining the mycology of these ringworm fungi has been for the most part the use of the ‘hanging drop.’ This method, we contend, is obviously not suited for the proper development of the aërial hyphæ, and it is on these that the true fructification is produced. The hanging drop shows the development of the submerged hyphæ of the ringworm fungi well, but with the *Microspora* the aërial hyphæ are never developed, and only to a partial extent with the *endothrix* and *ectothrix* fungi.”

“The best method to examine the aërial hyphæ is to make *Klatsch*

DIVISIONS.

I. **Small-Spore Tinea**,¹ the fungus of which is called *Microsporon Audouïni*. This is the common form of ringworm.

II. **Large-Spore Tinea**—*Tinea trichophyton*.² This is the rarer form of ringworm.

This **Large-Spore Tinea** is further divided into two distinct classes, by the names of its fungi: *viz.*—

(A) **Trichophyton megalosporon endothrix**, the commoner form; and—

(B) **Trichophyton megalosporon ectothrix**,³ the rarer form on the scalp.

(A) The **Trichophyton megalosporon endothrix** is also subdivided into two *varieties*:—

First variety, with "*Resistant mycelium*," much the commoner form of *M. endothrix*; and the

Second variety, with "*Fragile mycelium*,"⁴ seen, but very rarely, in "disseminated" and "black-dot" ringworm.

¹ This fungus ought not to be called a "small-spore *ectothrix*," as the shaft of the hairs is saturated with the mycelium. See "Notes on the Microsporon," by Frederick Taylor, *Brit. Jour. of Derm.*, April, 1896.

² *Teignes trichophytiques*.

³ This ought rather to be termed "*endo-ectothrix*," for it also invades the shafts of the hairs.

⁴ *La tondante peladoïde*.

specimens from plate-cultures, and by this means one sees their proper form and arrangement. In each group one finds delicate hyphæ supporting the spores, and the arrangement of the conidia is such that we have termed them 'Aaron's rods.' These spore-bearing organs differ slightly in the three groups as to the form, size, and arrangement of the spores; but it is unquestionable that the plan of the fructification is the same in all. Sabouraud has described it partially in the *endothrix* and *ectothrix* groups, but not in the

I. SMALL-SPORE TINEA (*Microsporon Audouïni*).

This is by far the commoner form of ringworm of the head, both in France and in England, and may be very extensive.

The Fungus is specially marked by its distinct *circumpilar* sheaths, consisting of a mass of innumerable small and rounded spores, situated outside the hair-shaft, and forming the "root-sheath." There is mycelium as well, and this is also to be found inside the hair. Its characters will be described in Chapter III.

The fungus is essentially a human parasite (Sabouraud).

Position.—Sabouraud says this form exists only on the scalp, and is seen exclusively in children. It is never detected on the heads of adults; hence, those attending children with common, or small-spore Tinea, need have no fear of contracting this disease on the scalp, though it is possible to have small places on the body.

Microspora, in which he finds quite different appearances. These are hyphæ with bent-over or 'flail-like' ends, pectinated. They can be seen in a hanging-drop specimen, but are never found in a *Klatsch* specimen. But, if we examine the *submerged* hyphæ from a plate-culture of a *Microsporon*, we find these *pectinations* most beautifully displayed. These pectinations are, as far as we know, as Sabouraud states, peculiar to the *Microspora*, and yet every *Microsporon* culture will show the aërial hyphæ with their spore-bearing rods on the surface of the medium, and in its depth the submerged hyphæ with their pectinations, a strong proof, if any were needed, that we have been working with the same species."

"With regard to chlamydo-spores, it is sufficient to say here that they are always present in the *Microspora*, and are by no means relegated to the other groups, as Sabouraud supposed. *Klatsch* specimens show them beautifully, but we have never found them amongst the *endothrixes*."

It does not produce ringworm of the beard (parasitic sycosis), nor does it attack the nails.

Slight circinate lesions are sometimes produced on the body; and Fox and Blaxall say: "Sabouraud was too positive in his early writings about the non-occurrence of circinate lesions of the glabrous skin. However, it is doubtless correct that in the great majority of cases the secondary inoculations of the glabrous skin are simple non-circinate macules. We cannot agree to the term 'furfuration,' because these lesions are nearly always reddened. They are apt to be numerous, to occur about the face, neck, and shoulders, and rarely elsewhere."¹

Age.—Small-spore Tinea is especially an affection of early childhood, and generally commences before nine or ten years of age; it rarely begins after twelve or thirteen. Sabouraud says it never commences after fourteen, and is not even seen after fifteen; but I have seen it begin after fourteen.

(The percentage of ringworm cases will be found in Chapter II.)

Contagion.—Sabouraud considers this form to be the more contagious, and I think he is right; but still the large-spore form often spreads to many members of the same family, and I have seen extensive outbreaks in schools, even of the *fragile* variety.

Difficulty of Cure.—Sabouraud says the small-spore form is the more rebellious to treatment. In a sense this is true, for extensive forms of the disease are most difficult to eradicate; but I cannot agree that the most inveterate cases are almost always of this form. I shall refer to this under the *Megalosporon* variety.

¹ *Brit. Jour. of Derm.*, July—September, 1896.

II. LARGE-SPORE TINEA.

(A) **Trichophyton megalosporon endothrix.**

This is not nearly so common in England as the small-spore (see Chapter II. for percentage).

The Fungus in this form exists chiefly *inside* the hairs. There is no sheath or collarette, like that seen in the small-spore. Practically, the fungus is not seen on the outside of the hair-shaft beyond the hair-follicle; and the fine epithelial layer of the hair is intact, instead of being eroded, as in the small-spore. The spores and the mycelium are larger (see Chapter III.).

Sabouraud considers the parasite to be exclusively human in its origin.

Position.—This form exists on the scalp of children; and also, but very rarely indeed, on the scalp of adults. I have seen five cases during the last twenty years. Hence, though adults hardly ever take this form of ringworm, it is not an impossibility.

It does not produce parasitic sycosis, nor does it attack the nails.

It often produces transitory forms of body ringworm (on the face and on the neck), which are not veritable forms of *Tinea circinata*, though circinate in character, and taking the form of small lenticular, rosy macules—the *Trichophytie accessoire des teigneux*, of Besnier. These spots are distinguishable from the furfuraceous, slightly reddened spots due to the *Microsporon*.

Age.—It is generally seen commencing at a later age than the small-spore form, often up to thirteen, and even from fifteen to sixteen years of age.

Contagion.—This is not so contagious, probably, as the small-spore; but it often spreads in a family, and even in schools. I have seen more than half the boys in a small preparatory school take this form of the disease from the admission into it of a chronic case, supposed to be only a scurfy patch. But, as there are many cases of this variety about, untreated and unknown, I agree that it cannot be so contagious as the *Microsporon*.

Difficulty of Cure.—Sabouraud thinks this form is not so rebellious to treatment as the small-spore. I cannot agree to this statement, if the case be chronic and extensive; but the small places are easily cured by the croton-oil treatment.

I have had a very exceptional experience (for over a quarter of a century) in seeing and treating inveterate cases of ringworm, which have often been under treatment for years before I have even seen them; and I have frequently found such cases to be due to the large-spore form. Of course, I cannot say in what proportion, as in former years no one attempted to distinguish between the two varieties. On looking back, however, and noting the form of ringworm I described and drew for my plates in former editions, as *chronic* ringworm, it is very clear to me that it was the *Megalosporon endothrix* (see Plate VI., published in 1882).

I have seen a large number of cases which in 1880 I called "disseminated," or "black-dot," ringworm, showing stumps or groups of stumps scattered about the scalp. These cases are, most certainly, usually of the large-spore form, though I have often seen isolated stumps scattered amongst the long healthy hairs in the *Microsporon*, especially if the case has existed for some years.

Many of the most inveterate and extensive cases I have had to treat have been large-spore *Tinea*; and I have seen such cases resist treatment for seven or eight years (I shall refer to this later on).

C. Fox and Blaxall evidently agree, for they say: "In Paddy the disease [*Megalosporon*] was probably of seven years' duration, and in two other families about four and three years respectively. In such disseminated cases, where no obvious disease meets the eye, the parents do not trouble about it, and the ringworm is only found out on the child applying for some other ailment."

This statement fully bears out my opinion (expressed for many years), that a large number of such chronic cases are about, not under treatment, and often quite unrecognised, until some special examination by an expert reveals their presence.

The two varieties of the *Megalosporon endothrix*—*viz.*, the *resistant* and the *fragile*—will be described under "Clinical and Microscopical Characters," in Chapter III.; but I may mention that the *resistant* form is by far the more common, and that the *fragile* variety is very rarely seen in England—"bald" and "black-dot" ringworm, with "disseminated stumps."

(B) **Trichophyton megalosporon ectothrix** (or *endo-ectothrix*).

There is a distinct group of *ectothrix Trichophytos* to be found sometimes on the scalp and on the body, to be distinguished clinically, microscopically, and by culture both from the *Microsporon* and the *endothrix Trichophytos*.

This form is but rarely found on the scalp; but, according to Fox and Blaxall, more commonly seen in hospital practice than the *fragile* variety of the *endothrix*

Trichophyton. They give it at about 5 per cent. I very rarely see this variety in private practice, and have not seen it on the head in adults.

The Fungus is almost entirely *outside* the hairs. Sabouraud says it is, as its name implies, *circumpilar*; but later investigations, by Leslie Roberts,¹ Adamson, and C. Fox and Blaxall, prove that it does partly enter the hair-shaft. It is located chiefly between the wall of the follicle and the hair; yet it certainly also enters the shaft itself; and, therefore, it is (as these observers suggest)

¹ "The Present Position of the Question of Vegetable Hair Parasites," *Brit. Med. Jour.*, September, 1894.

Those who wish to study this subject should read this paper, in which L. Roberts says: Sabouraud "asserts that there is one large family of *Trichophytons*, named by him the *Megalosporons*, which may be divided again into two divisions, according as they are of animal origin or human origin. Those of the former origin are found on the human host generally in any position but the scalp, though occasionally they may attack this part also. Their favourite locality is the chin, where they produce various lesions. The *Megalosporons* of human origin generally attack the scalp, but may travel to smooth parts. These two divisions of the *Megalosporons* are, according to this observer, histologically distinguished from each other by the fact that the *Megalosporons* of human origin do not trespass beyond the limits of the sheath of the hair, being confined to its interior substance, while that of animal origin vegetates outside as well as inside the sheath. The new doctrine, then, is this: When we find a hair with a *Megalosporon* fungus vegetating *around* the sheath, we are to label the fungus 'of animal origin.'"

Roberts then says he objects to this doctrine, and thinks it is misleading; and describes some experiments which tend to prove that "on one host the fungus may form *ectothrix* vegetations, and on another entirely *endothrix* vegetations," and says: "This may readily be observed in the transference of the fungus from man to one of the lower animals. I have noticed it in transferring human *Trichophyton megalosporon* through an inert soil to the guinea-pig. In the child's hair, the vegetation was confined within the sheath; in the hair of the guinea-pig, it was *ectothrix* and *endothrix*."

endothrix, as well as *ectothrix*; but the fungus is, essentially and primarily, outside the hair-shaft. The mycelium is large and distinct, and the spores are large (see Chapter III. for microscopical characters).

Sabouraud says it is essentially an animal Tinea—*viz.*, that the parasite lives on animals, and is communicated to man from them.

There are very many forms of this Tinea according to Sabouraud, forming different varieties, which occur on different animals.

Wickham remarks: "This group is far from being definitely elucidated. Twenty different sorts are suspected up to date; five or six are well defined—as, for instance, the *Trichophyton* with white pyogenic cultures in the horse, the cat, the calf, and in birds. These *Trichophytons* give rise to pus—pus in which there is no staphylococcus, nor streptococcus, etc., but only the *Trichophyton*, which can be obtained in the pure state by sowing the pus on agar. The commonest of these Tineæ is that caused by the *Trichophyton* with white cultivations of the horse; that it is which almost always produces Tinea of the beard."¹

Position.—This is the fungus that causes true *Tinea circinata*, or ringworm of the body (of course, excluding the secondary inoculations of the skin, as described under the *Microsporon* and the *M. endothrix*). The lesions are circinate and varied, but single, as a rule; and they may be dry, or vesico-pustular.

The *M. ectothrix* also causes parasitic sycosis, or ringworm of the beard, and ringworm of the nails; and most cases of pustular ringworm, ringworm with impetigo, and kerion of the scalp. There is no doubt that there is very

¹ *Brit. Jour. of Derm.*, October, 1894.

often a great tendency to inflammation and to pus formation with this fungus, especially when situated on the scalp; but it is not correct that kerion is caused *only* by this form of the disease. I have seen kerion many times in the small-spore form of ringworm. Fox and Blaxall are evidently of this opinion, for they say: "It seems clear, from this case, that the kerion type of scalp ringworm may be associated with *Microsporon*, and that Sabouraud's teaching to the contrary is too dogmatic."¹

Adamson² has also seen it many times with the *Microsporon*.

The special treatment, which I called the "artificial production of kerion" in 1880, shows that ordinary ringworm (*Microsporon*) may be turned into kerion by suitable treatment; and this is, in my opinion, the quickest way to cure small places on the scalp. I have found cases of *ectothrix* Tinea on the scalp generally easy to cure, by helping kerion to form, and thus rapidly getting rid of the hairs and fungus, as described later on.

I do not propose to fully describe the bacteriological examination of the different forms, as this little book is intended rather as a guide to *the diagnosis and treatment* of the disease, than as an exhaustive work on its pathology and bacteriology.

BACTERIOLOGICAL CHARACTERS.

The following quotations are taken from Wickham's paper³; and those who wish to study this subject should

¹ "The Plurality of the Fungi causing Ringworm," *Brit. Jour. of Derm.*, 1896.

² "Observations on the Parasites of Ringworm," *Brit. Jour. of Derm.*, July, 1895.

³ *Brit. Jour. of Derm.*, October, 1894.

consult Sabouraud's works, and especially the descriptions given in Fox and Blaxall's paper.¹

I. **Small-Spore Tinea** (*Microsporon Audouīni*) :—

“If a portion of the parasitic sheath is inoculated upon special cultivation media, a series of pure cultures can be obtained from the very start, without any association with the Cryptogams which are constant in the forms of *Trichophyton*. On a jelly of beer-wort, these cultivations yield a tuft of perfectly white central down, round which concentric downy circles in series, separated by smooth areas, successively form. On peptonised malt-jelly, these cultivations give rise to a downy layer of greyish-white colour, generally presenting in the centre a downy umbilicus-like prominence.”

II. **Trichophyton megalosporon endothrix**, with *resistant* mycelium :—

“Cryptogamic associations. On jelly of beer-wort (maltose 92 gr., albuminoid 1·7 gr., dextrine 5 gr. per thousand), the cultivation assumes the form of a sun of yellow powder, having in its centre a hemispherical cap. This cap gradually becomes hollow in the centre, and becomes crateriform on a more sensitive medium. Seen by transparent light, the culture has a dark-brown basis.”

III. **Trichophyton megalosporon endothrix**, with *fragile* mycelium :—

“A cultivation on jelly of beer-wort, powdery like those of *Trichophyton* with resistant-spores, assumes the form of a cone marked with radiating fissures. It is of brownish-

¹ “The Plurality of the Fungi causing Ringworm,” *Brit. Jour. of Derm.*, July—September, 1896. Very full directions for obtaining successful cultures, and their distinctive appearances, are given.

grey colour, and resembles a *pâte de carton*. On peptonised malt, the culture is not crateriform, but acuminate."

IV. *Trichophyton megalosporon ectothrix*:—

Wickham says: "It is impossible here to consider all the differential signs. Differentiation of the numerous species (horse, cat, dog, calf, ox, etc.) has been accomplished by the great divergence of appearance of their cultures, which, on the other hand, do not resemble in the least cultivations of *Tinea* with small spores, or of the *Trichophyton endothrix*." ¹

Fox and Blaxall remark: "*The Differentiation of the Ringworm Fungi by Cultures*.—Just as we have been able to follow Sabouraud in the clinical distinctions and in the microscopic study of the lesions, so also we find the great division into three groups upheld on culture media. From the seventh day onwards, one can at a glance distinguish the *Microspora* from the *Trichophyta*, and as development goes on these latter can be recognised as *endothrix* or *ectothrix* in the majority of cases with ease. We are, therefore, entirely at variance with Král and certain Continental writers, who dispute the plurality of the ringworm parasite, for we follow Sabouraud in considering these groups to be the outcome, not of the vagaries of one fungus, but of three, and probably several, distinct species, and remarkably stable species." ²

Conclusions.—Sabouraud's great researches, coupled with the experiments of Fox and Blaxall in this country, conclusively prove the view of the "*plurality of the fungi causing ringworm*." And I can speak clinically to the fact,

¹ See Sabouraud's atlas for plates of cultures.

² "The Plurality of the Fungi causing Ringworm," *Brit. Jour. of Derm.*, July—September, 1896.

that since these discoveries were published, I have not found two forms of *Tinea* on the same scalp.

For the last four years, I have had five children (brothers and sisters) under constant observation, and all had had ringworm of the scalp, and had been under treatment, for *four* years before I first saw them in 1893. Four were the most extensive and inveterate cases of *Tinea* I have ever seen; and all five had exactly the same form of the disease—*viz.*, the *Trichophyton megalosporon, resistant* variety. Two of these children have had second attacks, after getting quite well and remaining so for some long time (showing that children can have ringworm twice). In all these cases, during the whole four years, the microscopical characters of the stumps have been the same; and Plate II. was drawn from one such stump, after the case had been under treatment for seven years!

I never observed the slightest sign of spores, nor of mycelium, as is constantly seen in the *Microsporon*; nor did I ever discover a stump with fungus in it exactly like that seen in the *fragile* variety of the *Megalosporon endothrix*. One boy was easily cured with croton oil, as the places were small; but four of the cases have been the most extensive, and the most rebellious to treatment, I have ever seen. Two of the children took me two years to cure; and two have only lately been free from *disseminated* stumps. Relapses occurred many times. In one, when the case was all but well, and during a visit to the seaside, in 1896, a rapid and extensive spread of the disease took place, and treatment had to be commenced over again. This case again extended in February, 1897, from *one* stump.¹ It spread twice over a large extent of the scalp which had formerly been affected, but which was

¹ Described in Chapter X., under "Formalin."

at the time absolutely well, with long hairs growing freely.

The microscopical characters were exactly the same, whether a hair had been involved for years, or had only recently become infected. In one case, when the disease was spreading, and again when nearly well, I often found long, apparently healthy hairs; but, on pulling them out with the bulbs (for they did not break off), I found them slightly infected,—just one or two long ladder-like bands of mycelium passing up the shaft; not sufficient to cause them to be fragile and break off, but quite enough to cause the disease to continue for months after it appeared to be well. Therefore, it was often necessary to pull out the long hairs, in order to see whether they were infected with the fungus. Of course, as a rule, the affected hairs do break off; and, if they do not, it is very difficult indeed to find and extract all the diseased hairs. For, in this case, no lotions or ointments had the slightest effect in curing the disease, although I tried almost every known treatment. All these children were at length cured by croton oil, and some of them had the disease over most of the scalp. I do not believe any other treatment would have cured them. The hair is now growing freely, and there are no marks to show where the croton oil has been applied.

At the same time, I also had a typical case of the *Megalosporon endothrix*, *fragile* variety, under treatment (“bald” and “black-dot” form). This also exhibited exactly the same microscopical appearances during the six months the case was under treatment; and the child had had the complaint for eight months before I saw her. I never had much difficulty in telling whether any specimen belonged to the *fragile* or the *resistant* case of Tinea.

If the *fragile* form of “black-dot” ringworm were only

a very chronic variety of the *Megalosporon resistant*, it would probably have appeared in one of those chronic cases first mentioned, even after six or seven years' treatment. The typical "bead-like" arrangement (see Chapter III.) of the mycelial spores, easily disintegrating in liquor potassæ, is not seen in the *resistant* variety; though, in chronic cases of the *resistant* form, I have constantly observed mutually compressed masses of "fish-roe" looking spores, that could hardly be diagnosed under the microscope from those of the *fragile* variety. I shall refer in the next chapter to a large outbreak of the *Megalosporon endothrix* form in a school, where many of the cases have been under treatment for years.

Hence, from clinical experience, I feel fully convinced that the different forms, as described by Sabouraud, are absolutely distinct, and due to different forms or species of fungi. Very careful microscopical examination by a trained eye is generally conclusive, without bacteriological examination, which is hardly to be expected of medical men, in treating patients with ringworm. But the hairs must be carefully mounted, and soaked for some hours in liquor potassæ, as described in Chapter III.

The Biology of the Ringworm Organism has been investigated by Macfadyen, to see whether it produces ferments, and, if so, to determine their nature.¹

¹ See *Brit. Med. Jour.*, September 22nd, 1894.

CHAPTER II.

*TINEA TONSURANS.*¹

ETIOLOGY—SITE—THE SOIL—INCUBATION PERIOD—CAN A CHILD HAVE RINGWORM TWICE?—AMONG WHAT CLASSES IS IT FOUND?—THE COMMONEST AGE FOR RINGWORM—TABLES—PERCENTAGE OF RINGWORM AMONG CHILDREN—CHRIST'S HOSPITAL STATISTICS—PERCENTAGES IN SCHOOLS—RELATIVE FREQUENCY OF THE DIFFERENT FORMS—WHEN IS IT MOST CONTAGIOUS?—HOW LONG HAS THE DISEASE EXISTED?—DIAGNOSIS OF CHRONIC FORMS—HOW LONG WILL IT TAKE TO CURE?—INCURABLE CASES.

ETIOLOGY.

IN the present day, no one disputes the etiological importance of the fungi, as ringworm is essentially a contagious disease, easily communicated from one child to another by direct contact, as in playing together, or by caps, brushes, combs, towels, comforters, and clothing.

Combing or brushing the hair causes the short portions of the broken-off diseased hairs (commonly called "stumps") to break off; and the small detached portions, loaded with living spores or conidia, coming into contact with the heads of other children, are the usual vehicles by means of which the disease is spread.

There is no doubt that hair-dressers unwittingly propagate ringworm; for children, suffering from this affection in every stage, are taken to hair-dressers to have their

¹ *Germ.*, Scheerende Flechte: *Fr.*, Herpès tonsurant; *Teigne ton-dante*; *Teigne tonsurante*.

hair cut; and, if the next customer happen to be a child, and the same brush and comb be used, the chances of infection are great. The same want of care, on the part of parents and others, is seen when children, with this complaint, are taken to the barber to have their heads shaved, or to the hatter to try on new caps. There is little doubt that ringworm is spread by these means, as well as by children playing together. This allows of direct contact of heads; therefore, boys or girls with uncured ringworm should never be permitted to play with those who are free from this complaint. Again, children should never be allowed to put on caps belonging to other children, or to throw their caps together in a heap at school; but I do not think there is any undue risk in a child, when under efficient treatment, simply being in a room for meals or lessons with other children, *where there can be no contact*, as ringworm is not an infectious, but a contagious, disease.

One of the commonest causes of the spread of *Tinea tonsurans* is the accidental contact of healthy children with the heads of, or with infected articles belonging to, boys or girls with *chronic, unknown*, and therefore *untreated*, varieties of the disease, which are constantly mistaken for chronic scurf, seborrhœa, or dry eczema. This matter will be fully considered further on.

School life, and overcrowding of children, of course favour the spread of ringworm; but I much doubt the possibility of the transmission of the conidia through the air. Tilbury Fox found fungus elements in abundance in the dust deposited from the air of a ward in which cases of this disease were located; but Thin thinks no weight can be given to this statement, as the spores were probably only those of *Penicillium glaucum*.¹

¹ *Pathology and Treatment of Ringworm*, by George Thin, 1887.

Leslie Roberts thinks decaying organic matter may be a source ; and that the fungi were originally saprophytes, which in some way or other, yet unknown, have assumed a parasitic existence, and thus caused ringworm.¹

The contagious nature of this affection has been fully demonstrated by experiments, as well as by clinical observation ; and Tilbury Fox wrote in 1878 : “ The arguments in favour of the assertion that the growth of the parasite is the essential cause of the inflammatory symptoms and the disorganised state of the hairs in ringworm are unanswerable.”²

There is no doubt that ringworm is sometimes communicated to man from the lower animals³ (horse, cow, dog, sheep, pig, cat, mouse, and rabbit) ; but this source of infection is an extremely rare one for ringworm of the head. The disease so produced is usually *Tinea circinata*, with large and distinct mycelium, and large spores (*Trichophyton megalosporon ectothrix*), and generally found on the arms, the beard, or the bodies of those attending to diseased animals.

SITE.

The usual place to find ringworm is on the scalp, or the body, in children.

¹ Leslie Roberts also writes : “ In a sense, every case of vegetable parasitic hair disease is of animal origin, for domesticated animals come habitually into closer contact with saprophytically decomposing matter than we ourselves. The hair fungi ascend to man through the chain of domesticated animals. When they have reached this position, they may perpetuate themselves at this level by transmission from one individual to another.”—*Brit. Med. Jour.*, September, 1894.

² *Lectures on Ringworm*, 1878.

³ See Hebra, *Diseases of the Skin*, Kaposi, vol. v., p. 218 (New Syd. Soc., 1880) ; and *A Treatise on the Parasitic Diseases of Domesticated Animals*, by Professor Neumann, edited by G. Fleming, 1892.

Ringworm of the Scalp (*Tinea tonsurans*) is almost always confined to children, and is very rarely indeed contracted after puberty (from fourteen to fifteen : see p. 21) ; but I have seen five adults with well-marked and typical *Tinea tonsurans* (*Megalosporon endoethrix* form) during the last twenty-five years, in only one of which it was contracted under the age of sixteen. On the other hand, very young infants are but rarely affected.

Ringworm of the Body (*Tinea circinata*) may develop at any age, and attack any part. In England, it is more common in children than in adults, but is often seen in the latter in the moist heat of the tropics, forming the so-called Burmese or Chinese ringworm. If it occur in adults in this country, it is generally observed on the hands or arms of those attending animals affected with this complaint, or as *eczema marginatum*. Ringworm also appears in adults as parasitic (or tinea) sycosis, involving the hairs of the beard, and due to the *Megalosporon endoethrix* form.

Ringworm is very difficult to eradicate when it exists on the scalp, as parasiticides *cannot* be brought into contact with the fungus ; but ringworm of the body (especially the secondary and trivial forms seen with scalp disease : see p. 21), as it occurs in England, is generally readily cured by any parasiticide, because the essential cause of the mischief—*viz.*, the fungus—lies close at hand, and can easily be reached.

Formerly, it was taught that *Tinea tonsurans* and *Tinea circinata* differed only as to their locality. The former was thought to infect the body, producing well-marked patches of *Tinea circinata* ; while, at other times, patches of body ringworm were said to involve the scalp, and give rise

to *Tinea tonsurans*; but Sabouraud has shown that true *Tinea circinata* is due to a distinct species of fungus (the *Trichophyton megalosporon ectothrix*), and is not contracted from the common small-celled ringworm (*Microsporon Audouïni*), or even the large-celled variety, usually found on the head (*Megalosporon endothrix*). Circular furfuraceous patches and red scaly spots are often, however, found on the faces, shoulders, or chests of children with scalp disease; and also, at times, on their brothers or sisters, etc.; but this is a secondary and slight trouble, and not the genuine *Tinea circinata*.

When true *Tinea circinata* is found on the body, there is very rarely ringworm of the scalp as well. I have even seen rings of *Tinea circinata* passing from the neck upwards on to the scalp in an adult, and existing for weeks without involving the hairs.

THE SOIL.

All children do not appear to be equally susceptible to ringworm. A certain unknown condition of the skin is necessary for the growth of the fungus, as some children do not take ringworm, though constantly exposed to infection. For it is evident, that when one child in a family has ringworm, and is untreated, the others are very likely to be exposed to the action of the fungus; yet, at times, the disease does not extend; though, as a rule, it does, unless precautions be adopted.

The fact, that brothers or sisters, in a family with one chronic case of ringworm, remain free from the complaint, is often used as an argument by parents, to prove that their child is not suffering from any contagious form of disease, and is in a fit condition to attend school.

In some children, the fungus takes but slight hold, and

is easily destroyed ; while others are extremely susceptible, the disease quickly attacking the hairs, and spreading with great rapidity, even under good treatment. Sometimes inappropriate treatment, by producing impetiginous eczema with crusts, even accelerates the already rapid spread of the complaint ; and, by means of the pus, the fungus is carried to more distant and healthy parts. This variety of ringworm is difficult to manage.

The difference in these cases, when due to the same species of fungus, must depend on some peculiar nutritive condition of the soil or material in which it develops, or upon some special state of the general health or constitution. In fact, the state of the soil is a most important condition, and is hardly dwelt upon sufficiently by some observers, for the rapidity with which a small spot of ringworm spreads, before it comes under efficient treatment, depends chiefly upon a peculiar suitability or unsuitability of the soil. In some children, it appears singularly conducive to the rapid growth of the ringworm fungus ; and it has been stated that ringworm specially occurs, and spreads most rapidly, among poorly nourished children of a strumous or lymphatic diathesis. At times, it is observed that all the children in a family of this description, if they become infected, will suffer severely ; evidently showing that there is some general constitutional condition present favouring the parasitic growth.

Jamieson says : " It is especially in anæmic, fair, and lymphatic children that ringworm of the head is obstinate."¹

It has generally been taught that ringworm is more commonly seen amongst those who, while they are not decidedly strumous, are yet thin and pallid and sickly. Malcolm Morris wrote, in 1881, that children with very

¹ *Diseases of the Skin*, p. 559, 1894.

light brown, golden, or colourless hair, with grey or blue eyes, and with fine skin with thin epidermis, take ringworm easily, and usually have it severely.¹

Crocker combats this opinion, and remarks: "I have not been able to observe that the disease is more obstinate in fair children than in dark."²

There is little doubt that we do see more cases of ringworm in fair-haired children than in dark. Crocker attributes this to the fact that light-haired children predominate in England³; but, as Malcolm Morris says, "Crocker, however, admits that in dark-haired children the hair resists the invasion of the fungus more than in others."³

Malcolm Morris also writes: "The affection, however, is purely local, and I attach more importance to peculiarities of structure in the epidermis and the hairs, than to the condition of the patient's health. Some of the most persistent cases that have come under my notice have been in perfectly healthy children."⁴

According to Tilbury Fox, children with *chronic* ringworm dislike fat; and, he says, this avoidance of fat in the diet "has a most potent influence in leading to the development of a condition of nutrition which is favourable to the occurrence of obstinate ringworm."⁵

But a long and very practical experience makes me very much doubt this statement, and Crocker also remarks: "Tilbury Fox's dictum that children with ringworm dislike fat, and similar statements, are, I believe, fallacious."

I fully agree with this, and, therefore, still maintain the

¹ *The Lancet*, January 29th, 1881.

² *Diseases of the Skin*, p. 813, 1895.

³ *Diseases of the Skin*, p. 311, 1894.

⁴ *Diseases of the Skin*, p. 310, 1894.

⁵ *Ringworm*, 1878.

opinion I expressed many years ago : "That the peculiar condition of the soil which is favourable to the development of the ringworm fungus is unknown," and that it is not due to any known constitutional cause.

Crocker also agrees that "there is no known constitutional or other condition of the patient to be made out that predisposes to ringworm, though there is no doubt that some people are more susceptible than others." . . . "I have," he writes, "met with it in an extremely developed and obstinate form in perfectly healthy children, both fair and dark ; so that, while it is always right to attend to any defect of the general health, I could never convince myself that the progress of the disease was materially influenced by such measures."¹

Thin also remarks : "While delicate children are as liable to the disease as others, yet perfectly healthy children with excellent constitutions are equally liable to it."²

Duhring writes : "A certain state of the epidermis, or soil, the exact nature of which is obscure, is required for their [the fungi] development, without which favourable condition they fail to take root and grow, or at least to thrive."³

My own opinion is, that the general health, and the colour of the hair, have nothing to do with ringworm, as I constantly see both recent and chronic forms in children who are neither scrofulous, strumous, nor ill-nourished ; in fact, it is common in decidedly healthy and robust children, even "in those who are the picture of rosy health."⁴

¹ *Diseases of the Skin*, p. 813, 1894.

² *Pathology and Treatment of Ringworm*, p. 23, 1887.

³ *Cutaneous Medicine*, Part I., 1895.

⁴ *Textbook of Medicine*, Fagge and Pye-Smith, p. 861, 1891.

Another curious fact about the soil is, that when puberty is reached, about the age of from fourteen to fifteen, ringworm of the scalp becomes much more manageable ; and, even when it has existed for years, generally gets well spontaneously soon after that period. Also, it is very rarely contracted after twelve or thirteen (small-spore), or after fourteen or fifteen (large-spore). (See pp. 21, 22.)

What is the cause of this ? What happens at this time to the skin, or the hairs, that prevents the fungus from living ? It cannot be, as some have suggested, that the fungus cannot enter the hair-shaft, for it does involve it in some rare instances in adults. But, even if this were true, this fact could not kill the fungus already existing in the hairs. Even if they are saturated with the fungus, ringworm almost always gets well spontaneously from about fifteen to sixteen. I have not the least idea to what this death of the fungus is due, and only wish it could be discovered, for it might be possible to artificially produce this condition of the scalp, or the hairs, and then one of the most obstinate of skin affections would be rapidly and surely cured.

INCUBATION PERIOD.

The period of incubation of *Tinea tonsurans* is uncertain. There is no doubt that a small spot of ringworm may form on the scalp in a very few days from the implantation of the fungus ; but it is difficult in most cases of ringworm to tell the day on which this happened, or the number of days, or even weeks, the disease has existed before it has been discovered. Again, the time may differ in the several varieties of fungi.

Malcolm Morris's experiments show that, after spores have been placed on the human skin, a crop of itching

papules may form on the third day, and that by the sixth day they may have coalesced to form an erythematous patch of well-marked ringworm.¹ But there is also no doubt that the fungus may not find a very suitable soil, and thus may lie latent for some time, or grow very slowly; so that it is generally impossible to say, with any certainty, how long the incubation period of any given case of ringworm has been.

The usual time is certainly under a fortnight. Hence, if a child has been exposed to this disease, and be sent away in quarantine or completely isolated from the source of contagion, we might reasonably expect the child to be safe and free from ringworm, if no minute scurfy spot, as described in the next chapter, can be discovered by an experienced eye, after fourteen days.

CAN A CHILD HAVE RINGWORM TWICE?

This is a question sometimes asked, as it is thought by some people that one attack renders a child safe from another. This is a mistake, as it is perfectly well known that one attack of this affection in no way protects from a future one (see p. 30); and children have often been known to have ringworm more than once, especially on the body.

Even after new healthy hair has grown on a patch of ringworm, I have known the disease to commence again on the old place, due to reinfection from some distant uncured spot. This never takes place while the hairs are young and very fine, but only when somewhat matured; and it is very rarely observed.

Most cases of so-called fresh development of ringworm

¹ *Jour. of the Royal Micro. Soc.*, Ser. II., vol. iii., p. 329.

of the head are simply due to the original disease having never been completely cured. Ringworm may remain quiescent for some time, and be considered to be well, and then break out again and spread. Therefore, if a child has formerly had *Tinea tonsurans*, and has been supposed to be cured, and again presents evidence of having ringworm, it is much more likely to be due to some stumps having been left (thus causing a fresh outbreak), than to the child having retaken the disease from some one else.

Many years ago, I saw a little girl with a very small spot of ringworm behind one ear (*Megal. endothrix, resistant*).¹ The case was not under my care, and it was treated for a time, and then left alone. Months afterwards, I again saw this child, and suggested croton oil, but nothing was done. The spot was just the same size, and contained about half-a-dozen stumps. After *two years*, that spot suddenly enlarged, though it had not been treated for a long time, and the disease very rapidly spread over the scalp.

Why did it remain so long as one single spot, though untreated, and then suddenly spread? I cannot tell. I then had the case under treatment, and for months could only lessen the extent with oleate of mercury, and finally had to spend some months in curing it with croton oil. If strong measures had been used at first, much trouble would have been saved. I specially mention this case, to show that a small place may remain quiescent for many months, or even years, all the time capable of giving the disease to others, and then may rapidly spread.

¹ I feel sure this was a case of *Megal. endo., resistant*, because she was the sister of the case mentioned on p. 61, and caught the disease from her brother.

AMONG WHAT CLASSES IS IT FOUND?

Ringworm appears to be more common in England than elsewhere, and especially in London. It is seen in every grade of society, and certainly is not limited to the middle and lower ranks ; but it is much more common among those children of the lower orders who attend school.

Dirty Children.—It is a mistake to think ringworm is due to dirt, and want of personal cleanliness. Dirt affords no pabulum for the fungus to grow in, but, perhaps, the very reverse. Of course, neglected children with dirty heads are more liable to be exposed to, and therefore to take, the disease. Yet it constantly occurs where children's heads are kept clean, and where proper care is taken. In spite of all precautions as to cleanliness, some of the other children in a school will probably contract ringworm, if an untreated case be accidentally admitted into it, no matter from what class of society the pupils be obtained. Again, ordinary washing of the head does not prevent the fungus from developing, if it effect a lodgment on the skin.

It is a curious but certain fact, that in a large number of the dirtiest children (girls) I ever examined, in order to see the percentage of ringworm amongst them, and where only 2 per cent. had *Tinea tonsurans*, I actually found 98 per cent. suffering from nits, or even pediculi ! It made me wonder whether dirt, and other troubles, help to prevent the spread of ringworm ? It is worth following out ; for, as will be seen, I found a smaller percentage of cases of *Tinea* amongst some very dirty Board-school children, than I find in examining boys for admission into Christ's Hospital.

THE COMMONEST AGE FOR RINGWORM.

Children under nine years of age seem more prone to take ringworm than those who are older. The small-spore rarely commences after from twelve to thirteen years of age, while the large-spore may develop even up to fifteen or sixteen (see pp. 21, 22). I have seen only five cases of ringworm of the scalp in adults during the last twenty-five years (*Megal. endoth.* form). Crocker has seen only two cases,¹ and Thin also mentions two,² while some dermatologists have never noted even one case. Young infants are very rarely infected, but it may occur on babies even a week or two old.

With regard to the commonest age for *Tinea* to commence, it is difficult to decide, for children have often had the disease for some time before they are taken to a medical man who sees many cases ; and, again, young children are not so likely to be taken to a skin physician as those who are older, and, the question of education arising, a cure is desired as quickly as possible.

In the last seven hundred and seventy-five consecutive cases I have seen in private practice, the following table,³ compiled from my note-books, shows the ages at which the cases are *supposed* to have commenced (not the age when the children were first brought to me) ; while the second column shows the time the children had had *Tinea tonsurans* before I saw them. This table is interesting, for it shows how commonly ringworm commences between four and nine years of age ; and also how long it may remain

¹ *Diseases of the Skin*, p. 812, 1893.

² *Diseases of the Skin*, p. 27, 1878.

³ This table does not include any of the cases seen at the examinations at Christ's Hospital, or the boys who have had ringworm while in the school, or the outbreaks in schools, orphanages, etc., that I have seen.

uncured in spite of treatment, for many of these children had had ringworm for years before I first treated them.

INCLUDING ALL FORMS OF *TINEA TONSURANS*.

Ages when the children contracted ringworm.		The time the children were supposed to have had ringworm before I saw them.	
Under one month	... 1 child	Under one month	... 126 children
1 to 6 months	... 2 children	1 to 2 months	... 67 "
6 " 12 "	... 2 "	2 " 4 "	... 102 "
1 " 2 years	... 15 "	4 " 6 "	... 100 "
2 " 4 "	... 64 "	6 " 12 "	... 118 "
4 " 7 "	... 217 "	1 " 2 years	... 118 "
7 " 9 "	... 214 "	Over 2 "	... 56 "
9 " 11 "	... 175 "	" 3 "	... 24 "
11 " 13 "	... 67 "	" 4 "	... 13 "
13 " 14 "	... 10 "	" 5 "	... 3 "
14 " 15 "	... 1 child	" 6 "	... 3 "
15 " 16 "	... 3 children	" 7 "	... 2 "
16 " 17 "	... 1 girl	" 8 "	... 2 "
30 "	... 1 lady	" 9 "	... 1 "
35 "	... 1 "	" 10 "	... 1 "
36 "	... 1 "	Doubtful time	... 39 "
Total number	775	Total number	775

More than two-thirds of these cases were boys. This is accounted for by the fact, that parents are more likely to bring boys than girls to me to get them cured, in order to return to schools, and not because ringworm is more common amongst boys (see p. 49).

Fox and Blaxall give the ages at which their cases occurred as follows: "Two cases before one year, and five before two years; then the numbers rapidly rise, and attain a maximum from five to six years of age, but with little diminution up to seven, eight, and nine, and then rapidly fall. From ten to eleven years of age we met with twelve cases, and from eleven to twelve eleven cases, none

between twelve and fourteen, and two between fourteen and fifteen years.”¹

This table does not give the age at which the disease is supposed to have commenced, but the age when taken to the hospital for treatment.

PERCENTAGE OF RINGWORM CASES AMONG CHILDREN.

A number of children in private families, and in schools, have *Tinea tonsurans* without its being suspected. Such cases are usually chronic forms, often only a few stumps remaining after treatment has been discontinued.

Instructions have for many years been issued that children who have ringworm will not be admitted into Christ's Hospital; and yet, during twenty years, the number of boys who had well-marked ringworm, or just a few stumps scattered about the scalp, when first brought up for admission to Christ's Hospital, was 6·4 per cent.! Of course, I cannot tell how many were of the “large-spore” form, but I am inclined to think quite the proportion noted on p. 56, if not more, as so many were of the “disseminated type.”

CHRIST'S HOSPITAL EXAMINATIONS—TABLE SHOWING PERCENTAGE OF TINEA.

This table shows the number of boys examined for admission into Christ's Hospital in the course of twenty years, and the number of them rejected for having *Tinea tonsurans*. It gives only the percentage calculated for the *first* time the cases of ringworm were detected. Many of

¹ *Brit. Jour. of Derm.*, July—September, 1896.

these boys were rejected over and over again at subsequent examinations; and, therefore, the total number of rejections at each examination was much higher than this table shows.

CHRIST'S HOSPITAL EXAMINATIONS.											
FROM 1875 TO 1884.											
	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	Total in 10 years.
The number of boys examined the <i>first</i> time, supposed to be quite free from ringworm	193	190	174	187	205	217	183	179	182	102	1812
The number of ringworm cases (of the head) detected and rejected	15	20	10	19	16	16	16	15	13	5	145
Age 8 to 10 years— Average percentage in 10 years*	...	...	...	...	...	...	...	...	...	...	8 %
FROM 1887 TO 1896.											
	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	Total in 10 years.
The number of boys examined the <i>first</i> time, supposed to be quite free from ringworm	186	185	175	219	41	36	102	31	157	191	1323
The number of ringworm cases (of the head) detected and rejected	15	13	8	7	2	1	1	0	4	8	59
Age 8 to 10 years— Average percentage in 10 years	...	...	...	...	†...	...	...	...	...	...	4·3 %
Total number of boys examined in 20 years										3135	
Total number of cases of ringworm in 20 years										204	
Average percentage in 20 years										6·4 %	

* N.B.—The age.

† N.B.—Entrance age raised to from 10 to 13 years.

On examining this table, it will be seen that the percentage kept very high till the year 1891, when the New Scheme came into operation for Christ's Hospital, and the age of admission was raised from eight to ten years, to from ten to thirteen. The effect of this is well seen in this table. In 1893 and 1894, most of the boys coming for admission were between twelve and fourteen, and the amount of ringworm was under 1 per cent. ! This fully bears out the table on p. 46. During the last year or so, the age of the boys admitted has been getting lower, and the percentage is fast rising again (4 per cent. at the last examination).

Taking the total number in twenty years (the first ten years' table was published in 1885), there were two hundred and four cases of ringworm of the head detected, and rejected, out of three thousand one hundred and thirty-five boys examined, making 6·4 per cent.

The parents, as a rule, were much surprised when told their children were suffering from ringworm ; and, in many cases, I found they had been treated, and thought to be cured, months or even years before.

This large percentage is an important, and generally unknown, fact, especially as our boys are drawn from all quarters of the United Kingdom, and from all grades of middle-class society. During these years, very many of these boys were examined and rejected over and over again, and some lost their presentations, as the disease was not eradicated at the age they must enter the school.

Girls seem to suffer from ringworm as much as boys, and sex seems to have no influence on the spread of this disease. Crocker says: " In six hundred cases of the scalp, there were about 6 per cent. more boys."

My long experience (twenty-seven years) in examining children for admission into this large school, and for other

institutions, enables me to state most positively that *chronic* ringworm, in the form of isolated stumps left in the midst of long healthy hairs, and of a few disseminated stumps (often thought to be chronic scurf), exists amongst children attending schools (many of these boys and girls had been attending private schools before the examinations) without its being suspected. As a rule, I have found that the cases rejected had been formerly treated for the disease (often from two to three years previously), and that treatment had been discontinued because the affection was thought to be cured. From personal experience, I know that children presented for admission into other institutions have ringworm in the same, or even a larger, percentage. It also used to exist in some establishments without much notice being taken of it.

Many years ago, I examined a boys' school (lower middle class), and found more than half of them had *Tinea tonsurans*. Again, in 1882, I examined a public institution, where I found forty-six out of forty-seven boys, and thirty-seven out of forty-five girls, had ringworm of the head.¹

Even schools of the highest class (*viz.*, preparatory schools for Eton or Harrow) may suffer very severely from this scourge. I once examined such a school, where more than half the boys had had *Tinea tonsurans* during the previous year, though each fresh case had been immediately removed and isolated. This trouble was found to be due to the presence of a boy who had the usual chronic scurfy patch, covered with long hairs, and with numerous short stumps amongst them. This boy was actually under medical treatment for "chronic scurf"!

¹ *Vide* "Report of the Treatment of a Very Extensive Outbreak of Ringworm of the Head in a School," Aldersmith, *Brit. Med. Jour.*, December 16th, 1882; also a letter, *Brit. Med. Jour.*, October 7th, 1882.

In 1895, I was asked to examine a girls' school where there was a large outbreak of ringworm (forty cases out of one hundred and thirty-three children). The remarkable point was, that I found most of the cases were due to the *Megalosporon endothrix* (some of the *fragile* variety), which is so rarely seen at the London hospitals (see p. 55).

The trouble had existed for years, and had spread in the school, showing that this form is easily communicated from child to child, and that it is most difficult to cure by ordinary treatment. It also supports my statement, that many of the most inveterate cases of ringworm which I have seen have been of the large-spore form, and often bare spots with fragile stumps and "black dots."

I gave a bad prognosis with most of the cases; and another two years of treatment has proved that my opinion was correct, for the majority of the children whom I saw in 1895 are still suffering from chronic Tinea.

In March, 1897, I was kindly permitted to examine most of these children again; and I obtained specimens for microscopical examination from all I saw on the day of my visit.

I found that most of the infected children had ringworm of the "black-dot" form, and many with smooth bare places. In some cases, it was with the greatest difficulty that I was able to break off minute portions of the rotten stumps. Under the microscope these minute bits were simply one mass of "fish-roe" looking fungus, with the typical characteristics of the *Megalosporon endothrix*—some like "a bag of nuts" (see p. 87).

The following table is interesting, showing the length of time many of these children have been under treatment, and the form of fungus present, etc.

No.	AGE.	DURATION OF THE DISEASE.	THE FUNGUS.	PRESENT CONDITION.
1	15	About 7 years.	<i>M. endothrix.</i>	Was very extensive; now only numerous isolated stumps left.
2	14	" 1½ "	"	Perfectly smooth patches, black-dot isolated stumps only, scattered about, and very fragile. A most typical case.
3	12	" 3 "	"	Smooth patches, black dots, and corkscrew stumps.
4	10	" 3 "	"	A similar case.
5	12	" 3 "	"	An extensive case; no treatment any good, so far.
6	12	" 3 "	"	Same as Nos. 3 and 4. Has had pustular spots.
7	9	Over 2 "	"	Only one small pustular spot seen, with stump in it.
8	12	" 2 "	"	One stump only discovered.
9	12	" 2½ "	"	Many bare places, and disseminated stumps.
10	11	" 1½ "	"	Some stumps.
11	9	" 2 "	"	Bare spots, isolated stumps, and black dots. Stumps very fragile; impossible to remove much.
12	14	About 1½ "	"	Isolated stumps only; formerly had patches.
13	12	" 1½ "	"	Many very rotten stumps that cannot be extracted, but only minute portions broken off. Some pustular spots. Formerly had two large patches.
14	9	" 1½ "	"	Small patches, and black dots; very fragile.
15	11	" 1½ "	"	Very fragile stumps, not to be extracted; some pustules.
16	11	Some years.	"	Bare places, with many very fragile stumps.
17	12	Over 2½ years.	"	Only a few black dots; very fragile.
18	8	" 2 years.	"	An extensive case, and admitted with the disease 15 months since.
19	7	About 1½ years.	<i>Microsporon.</i>	An extensive case, admitted into the school with ringworm 15 months since.
20	10	Over 1½ years.	"	An extensive case, and admitted with the disease 15 months since.
21	10	About 9 months.	"	Admitted with ringworm.

There were about twelve more children with ringworm ; but, as they were isolated with fever, I did not examine them. I also examined thirteen children who had had ringworm, but were cured. Of these—

One child	had suffered with Tinea	for 5 years	before she was cured.
Two children	„ „ „	3 „ „	they were „
Two	„ „ „	2½ „ „	„ „
Three	„ „ „	2 „ „	„ „
Four	„ „ „	1½ „ „	„ „
One child	„ „ „	a few months	before she was cured.

From my old notes in 1895, I know that almost all these cases were large-spore.

SUMMARY.

<i>Megalosporon endothrix</i>	... 18 cases	} 21 examined.
<i>Microsporon</i> ... ..	... 3 „	
Not examined in 1897, but certainly most with large spores	} 12 „	

Total ... 33 out of 144 girls in the school.

Ten or even twenty per cent. is not a very unusual number, when an outbreak occurs in a school of young boys, from the admission into it of an unsuspected case of uncured chronic ringworm.

Thin remarks : “ Ringworm of the head is more common in London than in any other large city. Ringworm in the commoner schools of London has indeed become a great evil, with which it seems hardly possible to cope.”¹

Crocker says : “ In my clinique, it [*Tinea tonsurans*]

¹ *Pathology and Treatment of Ringworm*, p. 21, 1887.

forms 10 per cent. of all cases, or, taking all varieties of it, 13 per cent.”¹

In 1894, Dr. P. Abraham and I (with the kind permission of the medical officer of the School Board for London) carefully examined about six hundred children (boys and girls) of all ages, to see the percentage of *Tinea tonsurans* existing amongst such poor children. We purposely chose two of the most suspected schools in London; and, certainly, containing some of the dirtiest and most neglected children attending the board schools. We only found 3 per cent. of the children with ringworm, but we heard that some were at home with this disease. This result very much surprised us, as we expected to find a much larger percentage. Ringworm may exist, and probably does, in a much larger proportion than this in other elementary schools, but it is certain that we only discovered half as large a percentage as I have done in examining children for admission to Christ's Hospital.

It is difficult to suggest any practical means of lessening the percentage of ringworm that exists, both amongst ordinary school children, and also in the board and elementary schools. For it is very certain no proper examination of all children's heads is possible; and, even if the disease were diagnosed, the children could hardly be kept from school until perfectly free from the complaint, for this, in many cases, would be the whole school life of the children. I feel sure that very many cases of scalp ringworm are never cured amongst the poor, from the impossibility of properly applying remedies in such cases. Besides, *chronic* ringworm, especially scurfy places left after treatment, with some stumps still remaining amongst the long hairs, not producing evident bare places, would not

¹ *Diseases of the Skin*, 1893.

be noticed, or, if noticed, would not be attended to by the parents of such children. When in this condition (especially after treatment for a time, when some new long hairs have grown on the place, though diseased stumps are still to be found), their attendance at a hospital often ceases, and they are sent to school again in a contagious condition.

Therefore, as Thin remarks : "There is in our midst an ever-present source of contagion, and the disease increases and multiplies, to the great detriment of many children, both poor and rich."¹

RELATIVE FREQUENCY OF THE DIFFERENT FORMS.

Sabouraud gives the following as the percentages noticed in Paris :—

Microsporon, about 60 per cent., and *Megalosporon* 40 per cent., of all scalp cases.

Megalosporon endothrix, 72 per cent. of scalp ringworm with large spores, and the *ectothrix* 28 per cent., and—

Megalosporon endothrix, resistant, about 40 per cent., and the *fragile* 30 per cent., of scalp ringworm with large spores.

Megalosporon ectothrix causes about 5 per cent. of scalp ringworm, and 50 per cent. of body ringworm.

Béclère gives 42·7 per cent. for *Megalosporon*, and 57·3 per cent. for *Microsporon*.

Fox and Blaxall estimate the percentage, from their hospital cases, at—*Microsporon*, 80 to 90 per cent., while the *Megalosporon endothrix* is so uncommon at hospitals that it only formed about 4 per cent. of their cases of scalp ringworm, and the *Megalosporon ectothrix* about the same.²

¹ *Pathology and Treatment of Ringworm*, 1887.

² *Brit. Jour. of Derm.*, July—September, 1896.

Adamson gives the percentage in his hospital experience at 96 per cent. for *Microsporon*, and 4 per cent. for *Megalosporon*.¹

My own experience, taken from the last hundred cases I have treated in private practice, shows the percentage to be as follows :—

<i>Microsporon Audouini</i>	...	...	78		78 % small-spore.
<i>Megalosporon endothrix, resistant</i>	...	...	18	} 20	} 22 % large-spore.
" " <i>fragile</i>	...	...	2		
" <i>ectothrix</i>	...	...	2		
Total			...	100	

The difference between the two observations is very easy to explain : Fox and Blaxall's percentages were taken from hospital, and my own from private, practice. I feel very sure of the fact that many of the cases of *Megalosporon endothrix* form of ringworm, especially the fragile and "black-dot" variety, are not noticed when they occur amongst the poor ; for, as a rule, there are no distinct bare places, nor any unsightly appearances. Hence, the parents have no idea the child is suffering from ringworm, but think it is nothing, or simple scurf. The fact is, that many of these cases are not detected till some special cause, such as a rejection at a school examination, brings the child under the notice of an expert.

I feel sure that the hundreds of cases I have rejected at our examinations at Christ's Hospital have shown fully this, or a larger percentage still, of the *Megalosporon* form, especially "disseminated" cases. Again, I would refer to the remarkable outbreak of the *Megalosporon endothrix* form I have already described on p. 51. Such

¹ *Brit. Jour. of Derm.*, July, 1895.

disseminated cases, if amongst the poor, are not noticed, much less taken to the out-patient department or a hospital. But, when there are evident bare places, as seen in the small-spore form, the child is taken to a hospital for treatment, as the disease looks unsightly. This explains, I think, why Drs. Fox and Blaxall saw no cases of the *fragile* "black-dot" form at the hospitals.¹ These cases are not very evident to the naked eye, nor are the *chronic* forms of *Tinea*, which are left after treatment for some time, especially when the patches disappear, and only isolated stumps are left, scattered amongst the healthy hairs.

WHEN IS IT MOST CONTAGIOUS ?

The small-spore is considered to be more contagious than the large-spore ; but, still, the large-spore will easily spread, both in families and in schools (see p. 51).

I believe that ringworm is just as contagious in the chronic forms, so often left after treatment, when it is thought to be cured, as it is when recent.

One of the most important practical questions is whether ringworm is contagious when under efficient treatment ? This question will be noticed in Chapter VIII., under "Isolation." There is no doubt that treatment very greatly reduces the chances of the disease spreading, as the spores on the surface are readily killed by parasiticides.

HOW LONG HAS THE DISEASE EXISTED ?

This is a question often put to the medical attendant, and one extremely difficult, and often impossible, to answer correctly. Sometimes *Tinea tonsurans* runs a very rapid

¹ *Brit. Jour. of Derm.*, July—September, 1896.

course, and many places may form in a few weeks. I know it is possible that a ring the size of a sixpence can develop in forty-eight hours, and increase to the size of a florin in another twenty-four hours, because I have actually seen ringworm grow at this rate. But this is certainly not the usual rate of progress. Ringworm generally develops much more slowly than this, and some weeks usually elapse before the place, or places, are from two to two and a half inches in diameter; yet there is no doubt that a moderate-sized patch may appear in a few days.

On the other hand, it is generally quite impossible to affirm that even a small patch has *not* existed for some long time; for the place may have spread very slowly, and have continued in almost the same condition for weeks, or even many months, especially in the large-spore form (see p. 43). Therefore, it is very unwise to attempt to give a decided opinion as to the length of time the disease *must* have existed, though an experienced observer can often give a fair guess as to the probable age of the case.

Chronic Forms of ringworm can generally be recognised by the description to be found in the following chapter.

HOW LONG WILL IT TAKE TO CURE?

This question, which is of vital importance to parents who wish to get their child rapidly cured in order that he may be able to return to school, is almost always asked; but I strongly advise the medical attendant to be very diffident in giving any definite answer, as some cases, that appear likely to be easily cured, go on for months or even years, while some extensive cases may be rapidly cured.

The time it will take for any given case of scalp ringworm

to get well depends chiefly upon the extent of surface involved, and the treatment adopted.

The rate of growth and rapidity of reproduction are very different in individual cases. If the fungus spread slowly, it indicates only a slightly favourable soil, and it can then, in its early stage, often be quickly eradicated; but, if it spread, and places rapidly develop over the scalp, it is due to the general nutritive condition furnishing a favourable nidus. Then it is most difficult to arrest its course; but still, under proper treatment, ringworm rarely spreads after it is thoroughly taken in hand.

Tilbury Fox remarked, that "ringworm is obstinate in proportion as this or that patient offers a favourable soil in his textures for the growth of the fungus or parasite."

Recent forms of *Tinea* in young children can often be cured in a month or two, and very small places can often be stamped out by energetic treatment; but this happy result is more often the exception than the rule, when ordinary lotions or ointments are employed. Cases of *M. ectothrix* I have usually found to be easily cured; for most of the hairs can be pulled out, and the rest soon loosened by appropriate treatment, as hereafter described.

In a large proportion of children, ringworm is allowed, through inefficient treatment, or no treatment, to spread over a considerable portion of the scalp, and even to lapse into a chronic form, before it is well taken in hand. Then it is very difficult indeed to eradicate.

There is no doubt that very many cases of ringworm are *said* to be cured, and that certificates are given by medical men that children are free, and fit to return to school; but the question must arise, Who has given the certificate? I so constantly see mistakes made, and certificates given, when children are still suffering from ringworm, and

numerous stumps are to be found, that I am always interested in seeing a case *supposed to be cured*, for, as a rule, I easily find some diseased stumps.

By far the majority of rapid "cures"—"quite well in a month or six weeks," "one application quite sufficient," the special drug advised is "a specific," etc.—are simple mistakes in diagnosis; or, as Crocker so well remarks, "*are only examples of unskilled observation.*"

Unless *Tinea tonsurans* is seen in the very early stage, and quickly eradicated, as described further on (especially by the croton-oil treatment), it generally takes *at least* three months to cure; and often, when the disease is at all extensive and chronic, it means six or ten months; and sometimes, in very chronic cases, a year or two may be spent in trying all sorts of different remedies, and, at the end of that time, the disease may be as bad as ever. For the fact that some of the long hairs have grown firmly again on the patch is no proof that the case is nearly cured. It may be as difficult as ever to get well, though the parents have commonly been told that the child is "nearly well," and only requires "a little more treatment."

INCURABLE CASES OF TINEA TONSURANS.

Unfortunately, the disagreeable fact has to be faced, that there are extensive forms of ringworm that cannot be cured by any of the known remedies, such cases being too extensive for the use of croton oil. Fortunately, even these forms generally get well soon after fifteen or sixteen years of age.

The following, I believe, is an unique case. A boy had ringworm at nine years of age. He was under treatment,

more or less, for nine years, and I saw him at the end of that time, just before he left for India—now fifteen years ago—with chronic ringworm. After living in India for seven years, he visited England, and I had the opportunity of seeing, but not of treating, the case. He was then twenty-five years old, and had one distinct patch of chronic ringworm on the top of the head. There were numerous long healthy hairs growing from the spot, and to most people it only looked like a patch of scurf, but, on close examination, very many stumps could be seen saturated with fungus, evidently the large-spore variety. A year ago, after six more years of Indian life, I again examined this gentleman's head, and found exactly the same state of affairs. One place had from fifty to a hundred stumps, and they were very rotten and difficult to get out. Of course, I carefully examined them under the microscope, and found they had the typical characters of the *Megalosporon endothrix, resistant* variety. I could not find other places on the head. He never had had any patches on the body.

I am sorry I had no opportunity of treating this case, as I believe it could easily have been cured with croton oil. I have no doubt he has been able to give this disease to others during the last twenty-four years; but the place is not large enough, or bare enough, to draw attention to it, and it is simply left alone. The curious part is, that it does not spread, but still remains restricted to the one scurfy place. Even in this chronic case, there were no "black dots," tending to show that the *fragile* form is not a chronic variety of the *Megalosporon endothrix, resistant*, but due to a distinct form or species of fungus.

During the last ten years, I have seen many cases that have completely resisted treatment for from five to nine

years. One case was that of a boy who was treated for two years at our junior school, and then was under my care for three more years in London. I tried almost every treatment, including all the new remedies, that are often spoken of as "specifics." The result was unsatisfactory, as no impression was made on the disease. Some years ago, the boy had to leave the school for incurable ringworm, as we have not for some years now kept boys isolated in our infirmary for treatment (which we did in former years), if they happened to contract the disease in any way after their primary admission into the school.

About a year after this boy's discharge, he was brought to me to be examined again, as his medical attendant considered him to be cured, and had given a medical certificate to that effect. Yet, on examination, I found his scalp simply saturated with chronic ringworm, with numerous patches covered with a mixture of long healthy hairs and broken-off stumps, which, when examined under the microscope, were found to be full of "fish-roe" looking fungus, of the *M. endothrix, resistant* form; and this after six years of continual treatment, with all the most active and best known parasiticides for this disease! Such cases appear—with all our recent knowledge of the different species of fungi—to be utterly incurable, until kind Nature takes them in hand about puberty, when, without treatment, they get well.

In the last chapter, I mentioned the case of a girl who had Tinea for four years before I first saw her four years ago. That is, she has had ringworm for eight years, though under constant treatment the whole time! It is a case of *Megalosporon endothrix, resistant* form; and, though almost cured three times, it has suddenly spread each succeeding spring, from one or a few isolated

stumps.¹ During the last twenty-five years, I have many times noticed that chronic ringworm may remain quiet during the winter, and suddenly spread in the spring.

Bald, "black-dot," and disseminated ringworm (large-spore) can usually be more easily cured than extensive forms of *Microsporon*, because, inasmuch as there are usually no large places, but a number of small ones with isolated stumps, and groups of stumps, the croton-oil treatment can be readily adopted.

Tinea circinata, or body ringworm, affecting parts not having deeply rooted hairs, is generally cured in a week or two by most simple parasiticides ; but, in some cases, especially in *eczema marginatum*, and in tropical cases in adults, it takes a considerable time to thoroughly eradicate the disease.

¹ This case is now free from stumps.

CHAPTER III.

TINEA TONSURANS: DIAGNOSIS—CLINICAL AND MICROSCOPICAL CHARACTERS.

POSITION FOR EXAMINATION OF THE HEAD—RECENT RINGWORM—DIAGNOSIS OF *TINEA TONSURANS*—STUMPS—MICROSCOPICAL EXAMINATION OF STUMPS—THE CLINICAL AND MICROSCOPICAL CHARACTERS OF THE DIFFERENT VARIETIES—SMALL-SPORE *TINEA*: *MICROSPORON AUDOUINI*—LARGE-SPORE *TINEA*: *TRICHOPHYTON MEGALOSPORON ENDOTHRIX*, RESISTANT: *TRICHOPHYTON MEGALOSPORON ENDOTHRIX*, FRAGILE—BLACK-DOT RINGWORM—*TRICHOPHYTON MEGALOSPORON ECTOTHRIX*—PUSTULAR RINGWORM—KERION—BALD *TINEA TONSURANS*—SMALL CHRONIC SPOTS—DISSEMINATED RINGWORM—DIFFUSE RINGWORM—DIAGNOSIS OF RINGWORM THAT HAS EXISTED SOME TIME—GENERAL DIAGNOSIS.

THERE is no disease of the skin in which so many mistakes are made in diagnosis as in ringworm of the scalp. When the results of such errors are considered, it is surprising that all medical men, who at any time may be called upon to give certificates, or to treat ringworm, do not thoroughly acquaint themselves with the simple facts concerning diagnosis, and also with the exact condition which constitutes "a cure" of this most troublesome of complaints.¹

Errors are very frequently made, and children with well-marked *Tinea tonsurans* are often certified by medical men to be cured, and not to be suffering from any *contagious*

¹ See my letters in *The Lancet*, February 27th, 1886, and June 4th, 1887.

complaint, and, therefore, returned to schools, when they are, in fact, suffering from chronic ringworm, which is certainly very contagious.

The several forms of Tinea are often to be diagnosed, when recent, and untreated, by the naked-eye appearances, and will be separately described ; but, for simple diagnosis—*viz.*, whether a child has or has not ringworm—it is not at all necessary to distinguish between them. There are definite signs by which any one can tell whether a child has or has not this disease, so that no mistakes as to diagnosis ought to be made by medical men.

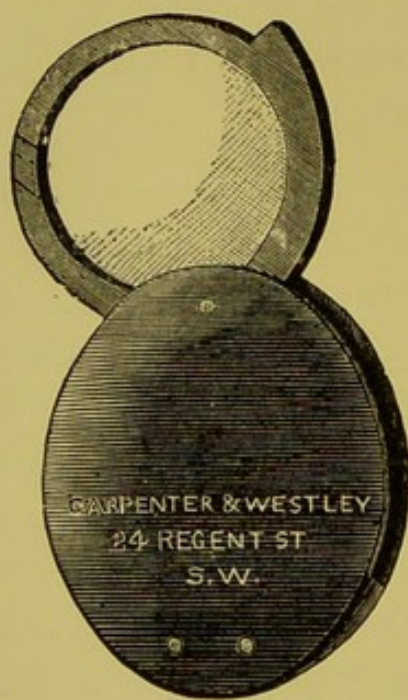
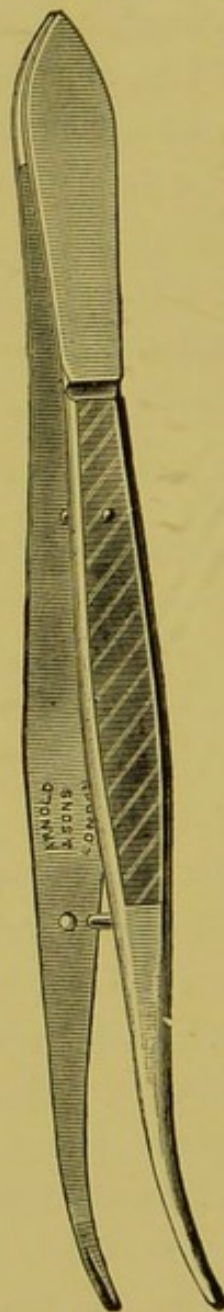
POSITION FOR EXAMINATION OF THE HEAD.

Before attempting to examine the scalp of a child suspected of having ringworm, it is essential for the examiner to have a proper lens (Fig. 1), and to stand or sit near a window with a good light (not direct sunlight), which should be on his right hand. One of the best ways is for the medical man to sit well back on a wide-seated chair, so as to leave a space on the front part of the chair for the child to sit, with his or her back towards the examiner.

Then, if a boy, beginning at the top of the back part of the head, and working round the entire scalp, the hairs should be turned upwards—the wrong way, *viz.* in the reverse way to the normal direction of the hair—with a pair of forceps (Fig. 2), comb, or the fingers, so as to expose the whole scalp little by little. Any uneven or broken-off hairs will stand out, and be easily observed, even with the naked eye.

But, if the patient be a girl with long hair, both hands should be used, and the hair turned over and over until the whole scalp has been minutely examined.

When the whole of the back and the sides of the head have been seen, the patient can kneel on a footstool with the face towards the medical man, or both can stand up, while the hair on the front part of the head is turned over

FIG. 1.¹FIG. 2.²

¹ The lens should have a focal length of two inches, and can be obtained of any optician.

² These forceps (Aldersmith's) can be obtained of Messrs. Arnold & Sons, Smithfield, E.C.

in the same manner. All scurfy or suspicious places should be closely scrutinised with a lens.

These minutiae are mentioned, as much time may be saved in examining a school, if a proper method be pursued.

It takes some little time to thoroughly examine a child's head, especially if a girl; and, certainly, no certificate should be given that a child is free from ringworm, unless the whole scalp has been thoroughly inspected, and no trace of the disease detected.

It is a great mistake to think that ringworm of the scalp usually presents itself to the medical practitioner as a red scaly spot, with raised edge, and of a decided ring-like form, almost destitute of hairs. The appearance of ordinary ringworm of the skin (except in very young children, and at times with the *Megalosporon ectothrix* form) is very rarely seen on the scalp.

Recent Ringworm.—At the earliest stage of the disease (small- and large-spore), there is commonly only a small, scaly, circular spot, containing, perhaps, hairs more brittle than usual (see p. 14). But it is rare for a child to be brought to a medical man before one or more hairs are broken off. In the *Megalosporon ectothrix* variety, there is a distinct scaly red spot, often followed by some inflammation, and even pus.

With regard to position, the first patch of Tinea is generally detected on the parietal region, or the vertex. It is sometimes seen in the front of the head, but rarely low down at the back of the scalp.

At times, attention is first drawn to the nature of the case by the child scratching its head; or a partly bare spot may be noticed by the hair-dresser or the nurse.

The special characters of each form will be described later on.

DIAGNOSIS OF RINGWORM.

The Patches may vary in number from one spot, the size of a split pea or less, to very many over most of the scalp. They are rarely larger than two inches and a half in diameter, unless formed by two or more places coalescing into extensive areas of disease. The patches are more or less circular in shape, and *non-symmetrical* (*Alopecia areata* is often symmetrical). They increase in size by extension at the circumference. At times, they are not circular, but of irregular gyrate outline, by the coalescence of the patches. Rarely, a little pus forms from irritation of the fungus, and it may mat the hair together, and form crusts.

A *typical patch* of common small-spore ringworm is usually a well-margined one, with most of the hairs lying one way and easily breaking off, leaving numerous broken-off hairs or "stumps." The part looks as if "nibbled." This appearance is very distinctive, and should never be mistaken, as it often is, for seborrhœa or eczema.

It is important to remember that when *Tinea tonsurans* is seen in a very early stage, the places resemble the scaly spots seen on the glabrous skin. There may be no stumps, and the hairs often look quite healthy; but the place is scaly, and may be thought to be only scurf. If the hairs are pulled, they may all come out; but, as a rule, some break off, leaving "stumps."

A network of mycelium is always present in the scaly spots before the hairs get involved. Therefore, the only way to diagnose ringworm, before the hairs break on attempted epilation, is to scrape the scaly spots, and to examine the epidermic scales under the microscope for the

fungus, or to find some fungus on or in a hair extracted from the suspicious place.

Children who are exposed to ringworm (as brothers and sisters, or children in a school where a case has been detected) ought to be carefully examined twice a week, and any small scaly spots recognised as early as possible, as the affection can then be easily cured by epilation, and some strong parasiticide.

I have known such a case brought under the notice of a medical man, who has only laughed at the idea of the spot being ringworm, and has advised no notice to be taken of it. Thus, the most valuable time for treatment has slipped away; for the most important thing of all, in treating ringworm, is to prevent the disease from spreading directly it is detected.

There is generally some itching of the surface, and this may be one of the first symptoms of Tinea. Ringworm generally spreads, if not properly treated in the early stages (as is so commonly the case), so that the spots enlarge, and more places form near, and even on distant parts of the scalp.

Stumps.—A mistake is sometimes made as to the meaning of the term "stumps." Healthy short hairs from previous cutting or shaving, taken from a treated patch, and even good hairs, half an inch long, have often been sent to me as "stumps," to be examined for fungus. It is probable that such hairs are also sent to well-known institutions which offer to examine ringworm hairs.

The term "stumps" should be restricted to *diseased* short hairs, broken off near the surface of the skin, only about an eighth or a quarter of an inch long. They are thickened, and lustreless, and *usually break off* on attempted

epilation, instead of coming out with entire and atrophied roots, as the stumps do from *Alopecia areata*. Sometimes they are so short that it is extremely difficult to remove any portion of them for microscopical examination ("black-dot" form). They are always more or less impregnated with the fungus, and this it is which renders them so fragile.

Stumps in *chronic* cases are, at times, extremely difficult to find, as they may be hidden amongst the long hairs on a scurfy patch, or under a little scale or scab.

When few in number, the best way to detect them is to have a good lens, and a pair of fine-pointed forceps (*vide* p. 66), and then, in a good light, to most carefully examine any scaly or sebaceous spot (pulling away with the forceps any slight scab or scale), and look for stumps under any crust, or even adhering—broken off—to the under surface of the removed scab.

On carefully seizing the projecting stump with the forceps, and using gentle traction, it may come away entire; but it will usually break off a little way down the hair-follicle, about a quarter of an inch in length, at the junction of the shaft with the neck of the bulb, or above it, leaving the bulb and some part of the shaft behind.

It is this short portion of the broken-off hair (if a whole stump cannot be extracted) which should be microscopically examined for the fungus.

At other times, the stumps, instead of sticking up, may be found lying close on the surface of the skin, looking dull and thickened, and often of a lighter or yellowish colour, and sometimes even glued on to the scalp with sticky sebaceous matter. They may also be seen, in chronic cases, like a corkscrew; perhaps matted down with a little sebaceous substance; so that, when that is removed,

a regular corkscrew stump springs up. They even, at times, lie on the surface in this peculiar shape.

MICROSCOPICAL EXAMINATION OF STUMPS.

In extracting stumps, they should be pulled very gently indeed, in the axis of their growth, and removed, if possible, with the bulbs, with a pair of finely pointed forceps, with the assistance of a magnifying glass, and should be placed in a drop of liquor potassæ,¹ which has previously been placed on the centre of a clean glass slide. The thin cover-glass should then be *gently* applied, and the specimen left, if there be time, for an hour or two, in order to make it more transparent; but, for ordinary examinations for diagnosis, it may be examined at once. Prolonged soaking for from four to twelve hours disintegrates the hair substance, and brings the fungus, especially the mycelium, fully in view, and it may be examined from time to time, as it gets more and more transparent.

If the specimen be required for diagnostic purposes only, the cover-glass may be gently pressed down before placing under the microscope, in order to compress the stumps, and spread out the "collarettes," if present. Any excess of liquor potassæ at the edge of the cover-glass should be removed with a piece of blotting paper.

The stumps, when in liquor potassæ, may be gently heated (as advised by Sabouraud and others), to render the fungus more quickly visible; but this is less efficient than waiting a few hours, as the hot liquor potassæ is apt to destroy the mycelium. In fact, examining in this manner, and with very strong liquor potassæ, Sabouraud and others

¹ B.P. strength (about 7 per cent.), and not strong liquor potassæ, as first used by Sabouraud, which is both unnecessary and harmful.

at first failed to find the mycelium in the small-spore form.

The liquor potassæ (B.P.) dissolves some of the fatty matter, renders the hair more transparent, and brings the fungus clearly into view; while strong liquor potassæ destroys or renders the mycelium invisible, especially the typical fringe of mycelial threads near the bulb. At times, there is so much fatty matter present, that it is desirable to wash the specimen in ether before placing it in liquor potassæ.

If it be desired to mount and keep the specimen, it should be first soaked for about six or eight hours in liquor potassæ, and then very carefully washed *in situ* by minute drops from a small pipette, first of distilled water, then of equal parts of spirit of wine and water, and lastly of ether. Finally, when the ether dries and leaves no stain on the slide, a minute drop of Canada balsam in *xylol* can be dropped on, the cover-glass applied, the specimen very gently warmed, and left to dry. I have mounted and preserved excellent specimens this way. Those I exhibited in 1895 were so mounted.¹

¹ *Brit. Jour. of Derm.*, Aldersmith, March, 1895.

Jamieson, in order to avoid error in measuring the size of the fungus, advises the following plan:—

“Several of the suspicious hairs are placed on a slide with a few drops of liquor potassæ. The slide is next warmed over the flame of a spirit lamp for twenty seconds, and the hairs at once thereafter transferred to a watch-glass containing distilled water. From this they are conveyed to a fresh slide on which a drop of glycerine has been placed, and a cover-glass laid on. This renders the parasites plainly conspicuous, and the specimen can be preserved.”—*Diseases of the Skin*, p. 555, 1894.

Personally, I much prefer the other plan, as the heat often destroys the mycelium; and it is difficult to demonstrate it inside the shaft in the *Microsporon* variety, when mounted in glycerine. Such demonstration is easy enough by the method I have advised above.

Great care should be taken to obtain a *diseased* stump, or, what is more usual, the upper broken-off portion of such stump, and not to remove any short cut-off hairs from the circumference of the suspicious place : which hairs, of course, have no fungus upon or in them.

It is advisable to magnify the specimens from three hundred and fifty to nine hundred diameters. Stumps often appear opaque, if examined too soon after being placed in liquor potassæ. Sometimes they are of a reddish-brown colour, but, after two or three hours, they become transparent. Often the form of fungus can be diagnosed before the stump is examined, as the "collarette" in the *Microsporon* form gets pressed out on either side of the stump, and looks whitish to the naked eye.

In former editions, the general characters and microscopic appearances of ringworm were given as if one, and only one, form existed; but now it is necessary to describe separately the different varieties, both *clinically* and *microscopically*.

SMALL-SPORE TINEA (*Microsporon Audouini*).

Clinical Appearances.—The places vary in size and extent (see p. 68). In this form—the commonest—if the patch or patches be untreated, they are usually round or oval and distinctly circumscribed, having a distinct marginal appearance, more or less bare, and sometimes of a greyish or almost slaty colour. Sometimes, in young children, there is a distinct red ring at the circumference. The scalp is often slightly raised above the surface of the surrounding skin, and the follicles appear too prominent, the skin having the appearance of *cutis anserina*. The surface is covered with fine, dry lamellated scales, giving the place

a dirty scaly appearance, and, here and there, slight crusts may at times be observed.

Small asbestos, lustreless, sheath-like coverings, of a dull white or grey colour, and composed chiefly of innumerable small spores, more or less surround the bases of the stumps.¹

This powdery sheath is found on the shaft, adhering to the hair, both within the follicle and just after emerging from it; and, at the surface of the epidermis, is what is called a *circumpilar collarette*. Hundreds of these collarettes lying closely together give a white frostlike-looking surface to the skin. These sheaths are not so clearly seen in light-haired children.

The hairs are generally all diseased on the patches in recent cases, and lie in one direction, without any elasticity, and, if pulled, generally break off. Thus, by degrees, most of the hairs get broken off at different lengths, while those remaining usually break off on the slightest traction, but some may come away with the bulbs.

The diseased hairs are whitish and lustreless, and look as if covered with a fine white dust. As the majority of the hairs are broken off short, as if they had been nibbled, the part assumes a stubble-like appearance. If the places have been treated, the scaly appearance disappears, the stumps may be very short from rubbing in remedies, and the collarettes are not so visible.

When under treatment, especially by soaking and rubbing, the places are seen to have many white stumps on them; but the skin is clean, and even looks somewhat bare to the naked eye. Parents often think the case is very

¹ Frederick Taylor gives from 15 μ to 29 μ as the thickness of the parasitic sheaths, inside the follicles, taken from his sections (*Brit. Jour. of Derm.*, April, 1896).

much better, or nearly well, because the places look so bare and "healthy"; but, with a lens, numbers of short, fine whitish stumps may still be seen.

The hairs may even be matted down with sebaceous matter, or twisted at times like little corkscrews, under small scabs. In time, especially after treatment, many of the hairs grow again, and thus numerous stumps are found mingled with long and healthy hairs, and the case is often thought to be cured. I have seen, though very rarely, the places get quite bald and bare, even with club-shaped stumps (!), closely simulating *Alopecia areata* (see Chapter XII.).

Pustular Forms.—Sometimes a little eczema is set up, even with crusting. Very rarely, even in this form, pus may form; but pus formation is much more common in the *Megalosporon ectothrix* variety; yet I cannot agree with Sabouraud that it is always due to this fungus, or that kerion cannot be caused by the *Microsporon*.

Even the small-spore may cause pustules, something like impetigo: the pustules burst, and the disease may rapidly spread over the scalp. I have seen small-spore *Tinea* go on to kerion; and Fox and Blaxall, and Adamson, in their papers, affirm the same. The former say, "It seems clear, from this case, that the kerion type of scalp ringworm may be associated with *Microsporon*, and that Sabouraud's teaching to the contrary is too dogmatic"; while the latter remarks, "In many cases [of small-spore], the actual kerion existed at the time of examination. This is distinctly contrary to Sabouraud's views, who states that kerion never occurs in the small-spore type."

A pustular and spreading ringworm must not be confounded with simple *impetigo contagiosa*. The microscope

will decide the diagnosis, and also the form of fungus causing the trouble.

Recent cases of ringworm, when placed under ordinary treatment, may take on this pustulating form; but this is a rare complication.

One of the severest cases of spreading pustular ringworm I have ever seen came on suddenly (without treatment), and commenced on a patch of chronic ringworm, which had been quiescent and untreated for six months. In a week, the head was covered with pustular ringworm, which spread even to the face and body.

As this case occurred many years ago, I cannot tell absolutely that it was the small-spore form; but from the fact that it had been an ordinary case of scaly dry ringworm for months before, suddenly taking on this pustular form when the child was out of health from improper feeding, I do not think it can have been due to the *M. ectothrix* variety, which would probably have caused some dermatitis long before.

The Stumps are rather long, from about five to seven mm. beyond the follicles, and sometimes much longer, and generally of a whitish-grey or light yellowish colour; they are thickened, dull, dry, opaque, and brittle, easily breaking off if pulled with the forceps. Some of the hairs are twisted, or bent at an angle, after emerging from the follicles. This bending of the hairs may be due to a partial breakage, while the complete fracture leaves a stump. When the hairs are bent, they do not spring back, like healthy hairs, having lost their elasticity. At other times, shortened, irregular, twisted-looking hairs may be seen, sometimes lying flat on the surface of the scalp, easily breaking when pulled. They may be dark in dark-haired

children. The stumps have the white coating for about three mm. beyond the follicles, and they look chalky in the intra-follicular part.

Microscopical Characters (*Microsporon*).—If a stump be removed with the bulb, and placed as described on a slide under the microscope, the most conspicuous object is the spread-out mass of conidia, which forms the parasitic sheath, and which is seen heaped together on either side of the compressed stump, and also spread over the surface of the hair, like so much fish-roe (see Plate I.). This mass is due to the collection of conidia between the hair-shaft and the inner root-sheath. If the case be untreated, the mass of conidia may also be seen on the aërial portion of the hair-shaft.

The chief characteristic of this form of *Tinea* is the mass of innumerable small *round* spores, which are not arranged in filaments or linear series, or in the distinct bands or strings of beads that are so clearly seen in the large-spore varieties ; but the conidia lie one against the other, without any definite arrangement, forming a mosaic by mutual pressure.

These conidia are *circumpilar*, and, if removed, the surface of the hair is seen to be distinctly eroded ; and, here and there, small cracks may be noticed in the upper portion, showing how very fragile the diseased hair has become.

Fox and Blaxall remark : “ Further, if a papillary hair, with such a long mosaic spore-sheath, be extracted entire (the root-sheath does not come away, as a rule, unless the scalp is inflamed), the bulb is generally seen to present columns of spores on its surface, which gradually become more numerous and grouped, and merge into the dense

mosaic sheath. It has occurred to us, as to Adamson, that these columns on the bulb might be thus arranged during the extraction of the hair. However that may be, the arrangement described is very frequent and characteristic."¹

As the higher portions of the hair are examined, the spore-sheath stops by degrees, leaving masses of spores in irregular groups, getting less and less, with many single spores and scattered portions of mycelium (see Plate I.).

Lower down, nearer the bulb, mycelial threads can be detected in a network on the shaft, and also in the substance of the hair. The mycelium ends at the neck of the bulb, at its junction with the root-stem, in a *long terminal fringe* of delicate threads, branching at times, and with ovoid endings, very characteristic of the *Microsporon* (Plate I.). This fringe is below the sheath of spores, and "appears to be situated in the hair substance" (Fox and Blaxall).

By careful focussing, if the specimen be transparent, the mycelium can easily be seen as minute threads, branching, and infinitely ramified, running up beneath the sheath of spores, and also in the whole substance of the hair, when the spore-sheath is carefully removed. They pass upwards in the hair-shaft, more or less parallel to its axis. If the spores be removed, or the shaft above them be examined, the hair will be found to be eroded, from loss of the cuticle; and though, at first, it may appear to be free from fungus, the mycelium can easily be seen as fine threads, after soaking for some hours in liquor potassæ. It fills up the substance of the hair-shaft,² and is seen to

¹ "Plurality of Fungi causing Ringworm," *Brit. Jour. of Derm.*, July—September, 1896.

² Sabouraud, at first, denied the presence of the mycelium in the

have septa at long intervals, with a few mycelial spores at the ends (Plate I.).

The hairs usually break off above the neck of the bulb, leaving the fringe of mycelium behind ; and it is curious that this long fringe-ending has not been described in Paris.

If the broken end of the stump be examined, it will generally be seen to be swarming with conidia from the broken sheath, with the end more or less frayed out ; and mycelium-threads may often be observed coming out of the substance of the shaft. I have also torn the hair, while in liquor potassæ, when mycelium was easily to be seen, like minute threads, coming out of the hair-shaft (clearly showing its *intrapilar* position), as well as on the eroded surface of the hair. In fact, the mycelial threads infiltrate the whole shaft of the hair, from the fringe at the root to the distal end.

With regard to the position of the mycelium, Frederick Taylor says : "The shaft of the hair is diseased throughout," and "its substance is filled with mycelium-threads." He gives some drawings of his sections showing this, and the threads "distributed uniformly through" the hair. He also thinks that "sometimes, if not always,

Microsporon ; and in the description given by Wickham of Sabouraud's views, in the *Brit. Jour. of Derm.* for October, 1894, it was stated that "the absence of mycelium" is one of the "characteristics of this form of Tinea" (small-spore). I showed the fallacy of this statement (see the *Brit Jour. of Derm.*, March, 1895), and maintained that mycelium was easily to be detected by simply letting the stumps soak for some hours in cold liquor potassæ.

Sabouraud, in 1895, also published a paper, *Diagnostic et Traitement de la Pelade et des Teignes de l'Enfant*, acknowledging that the hairs are filled with fine mycelium ; but he gives an elaborate method of preparing the hairs, which is quite unnecessary, as it is easy enough to find them by the above method.

the mycelium-threads invade the hair-shaft from surface to centre.”¹

In examining a specimen in the ordinary way, many conidia in groups and masses are generally seen floating about the field, together with oil globules, epithelial cells, and *débris*. The little masses of regular-sized and small circular conidia, generally more or less compressed at their sides by mutual pressure into irregular hexagonal shapes (see Plate I.), with a double contoured outline and nuclear contents (under a high power), show the specimen to consist of fungus, and not to be simply fat globules.

Often, in cases not under treatment, masses of fungus elements are removed that require teasing out with a pair of needles, before the conidia can be distinctly observed under the microscope.

The Conidia (*Microsporon*) are distinctly round, but sometimes slightly oval, getting polyhedral in shape from mutual pressure. They vary slightly in size, generally from $2\ \mu$ to $2.5\ \mu$ in diameter,² while those seen in the *Megalosporon* form are from $3\ \mu$ to $6\ \mu$. Whence it is to be noted, that the largest seen in the *Microsporon* are smaller than those to be found in the *Megalosporon*.

They are often distinctly nucleated (double contoured), and are composed of an outer envelope of cellulose, and an inner membrane or utricle, enclosing granules and a liquid. They are not destroyed by the action of liquor potassæ, ether, or chloroform.

The Mycelium (*Microsporon*) is composed of transparent,

¹ *Brit. Jour. of Derm.*, April, 1896.

² F. Taylor gives the size from $2\ \mu$ to less than $2.5\ \mu$, *Brit. Jour. of Derm.*, April, 1896; while Adamson says, from $2\ \mu$ to $3\ \mu$, *Brit. Jour. of Derm.*, July, 1895.

pale greyish, sharply contoured threads, with edges, about $2\ \mu$ in diameter, somewhat parallel, but often bulging here and there, and more irregular in shape and size than that of the large-spore, and sometimes serpentine in form (see Plate I.). It is branched in a forked manner at times, and the tubes are jointed at irregular intervals with real dissepiments. The septa contain granules and cells, and the mycelial threads often terminate in mycelial spores. In this variety, it will be seen that the mycelium does not run so parallel with the axis of the hair, as it does in the large-spore variety (compare Plates I., II., and III.), and it is found more irregularly scattered in the substance of the hair than in the large-spore form, and directed irregularly towards the sides of the hair-shaft. The mycelial threads involve, not the whole bulb, but only its neck, as before described.

Patches on Body.—The *Microsporon* may cause small places on the body (see p. 21). They are usually small scaly places, about the face and neck, or shoulders; and Adamson mentions cases “in which the body lesion consisted of a well-marked, red, raised ring, generally about three-quarters of an inch in diameter, but frequently much larger.”

Such spots are also sometimes seen on the mothers or nurses of the children.

Adamson also says that, “in those cases where the body lesions had passed beyond the small scaly patch stage, the glabrous hairs were found to be attacked by the parasite in the same manner as the hairs of the scalp.”¹

Mycelial threads can easily be detected by scraping the scales, and examining them under the microscope (see Chapter V.).

¹ *Brit. Jour. of Derm.*, July, 1895.

Diagnosis.—For simple diagnostic purposes, if the typical conidia are detected, it is not necessary to find the mycelial threads, as the masses of small, circular, circumpilar conidia, compressed into a mosaic, are quite characteristic, with the eroded hair denuded of its epithelium, and with its cross fractures.

LARGE-SPORE TINEA (*Trichophyton megalosporon endothrix*).

Clinical Appearances.—In both varieties (*resistant* and *fragile*), the surface of the skin is generally much smoother than in the *Microsporon*, and sometimes it is quite clean and healthy-looking, with only the broken-off hairs or stumps to be seen. There are no circumpilar collarettes, or white parasitic sheaths, to be found, as in the small-spore form; and no “frost-like” look of the skin.

Microscopically, this form is easily diagnosed by the large size of the mycelial spores, and by the *ladder-like* or *bead-like* arrangement of the chains of spores, and especially by their intrapilar position.

TRICHOPHYTON MEGALOSPORON ENDOTHRIX, RESISTANT.

Clinical Characters.—The places may vary in number from one very small place to many, scattered over most of the head; and in some rare and chronic cases the disease extends almost all over the scalp. Auto-inoculations are very common, so that the disease usually spreads before it is noticed. The patches are generally much smaller than those seen in the small-pore form, but large places may exist, with numerous stumps *scattered amongst healthy hairs*. I have often seen single places of this form, especially when it has spread in a school, or to other members

of the family. If the places are small, and stumps and groups of stumps are scattered about in all directions, it forms what I many years ago (1880) called *disseminated ringworm*, and there may be "black dots," from rubbing down of the stumps.

Although the places are often bare, smooth, and healthy-looking, as above mentioned, I have found the scalp to be scaly, especially if the case has been treated; and more often I have noticed some sebaceous-looking matter. This, as well as the typical broken-off hairs, may call attention to the places. In fact, the *resistant* form is sometimes thought to be only seborrhœa.

I have for many years drawn special attention to this variety of ringworm, though I did not think it was due to a distinct species of fungus. It is a form constantly overlooked, and very often there are no distinct patches to be seen, but only small places with a few stumps, groups of two or three stumps, and isolated stumps and black dots scattered about.

The "black dots" may be seen in this form of ringworm, but they are not so common as in the *fragile* variety. Fox and Blaxall also remark: "In one case, there was a striking proportion of black dots, but in no other respect was there any correspondence with the peladoid form."

The Stumps (*Megalosporon endothrix, resistant*).—The stumps are generally found mingled with healthy long hairs; and they are usually erect, broken off very short, coarse and swollen, and dark in colour. They are often found at some considerable distance from each other, with many normal hairs growing between them (*disseminated ringworm*). Hence, this form is so often overlooked and thought to be only scurf or seborrhœa. The stumps, though

generally short and erect, are sometimes very long, and even lying on the surface of the scalp, glued down with sebaceous matter. They may also be found lying under scales or small scabs. In light-haired children, they are not dark, but of a yellowish colour.¹

On attempted epilation, the stumps, which are very fragile, easily break off just inside the follicles. This generally occurs with a slight, but distinct, click. At times, a whole stump with the bulb may be pulled out, especially if the hair be not much involved.

I have seen, but very rarely, the long, and apparently healthy hairs, which come out with entire roots without breaking, to be slightly involved with the fungus. I have found only a few ladder-like threads, running down towards the bulb, and up the inside of the hair for some considerable way, but not involving the distal end. These long hairs had evidently been attacked very slightly by the fungus (under parasiticides), which had not caused them to become brittle, and to break off. Therefore, if such diseased hairs exist, it is most difficult to detect them, and to get the case well; for, if left, they in time get more involved, and break off. Again, a child may appear to be quite well, and be free from stumps, and yet the fungus may exist in the long hairs. I specially noticed this in the case mentioned on p. 31 (seven years' duration), where, for some months, I found a few of the long hairs diseased, and had very great difficulty in removing them all.

In practice, even skilled eyes may be deceived, as all

¹ Thin remarks: "In dark-haired children (as in black horses), when the hairs have been long affected by *Trichophyton*, we sometimes find, on splitting the hairs with strong solution of potash, that the mycelium is loaded with pigment."—*Pathology and Treatment of Ringworm*, p. 43, 1887.

sorts of conditions may be seen, especially if the case has been treated for some time. The stumps may even be rubbed down quite level with the skin, and look like so many black spots—though this is not so common in the *resistant* form. It is always advisable to use the microscope to decide which variety of fungus is present.

Microscopical Characters (*Megalosporon endothrix, resistant*).—There is no special mass of conidia heaped up round the shaft (parasitic sheath); therefore, no opaque mass of spores is spread out on the side of the stump when the cover-glass is pressed down (Plate II.).

If a hair, only lately infected, be examined, strings of jointed mycelium will be seen outside the hair, and also entering its substance at the upper portion of the follicular part, and then passing downwards towards the bulb. Often, only a few threads will be observed inside the hair, instead of the whole substance being more or less infiltrated, as observed later. In time, the fungus is to be found ramifying outside the hair-shaft, situated between it and the inner root-sheath. Therefore, around the shaft, groups and chains of mycelial spores may be seen forming a slight "sheath." Adamson says: "These external elements vary considerably in size and appearance from square or rectangular 'joints' arranged in chains (each joint from 2 to 4 μ , or more, across), passing through all stages to round refractile 'spores' of about 6 μ in diameter."

The attack is similar to that in the small-spore. The fungus first invades the hair from the outside, and sends filaments down the hair-shaft (see p. 10). Later on, the fungus grows and multiplies rapidly inside the hair.

On examining an ordinary stump, the mosaic of small round conidia is absent; but, *in the root-shaft*, long chains

of mycelium, with transverse septa, are to be found, branching dichotomously towards the bulb; and, as they pass downwards, the threads get longer, and finally form a network, and end as a fringe at the junction of the neck with the soft bulb, situated just inside the cuticular lining of the shaft, something like the fringe seen in the small-spore, but not having such long threads (compare Plates I. and II.).

Above the fringe, the mycelium can be seen passing up the hair-shaft, and can be traced upwards for some distance, at times as plain mycelial threads, but usually more or less divided up. The mycelium does not branch so much as in the small-spore form, and runs more nearly parallel with the axis of the hair. These bands of mycelial spores are often packed very closely together, side by side, in the substance of the hair. They branch dichotomously at times, by large wedge-shaped cells giving off two mycelial spores instead of one (see Plate II.). In rare instances, the offshoot passes backwards, instead of forwards. The plain threads generally end in long strings, or bands, of short septa or mycelial spores, jointed end to end, at distances which are more or less the diameters of the tubes.

These divisions are distinctly doubly-contoured, almost square, forming a band, with a distinct septa, like *the staves of a ladder*, rather than a string of beadlike-looking spores, as seen in the *fragile* variety. These "ladder-like" bands are most characteristic (see Plate II.), and they do not break up in liquor potassæ, as in the *fragile* variety. They are distinctly quadrangular in shape, rather than round, as seen in the *fragile* form, but some of the spores are rounder, or oval.

Practically, no mycelium is seen on the outside of the hair beyond the hair-follicle, except from bursting of the hair.

The hairs are not eroded, and the epithelium can be seen very clearly on the sides of the specimen, looking like so many minute tiles overlapping one another (see Plate II.), while this appearance is lost in the small-spore form. Sometimes there is a "fish-roe" look of the masses of conidia, much like the *fragile* variety; and Fox and Blaxall say, that, in one specimen of the *resistant* form, they found the spores packing the hair, and resembling a bag of nuts, as described by Sabouraud in the *fragile* variety. I have seen this very marked in chronic cases (see p. 32).

The Mycelial Spores exhibit a larger variation in size than the small-spore, from 3 to 6 μ , and the shape is essentially quadrangular (see Plate V., Fig. 3).

The Diagnosis is easy enough under the microscope, by finding the "ladder-like" bands of mycelial spores *inside* the hairs, and the epithelium intact; and, from the *fragile* variety, by the bands of sporulated mycelium not disintegrating in liquor potassæ, and not having the typical "bead-like" form (see Plates II. and III., and p. 90).

Patches on the Body.—Small places on the body are fairly common, if the case be untreated; and they are sometimes seen on the attendants. I remember one case where there was a distinct patch on the cheek of the father of a child with this form of Tinea, and I particularly noted that the fungus did not involve the hairs of the beard. This bears out the view of Sabouraud, who maintains that parasitic sycosis is always due to the *ectothrix* form.

The places on the body are scaly, red, raised patches (see p. 22), and mycelial threads and septa are easily detected under the microscope in scrapings from the place (Plate V., Fig. 1; also see Chapter V.).

TRICHOPHYTON MEGALOSPORON ENDOTHRIX, FRAGILE.

Clinical Characters.—The patch or patches are more or less rounded, and vary in size as in the previous form. Numerous secondary inoculations of the scalp are common ; therefore, there are usually many small places, and also isolated stumps and *black dots*. As a rule, the skin over the places is more or less smooth and clean, and some forms of this variety have probably been described in former times as “bald ringworm.” Sometimes no distinct patch can be seen ; but numerous groups of stumps, and isolated stumps, scattered over the scalp, can be detected with a lens. The diseased hairs are often at considerable distances apart. I described this condition in former editions as “black-dot” and “disseminated” ringworm. It is a rare and a very chronic form, often not discovered by the parents till some accident brings the case under the notice of a skin physician. Hence, these cases are rarely seen in the out-patient departments of hospitals.

These smooth and bare places have, I think, at times been mistaken for *Alopecia areata*. And, as hairs have been found with fungus on them, it has given rise to the opinion that *Alopecia areata* is in some way or other due to ringworm. This important matter will be fully discussed in Chapter XII., on Alopecia.

Very rarely indeed has this form of ringworm been found on the scalp in the adult.

The Stumps.—As a rule, the hairs are broken off very short—almost on a level with the skin—so that the broken extremities look like so many “black dots” or points ; or they may be incurved in the follicles. Therefore, the places often look bare and healthy, with many black points on

them, like comedones.¹ Most of the stumps in this form are very dark, often quite black—hence, the term “black-dot” ringworm. It is most difficult to get any portion of them away for microscopical examination, especially if the case has been treated and rubbed. Even if a minute portion of the stump can be seized with the forceps, it generally breaks off, or gets crushed. I have had to protect the surface for some days in order to let the stumps grow, and then have found it necessary to loosen a stump by electrolysis, in order to extract it for examination.

During the last twenty-five years, I have seen a number of these “black-dot” forms of *Tinea*; but still, compared with the other forms, it is very rarely seen in England. In 1880, I called special attention to these cases, but it was not until Sabouraud’s discoveries that they were known to be due to a distinct form of fungus.

I have not the least doubt that most of the cases I formerly described as “disseminated” and “black-dot” ringworm were cases of *Megalosporon endothrix*. And the “fish-roë” condition of the fungus inside the hair, as I then described it, is typical, but I cannot tell what proportion were of the *fragile* variety. At any rate, I well remember the “black dots,” and how very difficult it was to get even a minute portion away for examination. Plate VI. (drawn in 1882) was evidently taken from a large-spore case, as the rows of fungus inside the hair clearly show; and it was crushed by the cover-glass, as the hair is burst on the side, and the fungus protruding.

Microscopical Characters (*Megalosporon endothrix, fragile*).—Very great care must be taken not to crush the minute portion of the broken-off stump that can be got

¹ *La tondante peladoïde.*

away; and, for a good specimen, I strongly advise that a stump be removed by electrolysis.

Mycelium, and chains of spores, may be found round the shaft (as in the *resistant* form), and also the fringe of mycelium near the bulb.

The mycelial threads pass upwards, closely packed in the stump, and it is not so easy to find it in the long thread-like state, but it is divided up into rows and rows of mycelial spores, often completely filling up the hair substance, and making it look like so much "*fish-roe*," or a "bag of nuts" (Sabouraud). Therefore, as a rule, the chain formation is not seen at first, when a minute portion of a stump is examined, but only a mass of large spores, which (when soaked for some time) easily disintegrate and float about the field, as the fragile hair is almost sure to be crushed in pressing down the cover-glass.

These appearances are well seen in Plate III., which was drawn from a most typical case, with bare spots and black dots, and stumps so rotten that it was almost impossible to get any portion of them away with the forceps.

These long rows of mycelial spores lie side by side in the substance of the hair, not outside it, and are jointed end to end in the long axis of the hair.

Diagnosis.—The distinctive difference in this variety is, that these rows have the appearance of "*chaplets*" or "*strings of beads*" (Plate V., Fig. 4), instead of the "ladder-like," quadrangular form of band, seen in the *resistant* form (Fig. 3). At times, the masses of spores bulge out the side of the hair, and the shaft is often ruptured in mounting the specimen, so that the conidia seem to be outside the hair-shaft (see Plate III.). This

is due to pressure on the cover-glass, for the stumps are very rotten, and easily break.

The mycelial spores are somewhat larger than those seen in the *resistant* form, and are generally from 4 to 7 μ in diameter. They are, as a rule, distinctly roundish, but may be irregular in shape or bulged. These chains of spores very easily break up in liquor potassæ, and give the appearance seen in Plate III. It is just the reverse in the *resistant* variety, where they tend to remain in the ladder-like bands.

Spots on the Body may develop, as in the *resistant* form.

MEGALOSPORON ECTOTHRIX.

Clinical Characters.—As a rule, this form causes single lesions at first on the scalp, though other places may form later. It generally commences as a distinct red, scaly, spreading circination; but unusual characters (as dermatitis, often with distinct pus, impetigo, or folliculitis) generally quickly appear, perhaps running on to true kerion. At first, there may be a ring of minute papules, followed by pinhead-sized vesicles on a red base, situated at the circumference of a raised, and red, scaly spot. This may be followed by vesico-pustules, or confluent vesication, and inflammation; the exudation loosens the diseased hairs. Sometimes isolated pustules, with a hair in the centre, may be seen. It may even look like a pustular eruption with pediculi; and, in fact, the two may exist together.

This variety is seldom seen in large places on the scalp, and rarely in chronic forms of the disease, as it tends to produce inflammation and pus formation, and to get encrusted, with pus oozing from beneath the crusts, and the

hair more or less matted down with the discharge. Sometimes these cases pass on to true kerion, and thus a cure takes place (see "Kerion").

This form is often attended with swollen cervical glands, and some constitutional disturbance.

Underneath the pustular crusts, the surface of the skin is found to be red, and matter is seen, sometimes as little drops of pus, exuding from the follicles.

Very often it is easy enough to extract most of the hairs, with the root-sheaths and the fungus, as the follicles get inflamed; thus, we can help Nature to cure the disease. In time, the place gets denuded of hairs, and a bald red place is left, which by degrees gets healthy-looking, with new downy hairs growing in a few weeks.¹

The hairs are not disintegrated so rapidly as in the other forms of Tinea; they are often long, and look healthy when coming through the crusts. Most of them come away with the crusts, as the follicles are inflamed, and the exudation from them loosens the hairs, so that they fall out. But, if they remain in the follicles, they break off in time and form stumps.

The Stumps.—The hairs break off, but they are not very short; sometimes it is even difficult to find the diseased hairs, and they may be detected only at the circumference of a moist pustular spot, from which most of the hairs have already become loosened, or even have fallen out.

The hairs have a whitish-grey parasitic coating around the intra-follicular portion; and very often come away entire with the root-sheaths.

¹ I commonly manage to cure ringworm by *artificially* causing this inflamed condition of the hair-follicles, or even by producing actual kerion (see the croton-oil treatment).

Microscopical Examination (*Megalosporon ectothrix*).

—The characters vary very much in the different forms, probably due to distinct fungi.

The fungus is chiefly limited to the intra-follicular portion, but I have seen it passing along the hairs freely outside the follicles, as in Plate V., Fig. 5, which was drawn from hairs removed from the scalp of a young child with two places, with pus formation just commencing.

On examination, plenty of *large* mycelial threads in long bands, often plain and very delicate and nucleated, with segments at long and unequal distances, and chains of spores here and there, are situated round the hair in the intra-follicular portion down to the root, tending to ramify freely between the hair and follicular walls (see Plate IV., Figs. 1 and 2 and Plate V., Fig. 6).

The mycelial threads run along the outside of the hair, and slightly insinuate themselves beneath the cuticular portion; but the cuticle is not stripped off and eroded, as in the *Microsporon*. Sometimes there are many spores packed together resembling the *Microsporon* (see Plate IV., Fig. 2). Fox and Blaxall also state that they have seen four cases where the fungus was hardly bigger than *Microsporon*.

The spores are generally arranged in chains around the hairs; and the fungus varies very much in size in each form, and in the different varieties of fungi, but it is fairly constant in the same case. The size of mycelial spores varies from 3 μ to 12 μ .

According to Sabouraud, the fungus is only to be found *outside* the hairs; but the fungus certainly enters at times into their substance in the intra-follicular part, for I have seen the fungus ramifying freely inside the shafts of hairs taken from a typical case of *tinea sycosis*, where

kerion had been set up (see footnote, p. 10, Plate IV., Fig. 1, and Plate V., Fig. 6).

Fox and Blaxall remark:—

“Later researches appear to demonstrate that the hair itself may be more profoundly implicated than Sabouraud at first observed, and hence the term *endo-ectothrix*.” . . .

“The hair may become infiltrated with mycelial threads, mostly sporulated, with unequal segments, and this without any spore-sheath, or very little. This fact might be used in criticising the name *ectothrix Trichophyton*, but the location of the parasite must be considered in its entirety. In other hairs, a sheath of spores is the prominent and almost exclusive feature, *though the hair itself is probably always implicated to some extent*. All these appearances may be observed in the same case. The exclusive infiltration of a hair may suggest an *endothrix*; and, on the other hand, the external spore-sheath varies so much in amount in different specimens, that it is sometimes very difficult to tell whether we have to do with an *ectothrix* or a *Microsporon*, when we remember that there are some *ectothrix Trichophytons* with very small spores.”

“Sabouraud rightly points out a distinction between the sheath of *Microsporon* and *T. ectothrix*—*viz.*, that the former closely surrounds the hair, whilst in the latter the fungus collects between the hair and the follicular wall, often making a collarette towards the mouth of the follicle. This distinction may sound theoretical, but in certain cases it is very apparent.”

“Another important feature in the *ectothrix Trichophytons* is the tendency for the threads to ramify between the hair and the follicular wall, and even amongst the epithelial cells of the latter. The further from the hair the threads

extend, the less sporulated they become, as Sabouraud observed."¹

Patches on the Body.—Sometimes lesions also occur on the glabrous skin of the neck or the body (see Chapter V.).

KERION.

In former editions, I always drew a sharp distinction between the acute, superficial, crusting forms of pustular inflammation with ringworm, and true kerion.

Kerion arises when deep folliculitis occurs, with inflammation of the surrounding substance of the corium. The patch swells up, and has much the appearance of a subcutaneous abscess forming. Sabouraud maintains that this form is always due to the *M. ectothrix* fungus; but, as before stated (p. 75), it does occur with the *Microsporon*.

The disease is made up of one or more patches, which are distinctly swollen and raised. They are more or less red, tender, semi-fluctuant, and soft. In the early stages, the patches are studded over with opening of the hair-follicles, from which a muciform or purulent discharge exudes. Many of the hairs come out, while some remain in, and can easily be extracted entire with the root-sheaths, as they have been loosened by the exudation. In fact, the hairs are lying loosely in the follicles, and, when extracted, come out from a considerable depth, due to the thickness of the patch. After a time, all the hairs fall out, and a swollen, raised, red, exuding patch is left. The swelling gradually subsides, but the skin remains red and shining for some little time; but by degrees the

¹ *Brit. Jour. of Derm.*, July—September, 1896.

redness passes off, and the skin gets white and normal again, and in about six weeks fine, new downy hair commences to grow. If this happen to one patch, the rest soon follow suit, especially if the discharge from the primary patch be rubbed into the other places.

If kerion be set up, the case is easily carried on to a satisfactory result and cured by proper treatment, as all the diseased hairs come out, or can easily be extracted, together with the root-sheaths and the fungus. In fact, kerion cures itself instead of spreading the disease, as does the superficial crusting form.

I have seen some very extensive cases of kerion, even while very simple remedies have been applied. Some years ago, I watched two young children—brothers—who had most extensive kerion, almost over the entire scalp. Both cases commenced at the same time, and in one a subcutaneous abscess had formed before I saw the case. This was at once opened, proper treatment adopted, and almost the entire hair came away, so that the children were practically bald for a couple of months. I saw them after the hair had grown again freely, and there was a perfect recovery, except where the subcutaneous abscess had formed. Here there was a small scar left.

A subcutaneous abscess is a very rare complication, as also is such an extensive formation of kerion; in fact, I have never seen such cases either before or since.

I noticed this cure by Nature, and wrote fully on the subject in 1880, strongly advising the attempted "artificial production of kerion" by croton oil, as the most rapid way to cure small places of ringworm. This subject will be described in Chapter IX.

BALD TINEA TONSURANS.

Sometimes, though very rarely, we find *smooth*, bare, *bald* places, very much resembling *Alopecia areata*. Liveing¹ has called attention to this form of the disease, and such cases, I feel sure, have sometimes been mistaken for *Alopecia*; but the history of the case will help the diagnosis, as the places have generally commenced as scaly spots, from which the hairs have gradually come out, or the condition may have come on under treatment, as I shall fully describe in Chapter XII., under "*Alopecia*." There are also mixed cases of *Alopecia* and ringworm, as well as forms of true ringworm passing into *Alopecia*, which, at that stage, can scarcely be distinguished from true *Alopecia areata*. If one of the spots of *Tinea* under treatment undergo this peculiar change, it is most fortunate, for generally the rest soon follow suit, and the disease gets quickly cured. In fact, the best way to cure *Tinea* is to cause a temporary *Alopecia*, which is the way that croton oil acts.

Some cases of *Tinea* commence as bald patches, especially the *M. endothrix, fragile* variety, as described on p. 88. Crocker regards "the common form of *Alopecia* and bald *Tinea tonsurans* as synonymous terms."² I dissent from this statement entirely, and still firmly believe *true Alopecia areata* to be a complaint in no way associated with *Tinea tonsurans*, and to be non-contagious. This is a very important matter,³ and will be fully discussed under "*Alopecia areata*," in Chapter XII.

¹ *Brit. Med. Jour.*, April 8th, 1882.

² *Diseases of the Skin*, 1888.

³ Especially at the present time, when the parasitic and contagious theory of *Alopecia areata* is again being brought forward.

Fox and Blaxall report a case they saw as follows : "The widespread, confluent, indistinctly delineated, bald, polished areas (not left by any marked inflammatory process) were diagnosed as *Alopecia areata*, until one day two well-marked, long, ringworm stumps were detected beyond the border of the patches. The culture was, unfortunately, unsuccessful; but we possess specimens and photographs of a hair which afford some evidence that the fungus was a peculiar one, and not an *endothrix Trichophyton*." ¹

I think that those cases of Alopecia, where fungus like that of ringworm has been discovered, are simply due to ringworm causing Alopecia. They do not prove that ordinary *Alopecia areata* is due in any way to ringworm.

SMALL CHRONIC SPOTS.

Sometimes ringworm may exist without apparent change or extension for months, or even years (see p. 43), as a single spot, with a few stumps, or in spots so small that they are not noticed, even by professional men. Often ten minutes or more must be spent in examining a child's head before such a case can be detected. I have known an outbreak of ringworm in a school to be caused by an old chronic spot the size of a split pea, where only a few stumps could be found on close examination with a lens.

DISSEMINATED RINGWORM.

In 1880, I called special attention to a very chronic form of Tinea, which I then named "disseminated ringworm"; one, in former years, rarely diagnosed, and certainly, in

¹ *Brit. Jour. of Derm.*, July—September, 1896.

olden days before croton-oil needling was suggested by me, was practically incurable. Such cases are now known to be chiefly due to the *Megalosporon endothrix* variety (see p. 83); but not always, for I have often seen them in very old cases of the *Microsporon*. Only a few months since, I rejected, at an admission to Christ's Hospital, a boy who had no evident patches, but isolated stumps all about the head. This was due to the *Microsporon*, and the disease had existed for nine years!

In these cases of Disseminated Tinea, the hair is found to be growing freely and firmly over the scalp, and very often there are no distinct patches, or only one or two small ones, to be seen (although they have existed at an earlier stage of the disease), and the skin appears to be generally smooth and healthy (*Megalosporon endothrix*), and at times free from scurf. Numerous isolated thickened stumps, and groups of stumps, and even "black dots," are seen here and there, scattered all over the scalp, with sometimes long lustreless hairs, which easily break off. This form is often overlooked, and can be detected only by very careful examination. A case may remain in this chronic condition for years, and be the unsuspected source of much trouble.

DIFFUSE RINGWORM.

A very chronic form, "diffuse ringworm," is also sometimes seen, in which there are one or more large irregular patches, often extending over nearly the whole scalp, due to coalescence of the places. The surface is usually very scurfy, with some sebaceous matter; most of the hairs are long and healthy, but numerous stumps are to be found in every direction. This form is often overlooked, or mistaken

for seborrhœa or chronic squamous eczema ; but it can always be diagnosed by the stumps. Cases are even seen where almost the entire scalp is affected.

DIAGNOSIS OF RINGWORM WHICH HAS EXISTED SOME TIME.

Very few medical men are aware how extremely difficult it is to cure most cases of extensive ringworm of the scalp, and many consider the disease to be cured, and the child fit for school, when it has only assumed a *chronic* condition.

Boys are constantly brought to me on their return to private and public schools, and very many also on their presentation for admission to Christ's Hospital, with certificates from medical men of the highest professional standing, saying that they are cured of ringworm, and quite fit to mix with other children. I find them, on examination, to be still suffering from a chronic, and certainly contagious, form of the disease ; and, very often, I am informed, on inquiry, that an opinion has been formed, and a certificate given, without a complete examination of the scalp, and without the help of a lens or microscope.

Many practitioners imagine that ringworm is cured when some of the hair is growing freely and firmly again on the part affected. This is a very common, and a very grave, mistake, as some of the most chronic and intractable cases are those in which the hair has partially grown again on the scurfy patches. On close inspection with a lens, however, *some short broken-off hairs or stumps may be seen scattered among the healthy hairs.* It is impossible to speak too strongly on this point, as outbreaks of ringworm in schools are generally due to the admission into them of unrecognised cases of chronic ringworm.

I find that, as a rule, when this trouble appears in a

school, it can be traced to the return of a boy who has had an attack of *Tinea tonsurans*, but who, after treatment for a time, and the growth of many long hairs on the places, is returned—even with a certificate from a medical man that he is now cured. He has, in fact, reached only the chronic, and certainly still contagious, form of the complaint. On the other hand, trouble may arise in a school from the entry into it of an entirely unsuspected case, generally in the form of a scurfy patch on the head which has existed for some time. This is thought to be scurf or seborrhœa, but is, in fact, *Tinea*.

Writing after more than a quarter of a century's experience as medical officer to Christ's Hospital, and after the examination of a very large number of children both for public and private schools, I cannot help saying, that in by far the majority of cases, where a boy has had ringworm of the scalp within a few months of my examination, I have found that the disease has not been completely cured. As a rule, some treatment has been continued until some new hair has made its appearance on the patches, after which it has been discontinued, although many diseased stumps may remain. When this stage has been reached, the case often continues in the same chronic state for months, or even years—*viz.*, with the patches remaining about the same size, getting neither better nor worse.

It is very difficult to describe the exact appearance of the scalp in these cases. In one boy lately rejected at one of the examinations at Christ's Hospital, to the casual eye no mischief was to be seen, but, on close inspection with a lens, almost the whole scalp was observed to be scurfy in places. And, though the long hair was growing very freely and firmly, and the parents thought the boy to be quite

free from ringworm, there were hundreds of rotten stumps scattered about, saturated with fungus. Curiously, this case was due to the *Microsporon*, and not the *Megalosporon*, which is commonly seen with "disseminated" ringworm. Such cases are constantly overlooked. In fact, only a few weeks after this I saw a similar case, which had been only the week before certified as "cured, and fit for school." The first case had existed for seven years, and the second for three years, and both had been attending schools previous to my examination. Yet a patch two or three months old may look like one of one or two years' standing. In fact, some dermatologists say the symptoms of *acute* and *chronic* ringworm are the same; and that, for all practical purposes, they need not be separated. I think the reverse of this, and that it is very desirable to determine whether a case for treatment is recent or old, for many remedies that might be tried in the former case would probably be useless in the latter. For instance, the treatment of one or two places of recent ringworm, and of the diffuse or disseminated varieties, is quite different. In the latter, it is simply waste of time to attempt to cure with ointments or lotions, as it can be so easily done by efficient croton-oil needling, as described further on.

Chronic Tinea.—The probable length of time that the disease has existed can be guessed at only by the general appearance of the scalp; and it requires great experience to give a decided opinion, as a small place may have existed for months, or even years, and a large surface may have become quickly involved. The microscopical characters of the stumps do not help much, as the appearances in a stump fully but only recently impregnated with the fungus are just like those seen even after years.

It is much easier to tell the probable age of a small-spore than of a large-spore case; for, in the former, at first, all the hairs on the patches are diseased, and broken off; while, in a few months, many of the long hairs may have grown again (especially if the case have been treated), and the places look only very scaly and scurfy, with numerous diseased stumps scattered amongst long healthy hairs, as before described. Such cases have probably existed some time.

“Disseminated” cases, like the one described above, must have existed a long time, as this appearance is never seen in a recent case of *Microsporon*. Again, in the *M. endothrix* variety, if there are numerous scattered isolated stumps, and groups of stumps, with “black dots,” the case is not at all likely to be a recent one.

General Diagnosis.—In practice, after treatment, every sort and condition of patches may be observed. The small-spore form may exist without any frostlike-looking surface, and the skin may be covered with sebaceous matter and scurf. No distinct patches may be seen, and the case can be diagnosed only by finding the short broken-off stumps. As a rule, the microscope ought to be employed. It is probable that many of the different appearances may be due to the nature of the soil, and the constitutional condition of the patient.

I have known *black dots* to be caused by rubbing the places very carefully before an examination, or by epilation, so that the black dots were due simply to the stumps being rubbed off level with the surface of the skin, or by the hair-follicles getting filled with dirt after a portion of the stumps had been removed by epilation. Therefore, no certificate should be given that a child is cured while

there are any black dots to be discovered. By watching a case as above described, *no rubbing being allowed*, the stumps soon grow up again, and can be removed for examination.

But, apart from these special chronic varieties (some of which, I freely own, are exceedingly difficult for any one who is not constantly seeing such cases to diagnose), I constantly have children brought to me, certified by medical men as cured, with typical patches of ringworm, covered with scales and scurf, with broken-off, dry, opaque, and twisted hairs, looking as if they had been "nibbled off," and of the usual yellowish-white colour. These facts show that there are still doctors who do not know what ordinary common ringworm is like. Often, when I have pointed out these characteristic appearances to them, they have affirmed that the disease was "dried up and cured," and the child fit to return to school, and to mix with other children !

The typical appearance of the short stumps, which break off on attempted epilation, is most characteristic ; and, with a good lens, no mistake in diagnosis ought to be made, if the scalp be carefully examined.

CHAPTER IV.

TINEA TONSURANS: DIAGNOSIS.

WHEN IS TINEA TONSURANS TO BE CERTIFIED AS CURED?—DIAGNOSIS FROM SCURF—SEBORRHŒA SICCA—PITYRIASIS CAPITIS—SQUAMOUS OR DRY ECZEMA—PSORIASIS—IMPETIGO CONTAGIOSA—FAVUS—AND FROM BALD SPOTS, AND ALOPECIA.

WHEN IS TINEA TONSURANS TO BE CERTIFIED AS CURED?

A MEDICAL man should not consider a case of ringworm to be cured, or certify that a child is fit to return to school and mix with other children, until he has most carefully examined the *whole* scalp in a good light, and scrutinised any suspicious scurfy spot with a lens, and is certain that there are no broken-off stumpy hairs to be seen (or even the black dots before mentioned, p. 83), giving evidence of the ringworm fungus, when carefully examined under the microscope.¹ Sometimes it is extremely difficult to detect

¹ In *A Code of Rules for the Prevention of Infectious and Contagious Diseases in Schools, being a Series of Resolutions passed by the Medical Officers of Schools Association* (third edition, 1891), published by J. and A. Churchill, the following definition, as to when a pupil may return to school (after having had ringworm), will be found:—

“**Ringworm** (of the head).—When the *whole* scalp, having been examined in a good light, and any suspicious spot scrutinised with a lens—no broken-off stumpy hairs (which show the ringworm fungus when *carefully* examined under the microscope) are to be detected.”

“It is sometimes considered that ringworm is cured when the hair commences to grow on the diseased places; but this is a mistake, for it frequently happens that diseased broken-off hairs remain; and the

the stumps when only a few exist; and it is not right to conclude that there are no diseased hairs, because, after a superficial examination, none can be detected. Sometimes attention is directed to the *short healthy hairs* round a treated patch (caused by the hair having been cut off), instead of to the diseased stumps, which are frequently concealed by the long hairs, and only protrude about a sixteenth of an inch, or even less.

So long as *any* diseased hairs exist on a child's head, or even the "black dots" (and they may continue for years), ringworm is not cured; it may continue stationary, or spread again; and, what is of more importance, the child may give the disease to other children.

If all the hair-bulbs could be extracted, together with the upper part of the diseased hairs, ringworm might be considered to be cured after epilation; but some of the stumps are almost certain to break off, allowing the lower part of the hair-shafts and the bulbs (which, of course, contain living mycelium) to remain behind in the follicles. The diseased hairs may not protrude again from these follicles for a week, or more.

It constantly happens that a medical man believes he has removed all the diseased stumps from a patch of Tinea, and certifies the child to be cured. But, if the place be watched for a week or ten days, the stumps will appear again. In fact, it is extremely difficult to certify that a patient who has recently had ringworm is absolutely well. Time after time, a few stumps will reappear here and

disease may thus exist for months or years. It is often very difficult to detect the short stumps which protrude only a sixteenth or an eighth of an inch; and it is quite useless to examine short cut-off *healthy* hairs from a suspicious spot, under the microscope, for the ringworm fungus."

there, breaking off when an attempt is made to extract them ; a few may continue to come up again and again for months, and defy all ordinary attempts to destroy them, after the case, in other respects, appears to be cured.

Some men are deceived by applying a strong vesicant to the patch, and, perhaps, getting a temporary bald place, *apparently* free from the broken-off stumps. The case is then certified as cured ; but, after a week or ten days, the troublesome stumps again appear, and prove the incorrectness of such certificate.

Therefore, a bare patch, left after ordinary treatment,¹ should never be considered to be free from diseased stumps until the new *downy* hair is growing freely from all the follicles, without a single stump, or black dot, to be detected with a lens.

If all the fungus be killed, or if (as, in my opinion, almost always takes place) the hairs get loosened and come out with all the fungus, fine new hair will in time grow ; and, of course, the new healthy hair will not break off when pulled, but will come out with the roots. I do not believe that a diseased hair ever recovers itself, and grows up healthy again under the action of parasiticides. I have never seen this happen, and I think the diseased hairs always come out before the patch is cured, and that new hair grows. This is an important point, for it has been stated that, under certain treatments, the diseased hairs suddenly commence to grow up without fungus in them. I have never seen this.

The presence of some stumps, which break off on attempted epilation, shows that the disease is not cured ; but, if there be doubt, the microscope should be used.

¹ This does not apply to the temporary bald spots left after the croton-oil treatment, where all the hairs have come out.

Sometimes, after treatment (especially after the "boric-acid, spirit, and ether" treatment, or "chrysarobine"), no conidia or mycelium can be readily seen in the upper portions of a removed stump; but, if the part left in the follicle be removed and examined, it will be found to have fungus in it. In cases of doubtful cure, the treatment may be left off for a week or two; and then any diseased stumps will grow up again, and the fungus can easily be detected.

In hospital practice, it is almost impossible to get parents to continue to bring their children until they are quite free from all diseased hairs, as the places appear to them to be cured; and, therefore, very many cases of ringworm are thought to be well, when they have only passed into a chronic condition. Again, in the large-spore form, the fungus may remain in the long hairs, making it most difficult to be certain that the case is absolutely well.

Atrophied Stumps.—Sometimes, especially after the head has been shaved, a few, or even very many, atrophied stumps are to be seen.

These short little hairs are healthy ones which have not grown again beyond the length of an ordinary diseased stump, after they have been cut off close to the scalp. They are, at times, to be seen (usually over non-affected portions of the scalp) during the treatment of some cases of ringworm, and are often thought to be diseased stumps; but the diagnosis is very easy, as these short little hairs are bright and fine, and look like *small* cut-off healthy hairs. They easily come away *entire* when extracted, instead of breaking off short, as diseased stumps do. They have small *atrophied* roots—like the stumps from *Alopecia*—and microscopic examination reveals no fungus. The free

ends are also sharply cut (from shaving) or blunt, and often pigmented, the shaft being of the normal, or less than the normal, thickness ; and, at times, it shows deposits of pigment (like Plate V., Fig. 2).

In some cases, especially after fatty ointments have been used, oil globules, as well as the conidia, may be seen about the stumps ; but small oil globules, on a normal hair or atrophied stump, should not be mistaken for conidia. To a practised eye, there is no difficulty in distinguishing between atrophied and diseased stumps.

The regular, equal-sized mosaic of bright conidia, circular, or compressed into hexagonal shapes, as seen in the *Microsporon*, cannot be mistaken when once recognised. And the bead-like or ladder-like arrangement of the mycelial spores *inside* the hairs in the large-spore is diagnostic. Again, if mycelium can be detected, there can be no error in diagnosis. Oil globules are spherical, refract light very strongly, and can be easily recognised. Ether will also distinguish them from conidia, by dissolving the fatty matter.

Therefore, if a doubtful specimen has to be examined, where there are only two or three broken-off hairs, which seem to have conidia on them under the microscope, the best plan is to wash them with ether, to remove any oil globules. This can easily be accomplished by procuring a glass slide, with a small circular cavity ground in its centre. The stumps can be placed in it, a few drops of ether dropped on to them, and a thin glass cover applied. As the ether evaporates, this process can be repeated two or three times. Finally, the stumps should be taken, with a fine pair of forceps or a needle, out of the liquid ether, and placed in a drop of liquor potassæ on a glass slide, and examined in the usual manner.

As a rule, parents and friends will hardly credit the diagnosis of *chronic* cases of Tinea, or believe the time the disease has existed, or the long time it may take to cure.

They often take the child to another medical man, who too often confirms their opinion, and states that the case is only one of chronic eczema or scurf; or that, in his opinion (which, of course, is the opinion the parents desire), the ringworm is cured, and that only a little eczema remains, which he may even assure them is being kept up by the use of irritating parasiticides! This has happened many times to me, even after I have removed stumps and shown them (to the parents), under the microscope, swarming with conidia. At other times, the opinion of a hair-dresser, a boot-maker, an old woman, or quack is taken. I have actually known cases to be treated by such people, who assured the parents that the disease was cured, and that "stumps" were of no importance, and might be disregarded! Armed with this valuable opinion, the child is sent to some school, where too little care is taken about receiving children with "chronic patches of scurf," which are considered of no moment, until, when too late, and the school is infected, the grievous mistake which has been made is discovered.

DIAGNOSIS OF TINEA TONSURANS FROM OTHER DISEASES.

Painting any suspicious spot with chloroform has been suggested as a test by Sir Dyce Duckworth,¹ as the diseased hairs are whitened by it on drying. This test is hardly necessary when the patch has the distinctive broken-off hairs, and it is not of any use in detecting the isolated stumps seen both in the *Microsporon* and the

¹ *Brit. Med. Jour.*, November, 1875.

Megalosporon varieties ; but it may be useful at times in marking out the limits of a patch of small-spore ringworm.

In forming a diagnosis, no reliance whatever should be placed on the fact that the hairs come out easily on, or around, a suspicious spot, as they may do so with equal facility in *Alopecia* (see Chapter XII.), and also, at times, from any part of the scalp in children who are not suffering from ringworm—especially after debilitating diseases. On the other hand, in chronic and obstinate forms of *Tinea*, the long hairs are generally firm. This is specially mentioned, as it used to be a very common practice to try the hairs round a suspicious spot, and to conclude that the affection was not ringworm, or that it was cured, if the long hairs were firm.

Another very common error is, to take a long healthy hair—or more often one shortened, from previous cutting, or shaving—growing close to, or even on, a patch of ringworm, and, finding no fungus under the microscope, to consider the disease cured. It is worse than useless for diagnosis, to look for conidia on healthy hairs taken from, or around, a treated patch ; for, if these are found to be free, it only leads the examiner to imagine the disease cured. *The whole attention for diagnosis must be paid to the short broken-off diseased hairs or stumps.*

DIAGNOSIS FROM SCURF.

Local Scurfiness, without stumps, does not necessarily imply ringworm ; but such spots—especially in light-haired children, and if the disease exist, or has lately existed, on another part of the scalp—are very suspicious, and should be scrutinised with a lens. Some of the scales

should also be examined under the microscope, after soaking for some hours in liquor potassæ.

Lately, I had a girl brought to me who had been, as I hoped, cured from Tinea (large-spore), for no stumps had been seen for a month. I found six or seven small scurfy recent patches, but not the least sign of a broken hair; and the hairs extracted from the places were quite free from fungus. Yet, on examining the epidermic scales, I found some mycelium. Plate V., Fig. 1, was drawn from the scales removed from this patient, and shows what is to be looked for in such cases.

General Scurfiness is not very likely to be mistaken for ringworm, but there is a variety of local scurfiness of the head which, sometimes, very closely simulates it. Patches are at times to be seen from which the hair has partially fallen off, having the usual scurfy appearance of chronic ringworm; even scabs may exist from slight eczema; and, what is much more likely to mislead, a false appearance of stumps, caused by the white epidermic scales running up a short distance on the shafts of healthy hairs, forming asbestos-like sheaths, and thus very much resembling ordinary stumps in the *Microsporon* variety. With a lens, there is no difficulty in the diagnosis, as no broken-off hairs are present.

While children, who have only patches of scurf, are now and then thought to have ringworm, the reverse error is constantly being committed, and children with chronic ringworm are often believed to be suffering only from simple scurf.

I cannot speak too strongly about this matter, even after twelve more years' experience since these words were last written, for hardly a month passes without such cases coming under my notice. I often find that children with

chronic and uncured *Tinea tonsurans* have for months been attending schools, and mixing with other children ; and some have been under treatment for chronic scurf. In all doubtful cases of local scurfiness, the diagnosis is very easy, if a careful examination be made for the broken-off stumps, and, failing these, by examining the scurf under the microscope. It must be remembered that, if any fungus exist on the head, the case is still one of ringworm, and is contagious.

DIAGNOSIS FROM SEBORRHŒA SICCA—STEATORRHŒA—
PITYRIASIS SIMPLEX AND PITYRIASIS CAPITIS.

There is much more danger of chronic ringworm being mistaken for seborrhœa than the reverse.

Seborrhœa sicca is the form usually met with on the scalp or the eyebrows. It is characterised by the formation of dry yellowish scales, which fall off as scurf. Sometimes the hairs are quite matted down to the scalp with greasy crusts.

The nutrition of the hairs so suffers that they become dry and brittle ; they are then shed, and replaced by imperfectly developed ones. Hence, there is generally a distinct thinning of the hair, rather than patches with loss of hair. The scaliness is diffuse, and therefore there are no circumscribed patches to be seen, as in ringworm. Dry seborrhœa is much more common in adults than in children, and it may involve the whole head, which is very rarely the case in ringworm. This affection, which is due to micro-organisms,¹ may lead to baldness. Later on, changes are produced in the epidermis, and the surface

See Chapter XII., on "Alopecia," and Sabouraud's view concerning the toxin of the micro-organisms causing *Alopecia areata* and baldness.

gets covered with scales. The affection has been called *pityriasis capitis*.

All these forms of scurf and seborrhœa are easily distinguished from ringworm by the absence of stumps, and by the microscopical examination of any doubtful shortened or atrophied hairs, and of the scales.

DIAGNOSIS FROM SQUAMOUS OR DRY ECZEMA, AND FROM PSORIASIS.

Squamous or Dry Eczema of the scalp is rarely thought to be ringworm, but chronic patches of the latter disease are very often mistaken for eczema, and certified to be non-contagious. This mistake is frequently made by medical men overlooking the minute stumps, or black dots.

Many points of difference are given in some text-books, but the only one of practical importance is the absence in this disease of any characteristic stumps on the scaly patches.

Psoriasis must be diagnosed from ringworm by the same means. Other patches of psoriasis, too, are usually to be seen about the elbows or the knees, or on other parts of the body. Psoriasis may, however, exist as one or two round spots on the head alone, and may thus be mistaken for ringworm; but the places are very scaly, often with slight scabs, and no stumps are to be detected.

DIAGNOSIS FROM IMPETIGO CONTAGIOSA.

SYNONYM:—*Porriigo Contagiosa*.

The word *porriigo* was used, by the older writers, for almost any eruption on the head; but now it is generally restricted to this affection, which is a form of pustular

eczema, and is spread chiefly by the transplantation of the pus-cells and micro-organisms by the patient's fingers. This disease is generally confined to the poor and badly nourished; and there is often a defective state of the health, with enlarged glands about the neck. Yellow scabs form, with a purulent discharge, which exudes from underneath them, and mats the hair together.

This affection is sometimes thought to be ringworm; while the rapidly spreading form of pustular ringworm so closely simulates impetigo contagiosa, that it is always desirable to remove a few scabs, and to most carefully examine the scalp with a lens, to see if there are any diseased stumps.

Impetigo of the scalp may be due to the fungus of ringworm; and this variety of pustular ringworm—consisting of isolated pustules with diseased hairs—can be diagnosed from simple impetigo only by finding the diseased stumps (see p. 75).

DIAGNOSIS FROM FAVUS.

Favus is very rare in England, but comparatively common in Scotland. It is almost exclusively confined to the lower classes, and is but rarely seen upon the cleanly and well nourished. The diagnosis from ringworm is easy, if the characteristic sulphur-coloured crusts have formed. But in its early stage favus may be mistaken for *Tinea tonsurans*.

Favus commences as small scaly irritable patches. The hairs soon lose their lustre, but they do not become broken and twisted at this early stage like the hairs of *Tinea tonsurans*, so that they can generally be extracted entire. Soon several pinhead-sized, pale-yellow crusts develop round

the hairs; these are at first convex, but become concave and surrounded by an inflammatory areola. When these peculiar circular, elevated, friable crusts form, hollowed out into the shape of a cup, the disease is easy to recognise.

These yellow cups are as large as a pea, or larger, and have one or two hairs passing through them. A peculiar odour, too, is generally present, like that of mice. If a well-formed hollowed crust be removed, there is a cup-like depression of the skin underneath it. After some time, the hairs become thickened, short, dull, harsh, and colourless. If the case be neglected, permanent baldness may ensue.

The diagnosis, in the early stage, can be made only by extracting the hairs. These can generally be pulled out early in the disease with entire bulbs and shafts, whereas in *Tinea tonsurans* the stumps break off and leave the bulb and part of the shaft behind. If there be any doubt about the diagnosis, the microscope should be used. A portion of the crust—which is principally made up of the fungus, the *Achorion Schönleinii*—should be placed in a drop of liquor potassæ on a glass slide, and examined with a power of at least five hundred diameters. The crust will then be found to consist *almost entirely* of fungus-elements, which would not be the case if a pustular scab were examined from *Tinea tonsurans*. The mycelium-threads in favus are more numerous than in *Tinea tonsurans*, and the conidia are slightly larger than those of the *Microsporon*, but a practised eye is necessary to distinguish them. If the typical characters described on pp. 77 and 80 be remembered, there is but little danger of error.

There can be no real difficulty with the large-spore form of ringworm; and the difference between the small-spore and favus is chiefly as follows:—In favus, there is a much

greater difference in the shape and size of the conidia than in ringworm, while the mycelium is not so often seen as long slender threads, but is short, has very short joints, and easily breaks up into single cells. The conidia in favus are more ovoid, often elongated, and contracted in the middle. The size of favus spores is usually from 2.3μ to 5μ , while the conidia in the small-spore are from 2μ to 2.5μ .

In the later stages, patches of cicatricial atrophy tend to show that the disease has been favus.

DIAGNOSIS FROM BALD SPOTS AND ALOPECIA.

Bald Spots from cuts or other injuries are sometimes thought to be patches of ringworm. They are easily diagnosed by the depression of the part, the white glossy appearance of the skin, and the absence of stumps; and, if from a cut, they are oblong, not circular.

I have seen a bald patch on the head, purposely made by a boy pulling out his hair, very much resemble ringworm, as it happened to be on a scurfy place, but of course it contained no stumps.

There is another kind of baldness I have many times seen mistaken for ringworm—*viz.*, a bald, or partially bald, patch on the occiput of a young child, which has been caused by the head being bored in the pillow at night.

Alopecia areata.—The diagnosis of *Tinea tonsurans* from *Alopecia areata* is very important, and will be fully described in Chapter XII.

CHAPTER V.

RINGWORM OF THE BODY, THE BEARD, AND THE NAILS.

TINEA CIRCINATA—ECZEMA MARGINATUM—INDIAN, BURMESE, AND CHINESE RINGWORM—TINEA IMBRICATA, TOKELAU RINGWORM—DIAGNOSIS OF RINGWORM OF THE BODY—FROM SEBORRHŒA OR PITYRIASIS—FROM PSORIASIS—ECZEMA—ERYTHEMA CIRCINATUM, ETC.—ERYTHEMA IRIS—HERPES CIRCINATUS—LICHEN CIRCUMSCRIPTUS—PITYRIASIS ROSEA—TINEA ERYTHRASMA—PITYRIASIS VERSICOLOR—SYPHILITIC ERUPTIONS—WHEN IS TINEA CIRCINATA TO BE CONSIDERED CURED?—PARASITIC SYCOSIS, TINEA SYCOSIS—RINGWORM OF THE NAILS.

TINEA CIRCINATA : RINGWORM OF THE BODY.

SYNONYMS :—*Herpes Circinatus* : FR., *Herpès Circiné* ; *Trichophytie Circinée*.

ETIOLOGY.

THE term *Tinea circinata* has always been applied to the different forms of ringworm of the body, though it was not suspected in former years that there were a plurality of fungi causing the different varieties.

Sabouraud called attention to the fact, that the *Trichophyton megalosporon ectothrix* is the cause of well-marked forms of *Tinea circinata*, and said, that the *Microsporon* did not cause marked circinate lesions, but only small reddened furfurations.

In describing *Tinea tonsurans*, I showed that, at any rate in England, the *Microsporon* does cause distinct circinate patches on the skin, and quoted passages from

Fox and Blaxall, and from Adamson (see pp. 21 and 81). The *Megalosporon endothrix* also causes circinate patches on the glabrous skin (see p. 22).

In former years, it was noted that *Tinea* taken from animals "usually exhibits a severer type than when contracted from man"; and now it is known that the forms contracted from animals are always due to the *Megalosporon ectothrix*, and, therefore, more liable to cause pus formation.

Tinea circinata, due to the ordinary forms of ringworm, is common enough amongst children affected with scalp disease; and, in the outbreak mentioned on p. 50, I found by far the majority of the children had some slight form of body ringworm. In fact, when ringworm of the body appears amongst children at school, undiscovered *Tinea tonsurans* is very likely to be the cause.

The common forms due to scalp trouble may be communicated by comforters or clothes, but more often by direct contagion from the head. It is, therefore, always advisable to carefully examine the head of any child who has a small spot of body ringworm.

Tinea circinata, due to the *M. ectothrix*, is not very common in London, but is much more often seen in hospital practice than amongst the upper classes.

It is more common in those attending to diseased animals, and well-marked *Tinea circinata* is often contracted from cows, calves, horses, dogs, cats, and rabbits.

Special forms of body ringworm have been observed for very many years in hot climates; these have received special names, as Indian, Chinese, Burmese, and Tokelau ringworm, and may be due to distinct varieties or species of fungi. A very obstinate form of *Tinea circinata*, often called *eczema marginatum*, is also seen in England.

PATHOLOGY.

The fungus, after being implanted on the skin, under suitable conditions of soil, heat, and moisture, commences to grow; the mycelium-threads permeate the epidermis in all directions, causing hyperæmia, and often slight inflammation and vesiculation, followed by desquamation; and, when due to the *ectothrix* fungus, generally some severer form of dermatitis, with marked vesiculation, and even pustulation.

CLINICAL CHARACTERS.

When due to ordinary body ringworm (*Microsporon*, or *Megalosporon endothrix*), the spots are usually seen about the face, neck, shoulders, or upper part of the body. These forms have already been described on pp. 21, 22, 81, and 87. They are usually small, from the size of a split pea to that of a two-shilling piece, beginning as a circular, well-defined patch. They are slightly raised, and covered with scales or a fine branny or furfuraceous desquamation; they enlarge by centrifugal growth, and the skin in the centre becomes more or less normal again, with some desquamation. The places, especially if due to the *M. endothrix* fungus, may be distinctly red and scaly, and minute papules and vesicles may exist at the periphery, and a distinct raised red ring may appear (see p. 91). While the disease is spreading, the edge is usually distinctly raised and abrupt, not fading off into the surrounding skin; but, as a rule, the small spots due to ordinary scalp ringworm are trivial, and the distinct edge of, and the well-marked ring of, are more often seen with the *M. ectothrix* variety of fungus. As a rule, only two or three places are

present, but there may be a large number in neglected cases. When first situated on the face or body, the disease may spread to the scalp.

The disease is superficial, and shows no disposition to symmetry. There is generally some itching of the skin.

Megalosporon ectothrix.—When *Tinea circinata* is caused by any fungus belonging to the *M. ectothrix* group, the disease is much more marked, and it commences with a small, red, scaly, circular spot, with generally some dermatitis set up by the irritation of the fungus.

The place is often single, especially at first. It enlarges at its circumference, where the vesiculation and redness are most marked; while the centre becomes flattened, and more or less normal again, and often has a whitened, scurfy, shrivelled appearance. The margin is distinctly elevated, and sharply defined, forming a definite ring. The vesicles at the circumference often become pustular, forming slight crusts, especially if the disease is taken from animals, when there is usually a well-marked vesicopustular margin, and all the features of *Tinea circinata* are exaggerated. As a rule, the scalp is not involved, but it may spread and cause the *ectothrix* variety of *Tinea tonsurans*.

I once saw a gentleman, who had returned from India, with very many large rings, running one into the other, all about the upper part of the chest and neck, and passing upwards on to the scalp. Yet none of the hairs were infected.

The places sometimes look more like a well-defined eczema in circular patches, with pustular margins. There is no disposition to symmetry, unless perhaps through contagion in certain regions, as on the inner sides of the

thighs. Very often, when the patch has reached a considerable size, the disease dies out at portions of the circumference, and segments, more or less broken, advance over other portions of the skin ; or the rings may coalesce, and cause irregular patches or semicircles and segments of circles.

At times, the disease starts afresh within the part already swept over, and the result is a ring within a ring ; or even three or four rings, one inside the other, may be observed.

Patches of *Tinea circinata* are sometimes seen on the back of the hand, or the front part of the wrist. They have more the appearance of eczema, but have a well-defined edge with papules and vesicles, and often slight crusts. As a rule, it is very difficult, or impossible, to find any fungus, yet they rapidly get well under the use of parasiticides. Itching is generally a well-marked symptom in these cases.

In men, if the fungus be of the *ectothrix* variety, and the face be involved, it may spread and cause parasitic sycosis.

Under the combined action of heat and moisture, especially in hot climates, *Tinea circinata* may be very severe and extensive ; and (generally in adults) may spread over various regions, as the neck, the axillæ, the groins, the inner surfaces of the thighs (genito-crural region), and the parts between the nates. This disease is then very obstinate, and rebellious to treatment. These forms are generally called *eczema marginatum*.

The severer varieties of true *Tinea circinata* are much more common in hot climates, and are often called by local names. They are difficult to cure, and may last for years in spite of treatment.

Eczema marginatum (*Tinea cruris seu axillaris*) is the name given to a variety of ringworm, sometimes seen in cavalry men, shoemakers, and others, and attacking the inner sides of the thighs, and the parts between the nates and the genitals, or the axillæ.

It commences as a red, raised patch of papules and vesicles, which itches very much, and excites much scratching; it increases by centrifugal growth, and the circumference has a well-marked and defined border, often thickened and raised, with papules, vesicles, and crusts. As it spreads under friction, warmth, and moisture, it heals in the centre, leaving a dark-red scaly condition of skin; and, later on, there is marked pigmentation. The scratching aggravates the disease and gives it a markedly eczematous appearance; and, if it have existed some time, the parts get thickened by constant rubbing, for the complaint is attended with much irritation. It differs from ordinary ringworm in the eczematous character of the lesions, and in the congestion and pigmentation of the skin. Cases have been seen spreading down to near the knees, and even up to the umbilicus.

It is generally accompanied at first with a luxuriant growth of mycelium (*Trichophyton megalosporon ectothrix*); and, though the fungus may then be easily detected—if a few of the scales on the outer edge be scraped off and examined—when dermatitis has been set up, and the disease has passed into the chronic form, the fungus may be very difficult to detect, and the place then partakes more of the character of eczema.

Microscopical Characters (*Tinea circinata*).—The mycelium is generally well marked and large, especially if due to the *M. ectothrix*.

The forms seen with the *Microsporon* will be found to have a smaller mycelium than when due to the *M. endothrix*, and the largest is seen with the *ectothrix* variety.

To obtain scales for examination, the *inner* part of the *outer* ring, just where it is commencing to desquamate, should be scraped with a blunt knife; the epidermic scales thus obtained should be placed in a drop of liquor potassæ on a glass slide, the thin cover-glass applied, and the mass well flattened out by pressure upon it. The fungus may not be found if the cells are taken only from the outer portion of the ring which is not desquamating, or from the central portion, when nearly healed. A power of from four hundred and fifty to eight hundred diameters should be employed, and the mycelial threads will be seen best after the specimen has been kept from one to four hours. They have, at first, a very faint outline.

The Mycelium, which is far in excess of the spores in body ringworm, is seen as very long, slender, pale greyish, sharply contoured threads, like ribbands, jointed at irregular intervals, and branching dichotomously in all directions, forming a network amongst the epidermic scales (see p. 13). They vary much in size in different cases, from the variety of fungi causing the disease. In the *Microsporon*, they are about 2μ in diameter; and in the *Megalosporon*, from 2 to 6μ (see Plate V., Fig. 1).

The outline of the threads is always clearly defined with parallel lines, which are divided, here and there, especially at the ends, into mycelial spores, according to the form of fungus present.

Care must be taken, in examining doubtful specimens, not to mistake shreds of wool or cotton for mycelium; and, especially, not to confound the margins of the epidermic

scales, where they overlap one another, with threads of mycelium, for these overlapping edges have often the appearance of interlacing mycelial threads, so that a mistake may be made by an untrained eye. The diagnosis is easy, if the fine adjustment be used to exhibit the outline of the cells. The fungus is usually easily discovered in the early stages of body ringworm; but, later on, if eczema or crusts have formed, it is not so easy of demonstration, especially in old cases of *eczema marginatum*.

Adamson thus describes the microscopic appearances of the small hairs, in a patch of *Tinea circinata* on the forearm: "Epilated hairs showed appearances resembling those of ringworm of the beard. Around the upper part of the root-shaft were groups of spores of about 3 μ in diameter, and bundles of mycelial chains. The extra-follicular shaft appeared normal; the cuticle remained throughout the length of the hair. *Within* the root-shaft beneath the cuticle were strings of short-jointed, spore-like mycelium. These terminated as a fringe of 'wavy' mycelial threads at the junction of the soft bulb with the shaft. The appearances were thus exactly like those of the beard-hairs affected with ringworm fungus, and of the hairs of an early stage of attack in the *endothrix* form."¹

INDIAN, BURMESE, AND CHINESE RINGWORM, ETC.

In former editions, I quoted the following extract from Tilbury Fox² :—

"In various parts of the East, many local designations

¹ *Jour. of Derm.*, August, 1895.

² *Skin Diseases*, 1873.

are given to ringworm of the surface of the body. There, in fact, would appear to exist in different places peculiar diseases, apparently different, but in reality one and the same in nature. Chinese, Burmese, and Tokelau ringworms are examples in question. It is pretty certain that these affections are nothing more nor less than ordinary ringworm of the body, such as we have in Europe, determined in their occurrence to certain parts of the body by peculiar circumstances, and assuming characters somewhat different from those observed in the disease as it exists in colder climates, in consequence of the greater luxuriance of the parasite, consequent upon the presence in the one case of a greater amount of heat and moisture, which are favourable to the development and spread of growth of fungi."

In past years, these forms of *Tinea* were considered to be due to the same species of fungus that causes *Tinea tonsurans*; but Patrick Manson, especially, has shown that *Tinea imbricata*, or Tokelau ringworm, is a specifically distinct affection, with a peculiar fungus, and that it is not an ordinary form of *Tinea circinata*, modified by climate.

Sabouraud's discoveries have also made it likely, that there are several distinct forms of body ringworm in the East, possibly due to many distinct species of fungus; so that the old view, that all these different forms are due only to a "greater luxuriance of the parasite," has to be given up.

Many of these diseases are extensive and severe, and also rebellious to treatment.

TINEA IMBRICATA : TOKELAU RINGWORM.

This is a specific, vegetable, parasitic disease, with an incubation period of about ten days after direct inoculation.

It is very contagious, and was formerly thought to be only a modified form of *Tinea circinata*. It is confined to the tropics, and seen especially in the Pacific Islands and the Malay Archipelago.

For the following description of the disease, I am indebted to an article by Patrick Manson¹ :—

“The distribution of *Tinea imbricata* is peculiar. Its home, undoubtedly, is the Malay Archipelago; here it is indigenous, and from this it has spread east and south to many of the islands of the Pacific, and also northwards into China.” . . . “Samoa, some few years ago, was free from this loathsome disease, but a native of Tokelau (Bowditch Island) came to Samoa with the disease on him, and from him it spread, and is now firmly established on the island.”

Guppy, in his book, gives “authorities for the existence of the disease in the following islands: the Solomon Islands, where in some parts two-fifths of the inhabitants are affected; the Florida Islands, where quite one-half are affected; Treasury Islands, where four-fifths of the people are affected; the Elice group; New Guinea and neighbouring islands; Sumatra; Timorlaut; Buru; the Philippines and the Ladrões.”

Clinical Characters.—The disease usually avoids the scalp, and the hairs on it; but it may affect any other part of the body, and very often the entire surface is involved. It may last for years; and can be easily produced by direct inoculation from one person to another.

Fully developed patches consist of scales arranged in concentric rings, about an eighth of an inch apart. The

¹ *Brit. Jour. of Derm.*, January, 1892. All the quotations are taken from Dr. Manson's paper, by his kind permission.

There is also a description of this disease by Dr. Guppy in his book *The Solomon Islands and their Inhabitants*, 1887.

rings advance centrifugally at the rate of about an inch in thirty days, fresh rings continually starting at the centre of the patch. The general effect of the grouping of many rings is like that produced by the rings of light and shade in watered silk. Manson thus describes the scales :—

“If we look carefully at one of the numberless scales, we find that it is perhaps half an inch in length by a little more than an eighth of an inch in breadth, that it has a free border, and that it is firmly attached by the opposite edge. It is, therefore, in this respect unlike the scales of psoriasis, pityriasis, or ichthyosis, which are generally exfoliated by separation all round their periphery, the last part, as a rule, to lose hold in their case being the centre. These scales, on the contrary, are like surgical flaps—free at one edge, and continuous with the body at the other.” . . .

“Further, all the scales are arranged so that the free border of each is towards the centre of the circle or system of circles to which it belongs ; the attached border is, therefore, towards the periphery.”

When, “by means of soap and water the scales are removed, the body is seen to be marked by parallel brown lines, which observe a more or less concentric arrangement just as the lines of scales do. The colour of these lines—which are about a tenth of an inch, or thereabouts, in breadth, and often many inches in length—is rather darker than the fawn colour of *Pityriasis versicolor*,” and is owing to the fungus which is to be found in those lines in great abundance.

The scales are further described as “tissue-paper-like.” This disease does not appear to excite any superficial inflammation, like the ordinary *Trichophyton* fungus. There is generally some itching of the surface, but the general health does not suffer.

The Fungus is easily found, and is evidently a distinct species ; though resembling the *Trichophyton* morphologically, it does not implicate the hairs. It is much more abundant than in *Tinea circinata*, and Manson says "the fungus lies layer upon layer, the strings of conidia and mycelial filaments being packed almost as closely as they can lie. One never sees such abundance of epiphytic growth in ordinary *Trichophyton* disease, and I look on this profusion of fungus as one of the distinguishing features of the disease I am describing."

Diagnosis.—The rings (which spread centrifugally, and are constantly reproduced at the centre), the tissue-paper-like scales, and the profusion of mycotic growth, readily distinguish this disease.

DIAGNOSIS OF RINGWORM OF THE BODY.

Ringworm of the body may be mistaken for squamous eczema, seborrhœa, etc., and many affections have at times been confounded with it. Body ringworm can usually be distinguished by its history, commencing from a small red scaly spot, generally attended with itching ; by its rapidly assuming the annular form and maintaining it ; by its abrupt and sharply defined edge against the healthy skin ; by the papules and slight vesicles sometimes seen at its circumference, which is slightly raised above the surface of the skin ; by its slight desquamation ; and by its becoming pale and somewhat normal again in its centre, while spreading at its periphery.

Even, if there be no distinct ring, and a parasiticide (such as iodine or acetic acid) be applied, it usually brings a decided ring into view. Dry patches of squamous eczema or seborrhœa are often symmetrical, but spots of ringworm

are hardly ever so, except as the result of direct contact, as on the thighs, nates, or axillæ. But, as a fungus is the undoubted cause of this affection, it is advisable to employ microscopic aid in every case of doubt.

Seborrhœa, or Pityriasis—especially of the face and back—sometimes very closely simulates ringworm, and it may even take on an annular form and desquamate like *Tinea circinata*.

But the latter can generally be diagnosed by the characters above mentioned, often by its inflammatory nature, and distinct, abrupt edge not fading into the healthy skin, by the absence of enlarged follicles, and of a greasy surface. A patch of seborrhœa is irregular, very rarely circular, in outline, has the same appearance all over (not becoming normal again in the centre), and is never seen in sharply circumscribed patches.

Psoriasis.—Some patches of psoriasis—if of annular form—much resemble those of *Tinea circinata*, but they can be diagnosed by the presence of other small spots about the body, especially about the elbows and knees, by the characters named, and by the history of the case and by the microscope. As a rule, the uniform redness, and the great accumulation of scales, easily distinguish patches of psoriasis from discs of ringworm.

Eczema.—We often see round, red, simple scaly places which are only eczema; and sometimes patches of ringworm on the back of the hand and wrist, nates, etc., closely simulate eczema, but they can usually be recognised by the characters given above.

Eczema marginatum can be diagnosed by the symptoms already mentioned, by its site, and by microscopic aid.

The itching in this disease is always severe, and its course very chronic, often remaining in the same situation for years. The marginate character of the patches points to a parasitic cause.

Erythema circinatum, annulare, and marginatum.

—All these varieties of erythema may be mistaken for ringworm. In the former affections, we find one or more circular patches of erythema, fading in their centres, while they extend at their peripheries with well-defined edges, which are raised and thickened. Erythematous patches are often symmetrical. Sometimes the body is almost covered with them, and I have seen cases indistinguishable, by the naked eye, from ringworm; so that even experienced observers had been mistaken. The edge, however, is rarely so abrupt as in *Tinea circinata*.

Erythema iris.—A series of concentric rings exists, which will usually distinguish it.

Herpes iris, which is a form of *erythema iris*, must also be distinguished from ringworm. In this affection, we find a number of vesico-papules, or vesicles arranged so as to form a complete ring. There may be two or more of these rings one within the other, like *erythema iris*. *Herpes iris* first appears as a few papules round a central point. These soon become vesicles, and spread in the form of a circle. When one ring is formed, another appears outside it, and sometimes many follow.

The characters given above will generally enable a diagnosis to be made; but, in all doubtful cases, the microscope, to determine the presence or absence of the fungus, should be employed.

Herpes circinatus.—Much confusion has arisen from

this term having been formerly applied to ringworm of the body, because of the presence of quasi-vesicles which so often form at the circumference of patches of *Tinea circinata*. At times patches of ringworm may closely resemble those of herpes, but in all cases the diagnosis should be made, first by the history—commencing as a red, rough, scurfy spot, then gradually enlarging at the periphery, while the central portion becomes pale and desquamates—and, secondly, by the microscope. Herpes, moreover, runs a definite course, while ringworm may be indefinitely prolonged unless properly treated.

The term *herpes circinatus* should certainly not be applied to ringworm of the body, and had better be avoided altogether.

Lichen circumscriptus, or circinatus (*Seborrhœa corporis*).—This affection is associated with seborrhœa of the scalp, and may be mistaken for ringworm. It is usually situated on the back and chest, or between the shoulders, and consists of groups of papules, which have a tendency to spread at their circumferences, forming rings. These rings have well-defined margins, while the skin in their centres becomes somewhat normal again, or of a yellow colour. Thus yellowish spots are seen with red borders.

Pityriasis rosea (*Pityriasis maculata et circinata*; *Roseola circinata*, Liveing) is a term employed to designate a peculiar disease, occupying chiefly the trunk, and characterised by the development of discrete or confluent slightly raised macular or maculo-papular patches, varying in size; but it may be doubted whether this is an affection distinct from circinate lichen. The places are rose-coloured at first, slightly raised, rounded, sharply

circumscribed, with a ring-like border ; and the surface is reddish, dry, and more or less scaly. The skin is but little thickened ; and the patches, like those of *Tinea circinata*, tend to heal in their centres, which fade into a yellowish stain, while they spread at their peripheries, and the branny desquamation passes away in a few weeks.

Vidal considers it to be parasitic,¹ and most of the German writers agree with this view.

Both these diseases sometimes closely simulate eruptions of *Tinea circinata*, and have the general appearance and course of vegetable parasitic diseases, but there are no mycelial threads nor conidia to be detected. Micrococci, however, are present.

Tinea erythrasma.—This is a peculiar affection due to a minute fungus, the *Microsporon minutissimum* (Burchardt and Bärensprung).

Payne has described it, and considers it to be due to a distinct specific organism without spores.² It consists of pointed threads and cocci, and requires a high power and staining to be detected. It is seen at times when two parts of the skin come into contact, chiefly on the scrotum and the adjacent parts of the thighs, or in the axilla. The places are reddish, yellowish brown, pigmented, with slight branny desquamation. The growth is favoured by warmth and moisture.

Pityriasis versicolor (*Microsporon furfur*).—This affection (which is very rarely seen in children) is not very likely to be confounded with ringworm, though the scales exhibit well-marked conidia and mycelial threads when

¹ *Trans. Intern. Med. Cong.*, vol iii., p. 133.

² *Path. Trans.*, 1886 ; *St. Thos. Hosp. Rep.*, 1887.

examined under the microscope. In pityriasis, we see spots, or large patches of disease by coalescence, occupying chiefly the trunk—on parts not exposed to the air, especially the skin over the sternum and between the shoulder blades—of a light yellow or yellowish-brown colour ; and scarcely, if at all, raised above the level of the skin. The whole surface of the patch is of the same uniform tint, with fine branny or furfuraceous desquamation, but without distinct scales. The margins of the patches are well defined—not more congested than the rest of the surface ; and they are *not raised*, as in ringworm, but flat. Again, it has no tendency—like ringworm—to heal in the centre.

On microscopical examination of the scales, we find the conidia are somewhat larger than those of the *Trichophyton*, and irregularly circular in shape. They are distinguished from the spores of other vegetable parasites by their tendency to aggregate and crowd together into groups and heaps. These heaps of conidia are at regular intervals, and are joined by the network of mycelium. This peculiar grouping of the fungus is quite characteristic.

Favus (*Achorion Schönleini*) is not likely to be confounded with body ringworm, if the characteristic yellow crusts be present ; but if they have all fallen off, a mistake may be made. The lesion of favus is less distinctly circinate than that of ringworm ; but the microscope will decide the question, even if only a small portion of a crust can be found, as it will be seen to consist almost entirely of fungus (*vide* p. 116).

Syphilitic Eruptions may resemble *Tinea circinata*, but only those of the erythematous or the serpiginous varieties. They are not attended with itching ; and, as a rule, are symmetrical, and often of a coppery colour. Other syphilitic

symptoms may be present. The history of the case and the microscope will easily decide the question.

Diagnosis.—In these, as in all doubtful, scaly, circular spots, a careful examination of the scurf under the microscope will show the mycelium if present, and determine the diagnosis. But, if the disease be of long standing, and complicated with eczema, as in *eczema marginatum*, the fungus is often difficult to detect.

WHEN IS TINEA CIRCINATA TO BE CONSIDERED CURED?

A patient who has had *Tinea circinata* should not be certified as cured until the skin is almost normal at the circumference of the patch. The place may still be slightly red and stained, but the margin should be quite free from all papules and desquamation. Nor should the place be at all raised above the surface of the surrounding skin. If there be doubt, the skin just inside the margin of the patch should be scraped, and the epidermic scales examined, as before described, under the microscope. If any fungus be detected, it proves the case is not cured; but its absence does not, unfortunately, prove the absence of disease, for at times no fungus can be found, though it is undoubtedly still present. Therefore, it is very difficult at times to be positive, and the treatment must be left off, and the place watched, to see if any fresh papules occur, or if the disease spread at the circumference.

PARASITIC SYCOSIS—TINEA SYCOSIS.

There are two distinct forms of sycosis: one parasitic, the other due to the presence of the *staphylococcus pyogenes aureus* and *albus*. *Parasitic sycosis* is due to the *Megalosporon ectothrix* fungus, which involves the hairs of the

beard. It is much more common in France than in England, and Jamieson says it is fairly common in Edinburgh.

Minor degrees of *Tinea circinata* on the chin are sometimes seen before the hairs are involved.

Etiology.—According to Sabouraud, the parasite originally comes from the horse, and it may be taken direct from the horse, the cow, and other animals.

The common cause was formerly thought to be the barber's razor—hence, the name “barber's itch”—and it is more commonly seen in men who are shaved than in those who shave themselves or who wear beards.

Jamieson, however, believes “it is the brush and soap-box which is the real instrument of conveying the parasite, and not the razor, though a slight cut or scratch by the latter does favour implantation.”¹

According to Sabouraud, the fungus is always the *M. ectothrix*, and he says that the *Microsporon* and the *M. endothrix* never cause this disease. In confirmation, I may mention the case of the father of a child who had well-marked ringworm, *M. endothrix resistant*. He had a patch of this disease on his chin, but the fungus did not involve the hairs.

In a case I saw some little time since, the man was also suffering from *eczema marginatum*, and the same variety of fungus was probably the cause—*viz.*, the *M. ectothrix*. Again, I have never known the fathers of children with common scalp ringworm get parasitic sycosis. Hence, the old idea appears to be quite incorrect, that it was “the nature of the soil” that prevented men from taking ringworm of the beard when constantly exposed to infection from their children suffering from ringworm.

¹ *Diseases of the Skin*, p. 566, 1894.

Clinical Characters.—Parasitic sycosis commences like an ordinary patch of *Tinea circinata*, as an angry, red, scaly spot on the neck or the skin; and the place spreads with papules and an elevated margin, accompanied with much itching and burning, while the centre remains red and scurfy. Other places soon appear, and the disease may spread over the beard. At first the hairs are not involved, but sooner or later they get attacked by the fungus, and break off, leaving typical stumps. Often the disease spreads beyond the beard, forming patches of ordinary *Tinea circinata* on the skin of the neck; or it may commence on the neck, and involve the beard secondarily.

Very often there is much irritation, and some folliculitis, and after a time swelling and induration may come on, with pus formation and crusts, even kerion forming. In this, the second stage, the hair-follicles get deeply involved, and shaving becomes very painful. Then the skin may get nodular, and the disease resembles true sycosis. Pustules may be seen traversed by hairs. The deeper tissues may become involved, and firm raised masses of induration are formed, with a congested colour, tubercles, pustules, and scabs.

The hairs get dull and brittle, and the broken stumps can often be extracted entire, because they are loosened by inflammation and pustulation. The majority, however, break off. Sometimes the stumps are so rotten from the action of the fungus, that only black dots are to be seen, and it is difficult to remove even a small portion of hair for microscopical examination.

The tubercles are very characteristic, and may form large uneven masses of induration, with but slight pustulation. At other times the pustulation is excessive, a form of kerion being produced, and isolated pustules with hairs

coming through them. Crusts like those of impetiginous eczema also form, quite masking the disease.

I have seen cases of parasitic sycosis pass into genuine kerion, which of course loosened all the stumps and quickly cured the disease, after epilation of all the diseased hairs.

The suppuration in neglected cases may be so severe that permanent scars are left.

The places usually attacked are the submaxillary regions and the chin. The upper lip and the upper portions of the face are rarely infected. If left untreated, it generally spreads all over the chin, from one side to the other; if neglected, this affection may last for years; and, if the fungus be not thoroughly eradicated, it will probably relapse.

Age.—It is most common in young adults.

Diagnosis.—In its first stage, it is easily recognised by the characters already given for *Tinea circinata*; and, when the stumps have formed, there ought not to be the least difficulty about the diagnosis; but, when the second stage has been reached, it may be confounded with non-parasitic sycosis. Very often the ringworm extends to the neck or face, beyond the limits of the beard—especially in the first stage—and then the usual characters of *Tinea circinata* are seen. Parasitic sycosis, if neglected, generally spreads all over the beard, while the non-parasitic variety is often restricted to a certain portion, is often symmetrical, and does not itch. As a rule, non-parasitic sycosis exhibits more crusting.

The upper lip is rarely invaded in parasitic sycosis, while it is often involved in the non-parasitic variety. The hairs in the parasitic form are swollen and brittle, and broken off, forming stumps or even black dots.

The stumps are sometimes loose, and may be extracted without pain; while the hairs are firmly fixed in the non-parasitic variety. The microscopical examination of the stumps will always decide the question.

Sycosis may remain as an independent malady after all the fungus has been destroyed.

Microscopical characters.—It is generally very easy to extract some of the hairs with the bulbs entire, as they are often loosened by inflammation. The fungus will be found to belong to the *Megalosporon ectothrix* variety, or rather "*endo-ectothrix*" (usually of a large kind); and the mode of invasion of the hairs (see p. 9) and the microscopical characters have already been described (see p. 93). It is not correct to call this fungus simply an *ectothrix* form, as it undoubtedly enters and exists also inside the hair-shaft. I have seen the hairs simply rotten with fungus inside as well as outside them; and have often seen the hair-shaft infiltrated with many rows of chains of mycelial spores.

Fox and Blaxall give an excellent plate in their paper of a "shaft infiltrated with sporulated threads from a case of *tinea sycosis*." They also say: "The *ectothrix Trichophytons* appear to attack the hairs on the same plan as in the scalp and the beard—*i.e.*, they both infiltrate the hair, and form an extra-pilar spore-sheath."¹ (See also p. 93.) Jamieson also reports that the fungus enters the shaft (see p. 10). (See Plate IV., and V., Fig. 6.)

The fungus, of course, is at first outside the hair-shaft, and it is always to be seen there; but it is inside as well. Adamson, describing a hair from a case of parasitic sycosis, says: "Surrounding the upper part of the intra-

¹ *Brit. Jour. of Derm.*, July—September, 1896.

follicular shaft were bundles of jointed rods and groups of spores, forming an interrupted sheath." . . . "Within the follicular part of the shaft itself, lying just beneath the cuticle—which remained intact—were long strings of square jointed mycelium, passing downwards towards the root, branching frequently, until, at the lower part of the shaft, they formed a dense network, ending always as a fringe just at the junction of the soft bulb and shaft." . . . "The stumps of hair thus formed had often the appearance of large-spore *endothrix*—*i.e.*, their cuticle remained intact, and the hair substance was filled with strings or chains of spore-like bodies."¹

These observations conclusively show that the first view—*viz.*, that this fungus does not invade the hair substance—is wholly incorrect; and, in future, the term "*endo-ectothrix*" ought to be employed, instead of simply "*ectothrix*," for this variety of fungus.

TINEA TRICHOPHYTINA UNGUIUM: ONYCHOMYCOSIS:
RINGWORM OF THE NAILS.

Very rarely, indeed, some of the finger-nails become infected with the fungus of ringworm. According to Sabouraud, it is due only to the *Megalosporon ectothrix*.

Characters.—The nails get dry, opaque, and thickened, furrowed, fissured, and brittle, especially along their free borders, and there is a tendency to split longitudinally.

The disease can be diagnosed only by finding the mycelial threads, as similar general characters are found in psoriasis. It pursues a very chronic course, and is very difficult to cure.

¹ *Brit. Jour. of Derm.*, August, 1895.

CHAPTER VI.

TINEA TONSURANS: TREATMENT.

INTRODUCTORY REMARKS—SUGGESTIONS FOR TREATMENT—TREATMENT WHEN A CASE IS FIRST SEEN—REMOVAL OF THE HAIR—EPILATION—PRIMARY TREATMENT OF ONE OR A FEW PLACES—OF EXTENSIVE RINGWORM—GENERAL SUGGESTIONS—SELECTION OF A TREATMENT.

INTRODUCTORY REMARKS.

THE probable time any given case of *Tinea tonsurans* will take to cure depends chiefly upon the *extent of surface* involved by the disease, when the case is first efficiently treated. The age of the patient, and the variety of the fungus, have also to be taken into consideration (see p. 58). Whether there are a few very small places, or one or two moderate-sized patches, is a point of importance also. The smaller the places, the easier it is to cure ringworm; for special remedies may then be employed to cause follicular inflammation, and loosening of the stumps, without any risk.

As every fresh place makes the rapid cure of the disease less likely, the first duty of the medical attendant is to take efficient measures to prevent ringworm from spreading. Many slight cases of scalp disease are allowed, through no treatment, or inefficient treatment, to drift into extensive, and sometimes almost incurable, forms, by the neglect of precautions to prevent the spread of the disease—specially by trying to stamp out a patch of

ringworm, without using parasiticides all over the head. By reason of this omission, it is not unusual to find the disease rapidly spreading, while (and because) all the attention is given to one place only.

As a rule, *recent* small patches of the disease are easier to cure than *chronic* forms; but this is chiefly due to the number of the places, and to the extent of surface involved, in chronic cases. A small patch of ringworm, which has existed for months, is as easy to cure as one only a few weeks old, if the hairs be fully impregnated with the fungus, for the mycelium is as deeply seated in the one case as in the other (see p. 102).

There is no doubt that the nature of the soil, as before mentioned, has much to do with the spread of ringworm (see p. 37). What the special condition is, that favours the spread of the fungus so rapidly in some cases, is not known. Some children seem to have a remarkably suitable soil for the fungus to grow in; and, in such, the disease may spread so rapidly as to cover the whole head before it is well taken in hand. Such cases are often most difficult to get quite well.

Nothing is easier to cure than small patches of *Tinea circinata*; but it is a very different matter when the hairy scalp is involved. Most of the known treatments are very disappointing; and, at times, one treatment after another may be tried for months and years, and yet the disease will remain over most of the scalp, defying all known means of treatment. Quick cures, except by inflaming the places, and loosening the hairs, are very rare; and sure results can be obtained only by the thorough long-continued employment of active remedies.

It is essential to remember, that the cause of the disease is a rapidly growing fungus; that it exists inside the hairs,

deeply seated in the hair-follicles, even to the junction of the root-shaft with the neck of the bulb; and that it is useless to kill the fungus in the *upper* part of the follicles and the hairs only, leaving the mycelial fringe to propagate the disease.

Epilation is not of much use, for the diseased hairs almost always break off, leaving the root-part and the mycelium behind, the hairs growing up again as diseased as ever.

Since the last edition of this book was published, many new remedies have been suggested. I have tried them all, and hoped to be able to report that at length a certain cure for this complaint had been found. This is not so. Many men say they have found specific cures; but all the new treatments have gradually subsided, like the older ones, into the long list of more or less useful, but not even usually successful, remedies.

To save others from making useless experiments, I may mention that, some years ago, I tried the constant application of different remedies by means of india-rubber caps of all sizes, from one inch to a cap large enough to go over the entire scalp. I had them made with a flat, solid band at the edge, and was able to fix them on the scalp, after shaving the hair round the patch, by means of a solution of india-rubber. After fixing them, I injected different solutions, but found that the skin would not tolerate the constant application of any parasiticide in spirit and ether, except boric acid, as all other remedies very soon produced an eczematous condition, and made the disease worse. I was enabled to keep the entire scalp, in some cases, constantly soaked with this lotion for weeks and weeks, and thus hoped, by the exclusion of the air, and the constant application of a parasiticide, to kill the fungus;

but I was grievously disappointed. To make a very long story short, I found such constant applications quite useless, and gave up experimenting with them.

It was then suggested to me by a medical friend that a cure could always be effected by applying *freshly made* sulphurous acid gas. I had an apparatus made, enabling a nurse to discharge a constant supply of sulphurous acid gas, by passing a stream of air over burning sulphur, and forcing it through a tube on to the scalp.

The places were first prepared by shaving, and washing with spirit and ether to remove the grease. Then they were thoroughly soaked with hot water, a thin gutta-percha cap put over them, and the gas pumped on to the wet places. I had this done three times a day, for half an hour at a time ; and, though I tried it in numerous cases, there was no result. It seemed to be no better than applying an ordinary freshly made solution of the gas, a common way of treating ringworm.

Then I had a large copper cap made, with a sausage-shaped india-rubber tube, just inside the edge. When the cap was applied over the head, the tube was inflated at one time with air, and at another with water, and I tried all I could to make a joint that would stand some pressure inside the cap, intending to apply sulphurous acid gas (condensed in a bottle) under pressure to the scalp. This apparatus was also a complete failure, as directly I applied any pressure the gas escaped round the cap, and I was not able to form a joint that was of any use. I am sorry I have so far failed in this experiment, as it is quite possible that sulphurous acid would penetrate into the follicles, and kill the fungus, if only it could be applied under sufficient pressure ; but I much doubt whether any child would stand the pain of such pressure long enough to do any good.

I have tried every solvent I know : petroleum in all forms, ether, chloroform, benzol, turpentine, bisulphide of carbon, volatile oils, ammonia, and other alkaline solutions, but with no definite results. I have often known extensive cases of *Tinea tonsurans* resist, one after another, all the well-known remedies for years. I once had a boy brought to me who had had chrysophanic acid applied to the scalp for two years, without result. In fact, where croton oil is out of the question, I know of no way to cure these extensive cases, if they resist the different treatments mentioned later on.

Crocker very truly remarks: "The treatment of *Tinea tonsurans* remains the opprobrium of the dermatologist's art, from the difficulty experienced in carrying the parasiticide deeply enough into the follicle. As in all obstinate diseases, a legion of remedies are put forth as certain and speedy cures. I know of only one certain remedy—namely, *perseverance*."¹

Colcott Fox also says: "Resort must be had to local remedies ; but for generation after generation dermatologists had tried over and over again the old remedies, and, except for increased knowledge relating to the fungus, and the more rational and precise use of remedies, not much advance had been achieved since the beginning of the century."²

Remedies may act in three ways: first, by killing the fungus *in situ*—parasiticides ; or, secondly, by setting up some inflammation around and in the hair-follicles, or causing some alteration in the nutrition of the hairs, whereby they come out, and a temporary Alopecia is produced (many remedies may act in both these ways) ;

¹ *Diseases of the Skin*, 1893.

² "The Treatment of Chronic Ringworm of the Scalp," *Brit. Med. Jour.*, August 26th, 1893.

or, thirdly, mechanically, as by epilation with forceps, or by adhesive plasters, collodion, etc. These latter means rarely cure ringworm, though they may materially help.

I am strongly of opinion that *Tinea tonsurans*, except in young children, is rarely cured by the simple penetration of some parasiticide into the hair-follicles, and into the hair-substance, whereby the fungus is killed *in situ*; but I believe a certain amount of folliculitis is always caused, followed by exudation and loosening and subsequent shedding of the diseased hairs, before the disease is cured; unless, by some means, we interfere with the nutrition of the hairs, so that they come out and leave temporary bald places—a condition of “artificial Alopecia.”

In fact, to cure ringworm, *all* the diseased hairs *must* be got out of the follicles. I have never seen hairs fully impregnated with the fungus of ringworm (small- or large-spore) suddenly grow up healthy again, and free from fungus, under the action of parasiticides. This certainly ought to take place, if the fungus could be killed *in situ*, without producing sufficient inflammation of the hair-follicles and exudation to loosen the hairs, to cause a temporary Alopecia. But, when a patch of ringworm is cured, all the diseased hairs invariably come out, and fine, new downy ones grow in their place.

When using croton oil, the diseased hairs usually come out first; and, very often, the healthy hairs withstand the pustular inflammation, and remain on the patch, while all the diseased hairs drop out; clearly showing that it is much easier to loosen and get out diseased hairs, than healthy ones. I take advantage of this, and now very often manage to get all the diseased hairs out of the patches, and leave the healthy ones in. The diseased ones come out with the root-sheath and the fungus.

In 1893, I gave the views I then held, and which I still hold, at the Dermatological Section, at the annual meeting of the British Medical Association, in the following words¹ :—

“SUGGESTIONS FOR THE TREATMENT OF RINGWORM OF THE SCALP.”

“I. The treatment of extensive ringworm is still most unsatisfactory, as many cases resist all remedies for many months, or even years.”

“II. The new remedies suggested during the last ten or twelve years are no better than the old ones—such as sulphur, or oleate of mercury.”

“III. It is not new parasitocides which are required, but some reliable means of getting them into contact with the deeply situated fungus. Therefore, my chief experiments during the last few years have been with different vehicles ; but, so far, I have not been able to find any ointment base, or liquid, that can be relied on to penetrate to the bottom of the hair-follicles and hairs, and thus to kill the fungus *in situ*.”

“IV. For some time, I have been convinced that ringworm is rarely eradicated by getting the so-called ‘parasitocides’ into contact with the fungus ; but, while their use is essential to prevent the spread of the disease, yet, if such cases are cured, it is almost always by producing some alteration in the nutritive condition of the skin, so that the diseased hairs come out, leaving an ‘*artificial Alopecia*’ ; or by causing irritation and exudation around and in the hair-follicles, so that the invaded hairs, together with the fungus, are thrown off, and a *temporary bare place* is left.”

¹ *Brit. Med. Jour.*, August 26th, 1893.

“ My chief reason for this assertion is the fact, that hairs once invaded by the *Trichophyton tonsurans* do not recover under the use of parasiticides, and thus grow up again in a healthy condition ; but the *diseased* stumps invariably come out if the case be cured, and new downy hairs replace them, which are not invaded by the ringworm fungus.”

“ V. How is this result to be obtained ? After twenty-three years' experience in treating a very large number of cases of ringworm, I am still of the same opinion as when I wrote to *The Lancet* in January, 1880, where I strongly advise croton oil as the best irritant for the attempted artificial production of 'Kerion,' or at least of sufficient exudation into the follicles to cause the diseased hairs to be thrown off with the discharge.”

“ But it is necessary that the greatest attention should be paid to the details of this strong treatment—as I then fully described—or else trouble, or even slight scarring, may result ; one of the most important being that a parasiticide, such as carbolic glycerine (1 in 8), should be freely used, and the places must be bathed and poulticed constantly day and night, so that no scabs can form, under which ulceration might occur. The few scars I have seen produced by some medical men have been due to neglecting this precaution.”

“ VI. For the treatment of that variety of the disease called *disseminated ringworm*, where there are isolated stumps about the scalp, I feel certain the best plan is to cause each stump to be thrown off by individually needling each hair-follicle with a properly shaped fine needle—like the one exhibited—dipped in croton oil, containing an eighth part of carbolic acid. If this cause too much pustulation, creasote may be used.”

“If there are only a few stumps to be removed, it may easily be accomplished by electrolysis.”

“VII. Lately, I have used the croton-oil treatment for small patches of *recent* ringworm with great success, taking special care to prevent the spread of the disease first, by sulphur ointment. Thus, I have many times cured cases in a few weeks, that years ago would have taken me as many months, or even much longer, under ordinary ointments or lotions.”

“VIII. In conclusion, I feel certain that, in ninety out of every hundred cases I have really cured, I have had to employ croton oil sooner or later to the patches, or have had to needle out some isolated stumps, left after other remedies had failed. But there is no doubt in my mind, that, if some more simple, yet certain plan, could be discovered for causing the diseased hairs to fall out, forming an *artificial* and *temporary Alopecia*, it would be a grand success for eradicating this most troublesome and obstinate disease.”

To show that the above opinion is now gaining ground amongst dermatologists, I will quote some very recent remarks by Leslie Roberts, who wrote in 1895: “The lesson which we had to learn was, that, when once the fungus had entered into the interior of the follicle, we ceased to have any further *direct* control over it.” . . . “When once the fungus has entered into the interior of the follicle, we can influence its life only in an indirect way. This indirect therapeutic influence consists of our power to artificially provoke proliferation of the living cells of the follicle, and to excite the subjacent blood-vessels.” Roberts then says the rational treatment of ringworm is “to excite the soft cells of the affected follicles to a

physiological proliferation, or to a luxuriation (pus formation), which should not pass beyond the limits of the epithelium.”¹

This fully agrees with the opinion I have held and published for years ; and I think that croton oil, *if properly and carefully applied*, is the best means we *at present* possess to bring about this result.

Just before going to press, a remarkable article has been published by Wickham, on the *supposed* “microbial origin of baldness,”² which will be fully referred to under “*Alopecia areata*.” In it he says : “After four years devoted to the mycological and therapeutical study of *Tinea tonsurans*, and after trying in succession all the remedies devised for its cure, Sabouraud came to the conclusion that no antiseptic treatment is absolutely efficacious in the case of a *Tinea* fungus which has invaded the hair as far as the root. This is due to the inaccessibility of the root to antiseptics, owing to the narrowness and depth of the hair-follicle, which prevents the diffusion of all the therapeutic agents which have been employed. He has furthermore become convinced that, if, as appears in favus, one could make a complete series of epilations without breaking the hairs, *Tinea tonsurans* would be rapidly cured. But the diseased hairs break off close to the surface, and so it is necessary to take care to enucleate them by working somehow from below, by the root or even the follicle, killing the latter ‘temporarily.’ Following on this line of argument, and applying it to Alopecia, Sabouraud came to the conclusion that, if the loss of hair in this disease is due to microbial intoxication, the toxins

¹ “The Treatment of Ringworm,” meeting of Brit. Med. Assoc., *Jour. of Derm.*, October, 1895.

² *Brit. Med. Jour.*, April 24th, 1897.

of the micro-organisms would be capable of inducing Alopecia. It would then be possible to use them to produce a temporarily bald area at any desired spot, and so to cause a spontaneous falling out of the Tinea-infected hairs, which are too fragile to be removed by epilation."

What is here claimed as *new* suggestions were made by me years ago, and have been regularly acted upon in my own practice. As I have before said, my chief experiments have been towards causing such temporary bald places.

I at once wrote a letter, quoting the remarks I made in 1893 (to be found on pp. 147 and 148), and said: "If this be possible, it will be fully following out the views I have held for years—namely, that ringworm of the scalp is rarely cured by the direct action of a parasiticide on the fungus *in situ*, but by causing some alteration in the nutrition of the hairs, so that they come out, and thus produce a temporary bare place, or an 'artificial Alopecia.'"¹

In fact, I wrote in 1880: "The simple and plain truth is, that there is not a single plan (except the use of strong caustics which will form scars) which can be relied on with absolute certainty to cure ringworm of the head."

Of course, the primary suggestions in the *Journal* for April 24th, 1897, are not at all new; but, if Sabouraud's investigations enable him to produce a toxin, which, when injected under the skin in a patch of Tinea, will produce a *limited* and *temporary* Alopecia, he will have solved the problem of rapidly and surely curing *Tinea tonsurans*, and thousands will benefit by his discovery, which I even looked forward to in 1893 as quite possible (see p. 149, line 14).

In fact, before this book is published, Sabouraud's way of artificially producing a limited patch of Alopecia may

¹ *Brit. Med. Jour.*, May 1st, 1897.

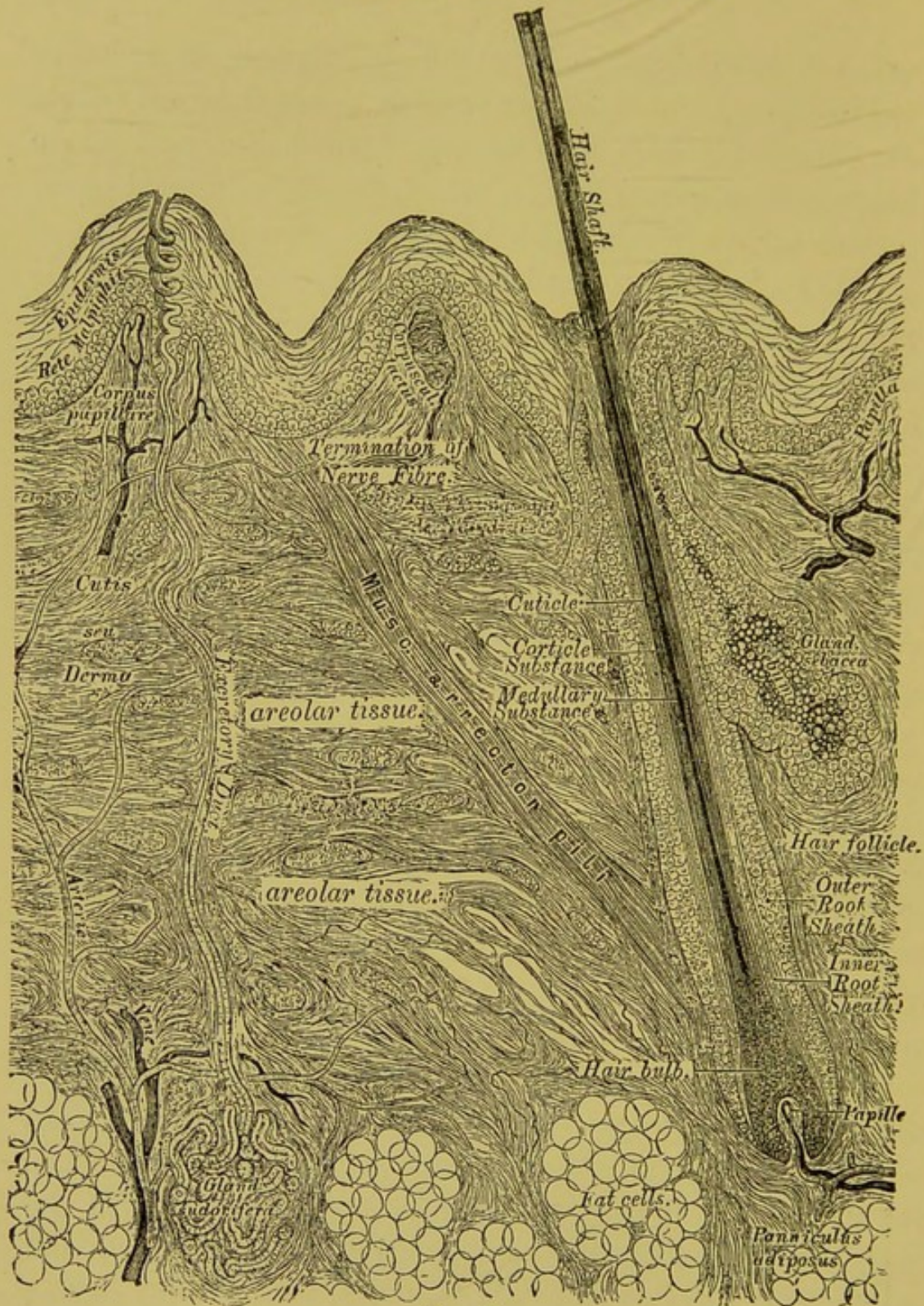


FIG. 3.

Fig. 3 is a general diagrammatic view of the skin, after Heitzmann. It shows three divisions of the skin : *viz.*, the epidermis, or epithelial part ; the corium, or true skin or fibrous part ; and the subcutaneous tissue, panniculus adiposus or fat layer. In the upper part of the

possibly be published in the journals. If so, the new treatment may supersede all the old ones about to be described; but croton-oil needling will still remain the quickest way of removing isolated stumps.

Sabouraud has discovered so much with regard to the plurality of the fungi in ringworm, that we must wait patiently to see if his prediction will be verified, especially as the temporary production of *Alopecia areata* (as I shall fully refer to under "Alopecia") is the surest way of curing ringworm, if it can only be produced. I am afraid no *limited* bald area will be produced by the injection of the toxins of the micro-organisms found with seborrhœa and *Alopecia areata*, as I do not believe the latter disease is *solely* due to any such toxin; if it were, *Alopecia areata* would be much more common than it is, since these micro-organisms are to be found with all seborrhœa (see Chapter XII.).

With regard to the possibility of finding a vehicle that will always penetrate, and carry some parasiticide, deeply enough to kill the fungus with certainty *in situ*, it must be remembered that the hair-follicles are practically closed below the openings of the sebaceous glands into them, and that neither ointments nor lotions can penetrate very deeply (see Fig. 3). My belief is that no such vehicle will be found. Again, any parasiticide has not only to penetrate into the follicles, but also into the hair-substance, in order to kill the fungus forming the corium, called the papillary layer, are the skin papillæ containing vessels and nerve terminations and lymph spaces, while the middle and deep layers contain the vascular plexuses, the hair-follicle, its muscle, and sebaceous glands, and the tortuous sweat-duct which traverses it to reach the sweat-coil situated in the fat layer.

Copied from "Diseases of the Skin," by Radcliffe Crocker (by permission).

mycelial fringe. Then, too, the hair is constantly growing upwards, while the mycelial threads are passing downwards into the newly formed substance at the same rate. Thus, there is constantly new fungus forming, and getting out of the reach of any parasiticide which simply soaks into the hair-substance.

It is not as if the fungus and hair were not growing, for then something might be found to penetrate; but the fungus generally grows into the soft part of the hair more quickly than any parasiticide can be made to penetrate into the hair-substance, and kill it.

THE TREATMENT WHEN A CASE IS FIRST SEEN.

When a child is first brought for treatment, it is of the utmost importance to prevent any further spread of the disease. This is especially necessary when the case is recent, for fresh places of ringworm are more likely to spread than those which have existed for months.

The first thing to do is to most carefully examine the whole scalp; but a casual glance at first will show whether it is an extensive case, or whether there are only a few places. I find a "head-rest" of very great value; for, without one, it is very difficult to keep a child's head quiet for ten or twenty minutes, while the whole scalp is carefully scrutinised with a lens. I use a stand with a movable head-rest, like the back of a dentist's chair, but mounted on a pedestal, so that I can place the head-rest, covered with a towel, in any position I may require. I have the patient sitting on a stool of the proper height, with his or her back to me (as described on p. 65), and a good light on my right hand.

I always examine the entire scalp, and carefully mark

out all the places, provided the disease is not so extensive as to make it necessary to shave the head. The first thing to settle is whether there are only a few places that may be marked out, or whether the head must be shaved.

The Removal of the Hair.—Many men advise that all the hair be removed, no matter what the size or number of the places may be. I strongly object to this course: firstly, because it is unnecessary in most cases; and, secondly, because, if there be only a few small places, they require special and strong treatment, which cannot be so well applied if the whole head be shaved, and the position of the patches lost. Very often the necessary time for marking out all the places is objected to, and the head is simply ordered to be shaved.

A short time ago, a boy contracted one small spot of ringworm, the size of a split pea, and the medical man who first saw him at once ordered the head to be shaved—an entirely unnecessary procedure.

If there be only a few places (Division I., Chapter VII.), it is much better to carefully mark them out, first with a blue pencil or red ink, and then to shave or closely cut the hair from them, and for a third to half an inch around them. It is well then to go over the scalp a second time, to be certain that no small places have been overlooked.

I do not advise the removal of all the hair unless the patches are very extensive, or unless it is necessary, at any rate for a time, to treat the whole of the scalp with the same remedy. At times, a number of places may be found on one side, so that it is necessary to shave the head on that side, and only a few marked places on the other side.

But, if the disease is very extensive (Division II.,

Chapter VIII.), the head should be shaved, or very closely cut with a pair of scissors.¹

If there be much irritation present, and shaving is likely to cause abrasions or cuts, it is better to closely cut with the scissors. I often use the miniature horse-clipper² to remove the hair at first; but this instrument does not cut the hair close enough to the scalp, for the shorter the hair the easier it is to rub in ointments.

If it is necessary to shave the head, I generally advise a small fringe to be left, from half to one inch, all round the head, and almost always at the back and front, for the sake of appearance. The fringe should always be left, if the disease does not extend to the forehead or the neck, as the look of the child is so much improved by it when a cap is worn. It can do no harm, as the parasiticides employed can easily be rubbed into the roots of the hairs that are left.

It is always advisable to examine the fringe after shaving, to see if there are any diseased places left; and, if so, they should be marked out. It is, however, unusual to find patches of ringworm at the edge of the scalp. If the disease involve the edges as well, the entire scalp should be shaved, or closely cut.

Shaving the whole of the long hair from the head of a girl over eight or nine is much objected to by mothers, and I always cut the places, and stop the spread of the disease by parasiticides, if possible. Experience alone will teach when it is safe to leave the hair.

¹ Small, round-pointed, curved, eye scissors are very useful for keeping the hair closely cut, and are specially made for this purpose by Messrs. Arnold & Sons, Smithfield, E.C.

² This can be obtained of the instrument-makers; and medical men, who have many ringworm cases to treat, may find it worth procuring.

If only a few patches have to be marked out on a boy, the rest of the hair had better be cut to half or one inch long ; but, if the patient be a girl with long hair, I avoid this, whenever possible.

If the hair be not removed, of course the whole scalp must be most carefully examined from time to time, to see that there is no spread ; and, if the disease spread in spite of treatment, the sooner the scalp is shaved the better.

The great advantage of marking out the places is, that they can be specially treated by some strong parasiticide, which, of course, cannot be used to the whole scalp.

If the head be shaved, in the small-spore form, the places can usually be seen as round, dry, scurfy spots, of a dull greyish or almost leaden hue.

Epilation.—If there be only a few places, and especially if the ringworm be recent, it is of great importance to epilate as many of the diseased hairs as possible. This ought to be done before the places are cut ; in fact, the best way to mark out the places, if there be time, is to epilate all the hairs, and even those for a quarter of an inch around the diseased places. This is specially useful in the *Megalosporon endothrix, resistant* form, as many will come out ; but it is almost useless with the *fragile* variety, as they break off level with the skin. In the *ectothrix* form, often most of the hairs can be extracted the first time the case is seen.

On p. 112, the case of a girl who suddenly had some scaly spots is mentioned. On careful examination, one diseased stump was found, and the sudden spread was probably due to this. I at once used strong parasitides, to try to arrest the spread of the disease. As no hairs broke off or appeared to be diseased, I waited two days, and

then, finding a few of the hairs getting involved with fungus, I spent two hours in extracting the whole of the long hairs from the patches, and for a quarter of an inch round them. I knew from old experience that this scalp was like a piece of tinder, and only required a spark to set it alight, as I had seen the disease spread on it twice before (this is the case mentioned on p. 30). This early epilation entirely prevented the spread of the disease, and the case was soon cured under the croton-oil treatment.

I generally use a broad-pointed pair of forceps (Fig. 4) to remove the hairs, so that many can be seized at the



FIG. 4.

same time. They must be pulled very gently indeed in the axis of growth (see "Epilation" in Chapter VIII.).

Malcolm Morris also advises epilation if possible, and remarks: "Not only should all hair that is visibly affected be removed, but a ring of sound hair around the seat of disease, in order to prevent its spreading."¹

I. ONE OR A FEW SMALL PLACES: PRIMARY TREATMENT.

After removing as many diseased hairs as possible by epilation, and seeing that all the places are clearly marked out (it is better to cut the hair which falls naturally over the marked places, so that they appear distinctly to the eye), I apply some strong parasiticide to the patches, according to the special treatment to be tried (*see the following alphabetical list*), and order the rest of the hair,

¹ *Diseases of the Skin*, 1894.

if the patient be a boy, to be cut to about one inch, and some parasiticide to be applied to *the whole scalp* as soon as possible. There are many things that may be employed for this purpose, and they will be found in Chapter VIII., under "Preventive Lotions and Ointments"; but my favourite applications at first are, either :—

℞ Sulphuris Præcipitati	.	.	.	ʒj. ad ʒjss.
Acidi Salicylici	.	.	.	gr. xv. ad xxx.
Adipem Benzoatum	.	.	.	ad ʒj.
Misce.	Fiat unguentum.			

Or—

℞ Sulphuris Præcipitati	.	.	.	ʒj. ad ʒjss.
Hydrargyri Ammoniaci	.	.	.	gr. x. ad xv.
Creasoti	.	.	.	m. xv. ad xxx.
Adipem Benzoatum	.	.	.	ad ʒj.
Misce.	Fiat unguentum.			

I find that ringworm hardly ever spreads, if either of these ointments be freely rubbed into the roots of the hair once a day, directly *after* washing the head. Of course, small places which are just commencing, though unseen at first, will appear during the first fortnight, and must be found and marked. After this, there ought to be no further spread of the disease, and then I usually use carbolic glycerine (1 in 8), or one of the preparations mentioned in Chapter VIII.

During the treatment of the case, the hair should be kept very closely cut over the places, about twice a week, until the new downy hair commences to grow ; and parasiticides must be kept applied until there are no diseased hairs left ; but it is always easy enough to needle out a few diseased stumps, as described in Chapter IX.

Epilation is not always necessary, but, if done, it should

be before cutting the hair. It often, moreover, helps the penetration of the remedy.

II. EXTENSIVE FORMS : PRIMARY TREATMENT.

If the case be so extensive that the scalp has to be shaved, there is little danger of any spread for a day or two, and I simply order a preventive ointment, have the head shaved (except the fringe), and see the case in a few days, to mark out any places left in the fringe, before commencing the special form of treatment decided upon, which will be found in Chapter VIII.

III. DISSEMINATED RINGWORM, ETC.

In many cases, only a few small places are to be seen, with numerous stumps and isolated stumps, or black dots, about the scalp. The treatment I advise for this form will be found in Chapter IX., under "Croton Oil," and "Croton-Oil Needling."

General Suggestions.—It is always advisable to ask if there are any other children in the house, as more may be infected. I have often found on inquiry that one child has had a scurfy patch for some time, which may very possibly be found to be chronic ringworm. Sometimes I have found other children with ringworm just commencing, quite unsuspected by the mother or nurse. It is always advisable, therefore, to examine all the children.

General Directions, about the treatment of crusting impetiginous ringworm, the forms in very young children, hair-cutting, washing, the application of remedies, epilation, prevention of spreading, preventive ointments, and lotions, caps, general and constitutional treatment, period of

treatment, signs of improvement, and the removal of crusts and scabs, etc., will be found at the end of Chapter VIII. They should be consulted before adopting any of the following treatments.

THE SELECTION OF A TREATMENT.

Of course, there are innumerable ways of treating *Tinea tonsurans*, and many so-called infallible "specific cures," "never-failing remedies," and barbers' nostrums, which are said to cure the disease. Most of the ordinary disinfectants are also said to "cure ringworm."

The reason why so many things are thought to eradicate this complaint is due to two causes. Firstly, many of the "cures" are cases of body ringworm only, which is easily stamped out by any parasiticide; and, secondly, very many children are said to be well when they are still suffering from ringworm in a chronic and contagious form. I have so often drawn attention to this fact that this may appear mere repetition; but, considering the number of children constantly sent to me certified to be "cured," who still have ringworm, it would appear that all that has been written on this subject has made but little impression.

The rapidity with which different cases, of apparently equal severity, and due to the same form of fungus, yield to similar treatment varies greatly. Some go on unchecked for months, or even years, and may even spread, while others rapidly get well. A remedy which cures one child in a family may utterly fail with another.

Crocker very truly remarks: "The road to success is to be sought, not in this or that formula, but in perseverance with the various remedies indicated, coupled with the employment of parasiticides, which are not to

be hastily changed, if there is any progress at all, such progress being looked for month by month rather than week by week.”¹

If a medical man wishes to rapidly cure any case of ringworm, it is quite useless for him simply to write a prescription. He must, besides marking out the places, give most minute and definite directions to some suitable attendant, and be sure that his directions are carried out, and that the remedies are properly applied. Of course, if croton oil be used, it must be under the direct eye, and constant care, of the medical man who employs it. He ought also to thoroughly understand all the details of the treatment before having recourse to it.

It is useless to give all the treatments suggested for *Tinea tonsurans*, and I shall fully describe only those I believe are the best, divided into two classes: firstly, those for small places (Chapter VII.); and, secondly, those for extensive forms of the disease (Chapter VIII.). Those I do not approve of will be simply mentioned last.

The selection must depend on many things, especially the age of the child, the size of the places, and whether the patient is very delicate and sensitive, and not likely to bear pain, or a strong boy or girl, who will not mind some pain and trouble to get rid of the disease. The parents should always be consulted, whether they object to the use of a remedy which must cause some pain.

If I have to treat the case myself, I generally advise the croton-oil treatment for all *small* places (Chapter IX.), whether recent or chronic, if the child is old enough, and able to bear a little pain; but I certainly do *not* advise medical men, who have had no previous experience in using croton oil, to attempt the cure of recent or spreading

¹ *Diseases of the Skin*, 1893.

cases with it; for the greatest care has to be exercised to prevent any spread of the disease; the case must be continually watched, so as to produce the proper amount of inflammation, folliculitis, and pus formation; and this requires very special experience, to prevent any slight scarring from carrying the process too far.

“Formalin” is one of the most recently advised treatments; and, though I have not had such a success with it as I hoped, it often cures, and may be tried, provided the parents do not object to the *intense pain* the application causes. I find that it is far too painful a treatment to use much in private practice, especially if the case is extensive; and, where it cures the disease, I believe it does so, not by its anti-parasitic properties alone, but by causing inflammation and scabbing and loosening of the hairs. Again, I have many times utterly failed to cure ringworm with formalin, and have had to resort later on to croton oil. In such cases, I have lost much time; and I have always found that children, both young and old, have infinitely preferred the croton oil to the formalin.

If neither formalin nor croton oil be used, my favourite remedies for small places are salicylic acid, “chrysarobine” and salicylic acid, iodide of mercury, or Coster’s paste; but any in the following list may be tried, remembering that they may all be superseded by the future discovery of something that will with certainty produce a *temporary* patch of *Alopecia areata*.

CHAPTER VII.

VARIOUS TREATMENTS OF SMALL PLACES OF TINEA TONSURANS.

ACETIC ACID—CARBOLIC ACID—"CHRYSAROBINE"—COPPER—COSTER'S PASTE—CREASOTE—FORMALIN—IODIDE OF MERCURY—IODIDE OF SULPHUR—IODINE—NITRATE OF MERCURY—PERCHLORIDE OF MERCURY—SALICYLIC ACID—SULPHUR—SULPHUROUS ACID—THYMOL—TURPENTINE—VESICANTS—AND REMEDIES NOT ADVISED.

THE following treatments for *small* places of ringworm are arranged alphabetically for easy reference, while those for *extensive* ringworm will be placed in the following chapter, and the croton-oil treatment in Chapter IX.

N.B.—The previous chapter must be consulted for the primary treatment, etc. ; and, in using any of the following treatments, it is most important to employ some milder parasiticide all over the head, to prevent the disease from spreading (see p. 159).

Besides the marking out and washing suggested, it is sometimes advisable, previous to the application of any parasiticide, to wash the places with ether and spirit (1 in 4), which remove the grease and epithelial *débris* from the mouths of the follicles. From five to ten grains of salicylic acid may also be added to this lotion.

(1) ACETIC ACID.

Strong acetic acid (*acidum aceticum*), not the glacial,

is a very old and useful remedy for ringworm ; but it makes a powerful application if constantly employed, and forms a hard scab. Sometimes it is used with sulphate, or acetate, of copper (gr. x. to xv. in ℥j.), or perchloride of mercury (gr. iij. in ℥j.). (See p. 182.)

I rarely employ acetic acid for recent ringworm ; but, at times, it is useful to apply, mixed with water, to the scalp before rubbing in other parasiticides. It can then be used as strong as the skin will bear it without producing any scabs. Mixed with iodine liniment, it forms an excellent parasiticide for small spots on the body.

(2) CARBOLIC ACID.

Carbolic acid¹ *diluted* is a favourite parasiticide, while it also acts by causing a certain amount of inflammation, which may loosen the hairs. It has been advised full strength, but this is dangerous, even for small places. I have often tried it and failed, and now never attempt to arrest the disease by applying strong carbolic acid. I generally use it with glycerine, or lanoline.

Carbolic Glycerine may be freely dabbed into small places, especially when first discovered, to prevent any spread of the disease. The strength should be one part of carbolic acid to two, three, or four parts of glycerine, according to the size of the places, and the age of the child. The scalp will very rarely bear equal parts without scabs forming, and I think it is a mistake to form scabs when using this remedy. It must not be used too strong to a young child : it may be commenced one in five, and

¹ It is advisable to order Calvert's carbolic acid, No 2.

then increased, if the scalp will bear it. Carbolic glycerine *alone* very rarely cures ringworm, and I have given it up, except as a parasiticide for early use, and then later on all over the head (1 in 8) as a preventive. I generally employ this when curing small places with croton oil, and have never seen any harm from using one part in eight all over the head for some time.

When using strong solutions of carbolic acid over an extensive surface, it sometimes—but *very rarely*—happens that the child appears drowsy after its use, as if some portion had been absorbed, and I once saw the urine darkened after a strong application over the whole scalp. If any symptoms indicative of absorption occur, the application should be at once stopped.

Ointments.—If used alone to small places, it may be melted with anhydrous lanoline (ʒj. to ʒijss. in ʒj.), or it can be added to ointments (ʒss. to ʒjss. in ʒj.). It may also be used with salicylic acid (ʒss. to ʒj. in ʒj.).

(3) GOA POWDER, CHRYSOPHANIC ACID, CHRYSAROBIN
(ARAROA, POH DI BAHIA).

If either of these remedies be used for ringworm, the Bombay Goa powder (Messrs. Kemp & Co., Bombay—called “chrysarobine”) is to be preferred, as it causes less irritation and staining than the ordinary Goa powder, and chrysophanic acid (or rather chrysarobin¹) ointment. If this special powder be used with proper care, no untoward result will happen, as is so often the case

¹ The powder that is extracted from Goa powder, and sold as chrysophanic acid, is not chrysophanic acid, but chrysarobin.

with chrysophanic-acid ointment, and the ordinary Goa powder.

Objections to its Use.—Goa powder stains, and spoils everything with which it comes into contact (as, for example, collars, pillow-cases, and linen); the hair becomes a dull purplish-red or brownish-red colour; and, if the preparation get on to the face, it causes great irritation, red staining, and roughness of the skin; if it reach the eyelids, they become œdematous, and the eyes inflamed. When used all over the head, it may produce an erythematous rash, something like rose rash, even with a temperature of over 100°. I have seen children very poorly indeed, with fever and headache and swollen eyelids, from Goa powder. Hence, I never use it all over the scalp without warning the parents of what may happen.

Although every precaution be taken, if used to a large portion of the scalp, or to the front part near the forehead, children frequently manage to get the chrysarobin on to their foreheads or faces, often by first scratching the irritated scalp, and then by rubbing the face and eyes. After using the remedy for a short time, pustular eczema may be set up on the healthy portions of the scalp. The places themselves may not become irritated, but the powder seems to collect about the hairs around the patches, and to cause eczema and crusts. The glands at the back of the neck generally enlarge, and become painful. I have constantly seen eczema, and even impetiginous eczema, caused by the use of chrysophanic acid, and of the ordinary Goa powder sold in this country.

Kemp's "chrysarobine" is a good parasiticide, *if* it can only be brought into contact with the conidia; and I have often noticed that this remedy appears to cure cases of

ringworm by destroying all the fungus within its reach. But it does not, as a rule, penetrate deeply into the follicles ; and, though the broken hairs, removed from the surface of the scalp, may appear to be free from fungus under the microscope, yet, if the stumps are carefully extracted from some depth, and the deep fractured end examined, plenty of conidia are generally to be found. Such cases are frequently certified as cured ; yet, in a week or two after the parasiticide is discontinued, the diseased stumps again make their appearance.

Often, after this remedy has been used, the follicles get marked out, as so many black dots, and the edges of the minute bits of scurf get coloured dark red, so that it is most difficult to determine whether any diseased stumps are present or not.

Therefore, it is advisable not to certify a case of ringworm to be well, after the Goa powder or "chrysarobine" treatment, until at least two or three weeks have elapsed since the application of the remedy, and until the new downy hair has appeared.

I think "chrysarobine" acts, not simply as a parasiticide, but by setting up some inflammation, and so loosening the stumps. In fact, as Malcolm Morris says : "Whatever excites inflammation is so far beneficial ; and many things, as Coster's paste, oleate of copper, carbolic acid, etc., all act in this way."¹

With "chrysarobine," as in all treatments that cure ringworm, the diseased hairs come out, and new downy hair grows when the case is well.

I use this remedy only for small and comparatively recent cases, as I have not found it of much value in the

¹ *Diseases of the Skin*, 1894.

extensive and chronic forms of the disease.¹ It may be used in many ways :—

Treatments.—*First plan.* The hair should be very closely cut on the patch or patches, and for at least half an inch round them; they should then be well washed with soap and water, and bathed with hot water. While the places are still moist, a little "chrysarobine" should be well rubbed into them with the tip of the finger, protected by an india-rubber finger-stall. The tip of the finger can be dipped, now and then, into a little hot water, in order to keep the powder moist. The rubbing should be continued for five or ten minutes, two or three times a day; the places being first thoroughly bathed with hot water. No excess of powder should be left on the patches, or it may fall into the eyes; and no powder should be permitted to remain at the outer edge of the patch, among the healthy hairs, as it may cause impetiginous eczema upon the healthy portions of the scalp. If much irritation occur, the powder should be discontinued for a few days, or some other treatment adopted.

Second plan. "Chrysarobine" may also be rubbed in with lemon juice, instead of water; and, when I use it for small places of recent ringworm, I often have it rubbed in with a lotion containing from twenty to forty grains of salicylic acid to the ounce, and think this is one of the best ways of applying the powder direct.

¹ A report by Crocker will be found in *The Lancet* of January 27th, 1877, on the use of Goa powder, in which he does not speak very favourably of the value of this parasiticide: "Of the whole twenty [cases] two were cured completely—in seven there was certainly improvement—the remaining eleven cases were only slightly improved, although the treatment was kept up for at least three months, and even longer." He also remarks: "Its disadvantages outweigh its advantages."—*Diseases of the Skin*, 1893.

Third plan. I prefer to use "chrysarobine" in an ointment, and generally order from twenty to sixty grains, combined with salicylic acid:—

℞ Chrysarobini (<i>Kemp & Co.</i>)	.	.	gr. xx. ad ʒj.
Acidi Salicylici	.	.	gr. xx. ad ʒj.
Olei Amygdalæ	.	.	ʒij.
Adipem Lanæ Hydrosum ¹	.	.	ad ʒj.
Misce. Fiat unguentum.			

Sometimes I add precipitated sulphur as well. This is a good ointment for recent ringworm. Directions should be given to have it well rubbed into the places for at least ten minutes at a time, two or three times a day, the strength varying according to the age of the patient, and the extent of surface involved. It very often cures recent places in young children; and, if proper precautions be taken, the excess of ointment rubbed off, and the surface protected with some covering, no unpleasant symptoms are likely to occur; but special caution must be given to prevent the ointment getting on to the face, or into the eyes. Malcolm Morris speaks well of chrysarobin.²

Unna's compound chrysarobin ointment consists of five parts of chrysarobin, two parts of salicylic acid, five parts of ichthyol, to one hundred parts of simple ointment. Duhring also advises chrysarobin.³

Fourth plan. "Chrysarobine" may be dissolved in chloroform or benzol, though it is barely soluble in spirit and ether. These solvents also dissolve the fatty matter from the follicles, and thus help the parasiticide to penetrate

¹ "*Lanoline*"; or it may be used with lard.

² *Diseases of the Skin*, 1894.

³ *Amer. Jour. of Med. Sc.*, February, 1893. See also a paper by Alfred Eddowes, *Brit. Med. Jour.*, April 15th, 1893.

deeply. In 1884,¹ I suggested a solution of seven grains to the ounce of chloroform, for cases of recent ringworm, where there are only two or three small places.

They must be very carefully marked out, the hair closely cut, and the chloroform solution be well pressed and dabbed into the places with a minute sponge-mop, for from five to ten minutes two or three times a day, according to the amount of irritation produced. The aim of this treatment is not to produce scabs, but to get the solution to penetrate deeply, and also to set up some inflammation in the follicles. The sponge-mop must be very small (the size of the end of the finger), and it should be constantly dipped into the chloroform solution, as it soon evaporates whilst it is pressed into the diseased spot, leaving the "chry sarobine" dry upon it.

The *places* should be well washed every morning with hot water and soap, to remove all sebaceous matter and scurf. Care should be taken to first wash off the "chry sarobine" from the places, and not to rub it into the surrounding part of the scalp, and thus stain the head; also that the lotion does not run on to the forehead or into the eyes, and that the person using it does not inhale the vapour. It is always advisable to give full directions to the nurse about the care necessary in using such a potent remedy, and to apply it to small places only. It is also well for her to keep her face away from the sponge, and to use the solution in a current of air, and not in a small and closed room.

It is not advisable to employ this treatment if the disease be at all extensive, or if a patch extend nearly to the forehead, as staining is sure to happen.

Plasters have been made containing chry sarobin, but I

¹ *Vide* "Therapeutic Memoranda," *Brit. Med. Jour.*, November 1st, 1884. See also a letter in the *Brit. Med. Jour.* for January 24th, 1885.

have not found them of any good. Some time ago it was suggested, that a solution of the drug in gutta-percha and chloroform should be painted on; but, of course, this will not penetrate far, and is quite useless for curing *Tinea tonsurans*.

(4) COPPER.

A solution of sulphate of copper was formerly used, but, if too strong, it may cause scars. The old "penny and vinegar" cure was acetate of copper; and both the acetate and sulphate are sometimes used in acetic acid (gr. x. to xv. in ℥j.). They may also be used in ointments (gr. x. to xx. in ℥j.), with sulphur, etc. :—

℞ Cupri Sulphatis	gr. x. ad xx.
Olei Juniperis Pyrolignei } (Huile de Cade) }	. . . . . ℥ij.
Sulphuris Præcipitati	℥ij.
Hydrargyri Ammoniati	gr. x. ad xx.
Adipem Benzoatum	ad ℥j.
Misce. Fiat unguentum.	

N.B.—This is too strong to use over an extensive surface.

The oleate of copper is the favourite form now, and will be described in the second section for extensive forms of the disease.

(5) COSTER'S PASTE.

This application is an excellent one for small places of recent ringworm :—

℞ Iodi	℥ij.
Oleum Picis Liquidum	ad ℥j.
Misce.	

It is advisable to write a prescription, and not use the

term "Coster's paste" only, as I once heard of a chemist who made up "Vienna paste" (potassa cum calce) instead of "Coster's," and the result was the formation of a very bad scar. Ebullition takes place when the two are mixed, for a part of the oil is oxidised, and a resinous deposit is formed. Therefore, it is best to use a paste which has been made some little time.

It is most important to well mark out the places, cutting the hair for at least half an inch around them, so that the scab which forms will not stick to the long hairs. The bottle must be well shaken, and the paste painted on with a stiff brush, the application being repeated once or even twice daily till a scab forms. The sooner this is picked off with forceps the better. Many of the stumps will be found to come out with the crust, which should not be left to come away by itself, but must be torn off by degrees. Epilation will then do good; and, after washing, some more paste can be applied, and the process repeated till all the diseased stumps have been got out.

This treatment has many advocates, and is well worth trying for small places, but it is a little painful when the scabs are pulled off. Very often I manage to reduce the size of the patches by this treatment, and then use croton oil to any small places which may be left.

Morrant Baker suggested that creasote should be used, instead of the oil of tar. This preparation, of course, smells very strongly, but it is a good application for ringworm.

(6) CREASOTE.

Creasote may be used undiluted to small places, or it may be mixed in ointments (ʒss. to ʒij. in ʒj.), or with turpentine,

iodine, etc. It is often employed to dissolve iodide of sulphur. It has a strong objectionable smell.

Creasote has also been used by P. Abraham by means of an apparatus consisting of a glass bell with two tubes attached with stop-cocks. To one is fixed an exhaust syringe, and to the other a tube containing creasote. The patch is epilated, shaved, and washed with soap and water, and then with ether, to remove any fatty matter. The glass bell is then applied over the place, and some air extracted. Then the stop-cock is turned, and some creasote let in. The air can again be extracted, and let in again, many times, so that the air is sucked out of the hair-follicles through the layer of creasote, and the creasote is made to penetrate by atmospheric pressure. This is repeated every two or three days.¹

This does good at times, but if there be only a few small places suitable for this treatment, I prefer to use croton oil, as the creasote often fails to cure, and I have had to employ croton oil afterwards.

(7) FORMALIN, OR FORMIC ALDEHYDE.

This new and very painful treatment was tried by Pottevin in 1894,² but he only used it in a 2 per cent. solution, applying it soaked in cotton-wool over the scalp, and covering it with an india-rubber cap. He was not able to use even 3 per cent., and in almost all the cases it failed to cure.

Dr. A. Salter again drew particular attention to it in 1896,³ but advised a very strong solution—*viz.*, 40 per cent. (Scheering's).

¹ *The Lancet*, October 3rd, 1894.

² *Ann. de Derm. et de Syph.*, July, 1894.

³ *Brit. Med. Jour.*, September 12th, 1896.

Formalin, as Salter has shown, has great bactericidal qualities, and will easily kill the fungus of ringworm, if it can only be brought into contact with it. It is supposed to penetrate better than any other parasiticide, but I believe the cases successfully treated by it are really cured, not by the simple penetration of the formalin, but by the inflammation and exudation it always causes. In fact, I consider it acts much in the same way as croton oil—*i.e.*, it loosens the stumps, which then come away with the scabs.

Salter showed that the vapour of formalin kills the *Trichophyton*, and that no cultures can be made from a hair soaked for five minutes in a 40 per cent. solution ; while cultures can easily be made from hairs soaked for the same time in strong carbolic lotion, and in a solution of perchloride of mercury. Salter also speaks of œdema of the face, coming on some hours after formalin was used, and says : “ In one boy, this was so extensive as to completely prevent vision, from swelling of the eyelids, and the forehead pitted half an inch on pressure. The skin, however, was neither hot nor red, and there was no pain or constitutional disturbance. The œdema only occurred when the area treated was very large, and the conditions are probably analogous to that produced by a nettle sting on a big scale.”

Of course, the œdema and pain of the sting of the nettle are due to formic acid ; and this remedy seems to produce similar trouble. I have often seen œdema produced round even small places, and the skin pitting for a third of an inch ; and, in a case I lately tried it on unsuccessfully, the forehead was covered with patches of erythema, and the skin pitted half an inch, and the upper part of the face and eyelids were swollen. So far, I have never used this severe

treatment to any extensive form of ringworm, and, from what I have seen of its action, I should not care to do so. I have used it only to small places, which I could easily have cured by applying croton oil. One advantage is, that, though dark hard scabs may form, even with some pus, and the scalp be even depressed by the scab, leaving the skin white and smooth afterwards, and looking as if it might be a permanent bare place, yet a distinct scar is rarely produced.

If the case is cured, though a bald spot may remain for a time, the hairs generally grow again; but I have seen it cause a partial permanent loss of some of the hairs, so that the place could easily be noticed by the scanty growth of the hair afterwards.¹ In one case, also, distinct, small, and permanent bare places were formed, certainly worse than I have ever caused with croton oil; but it is a safer treatment than glacial acetic acid, which also causes crusts, and very often bad scars.

In one case, after five applications of formalin, a dark scab formed, with severe inflammation round it, and some pus. After a time, the scab came away, but the place was not cured, and many diseased hairs grew as before. Later on, I easily cured this case with croton oil, with very much less pain and trouble.

Is this treatment in any way better than croton oil? So far, I do not think it is as good; for I have failed to cure many cases with formalin, and after a time have easily cured them with croton oil. There is also the danger of making a permanent bare spot.

Again, the testimony of all the children is, that the pain of the croton-oil treatment is nothing compared with that of formalin. I do not think I have cured one case with

A medical friend has told me of a similar case in his practice.

formalin that I could not have cured with much less pain with croton oil, and certainly without producing any more mark. As more experiments are made, formalin may prove one of the best applications for *Tinea tonsurans*, but some means will have to be found out for moderating the great pain it causes at the time of application. Certainly, in private practice, the parents often strongly object to following out the treatment, and in some instances I have soon lost my patients after advising formalin.

I can speak very positively about the great pain it produces, because I have tried the remedy myself in most cases, seeing the children every other day, and most carefully watching its action. Children twist and cry out most bitterly, and even boys of thirteen say the pain is almost more than they can endure, though it passes off in from a quarter to one hour. In many cases, especially in young children, I have not had the heart to go on with the treatment, as the cries were simply piteous ; and one little girl had nightmare, night after night, crying out, "Not that bottle with the red label !" Children will often suddenly cry out as if the liquid had gone into the eyes, but this is only due to the vapour getting into them ; and, on putting my own eyes down on a level with the child's, I have suffered great pain, with lachrymation. To avoid this, I put a wet towel over the eyes, and tell the child to keep them shut while the formalin is being soaked in. In three-fourths of the cases in which I have used it, I have had to give it up, either from a failure to cure, after from six to nine applications, or because the parents would not allow it to be continued. Even when I have used it very freely, and removed the scabs, I have often found very little good done, and numerous diseased stumps left, so that other treatment had to be adopted.

I once tried formalin to a boy who had disseminated ringworm (*Microsporon*) of *eight* years' duration, feeling that, if it cured this case, it would soon be acknowledged to be the best remedy known. But, though the boy was fourteen, and I used it myself every other day, soaking it thoroughly in nine times, it failed to do any good; and, after the scabs had fully come away, I found numerous stumps still growing on the place as before. They were still saturated with the fungus, and so were the roots which I removed by electrolysis for examination.

Again, I had nearly cured a small place of ringworm on a boy's head by croton oil, and could easily have finished the case in a few weeks by needling out some stumps that were left; instead of doing this, I needled them with a 40 per cent. solution of formalin, and also let it soak into the isolated stumps, for many applications. The boy complained most bitterly of the pain produced, which he never did with croton oil. It did no good, for the stumps came up as diseased as ever. I lost one month by trying to finish this case with formalin, and then easily cured him by needling the diseased hairs with croton oil. I tried it lately to six places the size of a sixpence, on the head of a child aged four, who had many other places on the scalp. The result was that three were quite cured, and on the others just a few stumps remained; but the child cried so much that the mother refused to go on with the treatment, and prefers to lessen the extent with Coster's paste. This is the case where slight scars were formed.¹

I also tried formalin most thoroughly (nine applications) to the places that developed so suddenly in that chronic

¹ Since writing the above, I have easily cured one small place with croton oil, and shall by degrees be able to treat all the patches.

case mentioned on p. 30. This was a recent case of ringworm, and the treatment caused infinitely more pain than croton oil had formerly done, together with œdema of the forehead and face, and swelling of the eyelids, so that she could not see out of them for two days. No good whatever was done by the application of formalin, and I had to wait a fortnight before I could use croton oil, which was successful.

In *The Year-Book of Treatment* for 1897, the following editorial words may be found: "I am sorry to say that I have seen the rise and fall of so many 'one and only' treatments for ringworm that I have grown somewhat sceptical in the matter. Thinking it my duty, however, to try all things that offer a reasonable possibility of usefulness, I have employed formalin in several cases of ringworm, and I must sorrowfully report that the results which it has given do not justify the enthusiasm with which the new treatment is regarded in the place of its birth."

This quotation was not seen by me until after the above notes on formalin were written.

Therefore, if I have a case to treat, with moderate-sized places, where I can use croton oil, I shall do so in preference to trying formalin; but, if they are too extensive for the croton-oil treatment, and the parents fully realise the pain it will cause, and do not mind the experiment being made, I may try formalin again.

The Treatment.—The places must be properly marked out, and the solution (40 per cent.) well soaked into them with a small sponge-mop, or brush. The soaking ought to be constantly repeated for from five to ten minutes at the time, if the child can bear it.

In a day or two (every other day is generally as often as it can be used), the places should be again soaked for

ten minutes with the formalin. This treatment can be continued from six to nine times. A yellowish exudation first appears under the epidermis ; this soon forms a scab resembling that from acetic acid. The places get red and inflamed, and there is generally a distinct ring of redness round them, often with some œdema. By degrees, there forms a distinct, hard, brown scab, which it is very difficult to get the solution to penetrate. I have many times seen some matter form after using formalin. I prefer to soften the scab a little with carbolic lanoline (1 in 8); and, when the scab can be got off, it very often brings most of the diseased hairs with it, and a partly bare spot is left. The diseased hairs do not, so far as I have seen, grow up healthy again, but they come out, and new downy hair comes in time.

I have had no success with weaker lotions of formalin, as might be expected, if the disease was cured by the parasiticide simply penetrating, and killing the fungus *in situ*. I have also tried it mixed with equal parts of anhydrous lanoline, but have not cured any places with it, though it caused a considerable amount of pain.

While using formalin, some other parasiticide should be used over the head, or the disease may easily spread.

Formalin is most certainly a very strong remedy, and must be used with great discretion ; but, if croton oil is objected to, or a medical man does not care to go into all the minutiae necessary in this excellent treatment, then formalin is well worth trying ; and, in unskilled hands, is certainly safer than croton oil.

(8) IODIDE OF MERCURY.

This is one of the best parasiticides I know, and I often employ it for small places. I never use perchloride of

mercury now, but always the red iodide, as I believe there is less danger. It can be dissolved in iodide of sodium, and used in the following lotion :—

℞ Hydrargyri Iodidi Rubri	gr. iv. ad vij. ¹
Sodii Iodidi	ʒss.
Spiritûs Chloroformi	ʒij. ad ʒiv.
Aquam	ad ʒj.
Misce. Fiat lotio.	

Or it can be dissolved in rectified spirit.

It is better, I think, to use it so dilute as not to produce scabbing. Of course, this lotion must not be employed to a large surface of the scalp; but I often employ it to small places, when first discovered, before I commence some other treatment—such as croton oil. It may be also used in the form of ointment.

This application alone may cure ringworm; but, as I still find most parasiticides fail, I rarely use them now for small places, for it is usually a mere waste of time. I much prefer to at once inflame the places, and so loosen the stumps, and cure the disease (refer also to § 19).

(9) IODIDE OF SULPHUR.

This useful application can be dissolved in creasote (gr. xx. to xl. in ʒj.), or in a mixture of creasote (2 parts) and turpentine (6 parts).

(10) IODINE.

The liniment and tincture are sometimes used for *Tinea tonsurans*, but I rarely use iodine, except dissolved in oil of tar (Coster's paste), or creasote. I have constantly

¹ In *Brit. Med. Jour.*, September 7th, 1889, fifteen grains to the ounce was advised, but I think this is far too strong an application.

found that, in cases which have been treated without any benefit before I have seen them, by soaking in iodine liniment, the disease has, if precautions have not been used, spread over the scalp, while one or two places only have been treated with iodine (see "Turpentine").

(11) NITRATE OF MERCURY.

Nitrate of mercury ointment (citrine ointment) is often employed, generally diluted, but sometimes of full strength. I rarely use it, except for extensive forms (see next chapter).

(12) PERCHLORIDE OF MERCURY.

Corrosive sublimate used to be extensively employed for ringworm ; but my faith in it failed some years ago, as I often applied it to small and recent places without any good result. I have entirely given up the use of the perchloride,¹ especially as it is so poisonous as to be dangerous when applied to large or excoriated places ; and one fatal case happened, some years ago, from the application of a strong solution in spirit to the scalp. I much prefer the red iodide of mercury.

If used, it should be only to *small* places. It may be dissolved in rectified spirit (gr. j. to iij. in ℥j.), in acetic acid, or in an ointment.

If used in an ointment, it should always be dissolved in a little spirit, before it is mixed with the lard ; but the best plan is to use the alcoholic solution, and to thoroughly dab it into the small patches two or three times a day.

See also p. 189.

(13) SALICYLIC ACID.

Salicylic acid is a safe and excellent parasiticide, very useful for small spots of ringworm, as well as for the extensive forms of the disease. It may be dissolved in water, in proof spirit, in rectified spirit, in ether, or in spirit of chloroform.

A good formula for a recent case of ringworm is:—

℞ Acidi Salicylici	.	.	.	.	gr. x. ad xxx.
Ætheris	.	.	.	.	ʒij.
Spiritus Rectificatum	.	.	.	.	ad ʒj.
Misce.	Fiat lotio.				

I have often used it in proof spirit, even over the whole head, but it produces a thin skin, which can often be peeled off the scalp in very large pieces. If applied too strong, it causes some pain and scurf. It is best to commence with ten grains to the ounce, and to gradually increase the quantity. Malcolm Morris advises from five to twenty grains, in chloroform or ether, for small recent places, and says: "It dissolves the fat, dehydrates, loosens the hairs, and directly attacks the fungus. By the use of salicylic acid in this form, if applied sufficiently early, before the fungus has had time to reach the deeper part of the follicle, a rapid cure may be effected. It is an essential condition of success, however, that no fatty substance should be used."¹

Salicylic acid can be freely used in ointments (gr. xx. to ʒj. in ʒj.), combined with precipitated sulphur (ʒjss. to ʒiij. : see § 14). This combination will be found very useful for extensive forms of the disease, and especially for young children.

¹ *Diseases of the Skin*, 1894.

Many speak very highly of this application, and Crocker advises—

Salicylic Collodion: “The head is shaved, not clipped, over the affected region, and for at least three-quarters of an inch beyond the patch. Then salicylic collodion (consisting of salicylic acid gr. x., collodion ʒj.) is painted daily, for a week, on and beyond the patch. At the end of a week, the thick skin formed by the collodion is lifted off by insinuating one blade of the epilation forceps under the skin, and gradually lifting up a portion. This is repeated in various directions till the skin is clearly off, and then the scalp is again shaved, and the salicylic collodion again applied for another week.”

When the skin is pulled off, a large number of stumps are seen adhering to it; but I have generally noticed that they are only broken-off some way down the hair-follicles, and that most of the bulbs are left behind. This treatment is somewhat painful, and I have lost patients by trying it, as it caused so much pain. It should, therefore, not be employed with very young children. I have generally soaked in some parasiticide lotion, after removing the skin, before reapplying the collodion.

I have not had much success with this treatment, but it is certainly better than **Salicylic Acid Plaster**, which has been also advised for ringworm. I have never seen this do any good.

Salicylic acid is also a safe and excellent parasiticide to use over the whole head as a preventive, either dissolved in spirit and water, and soaked on, or else in an ointment—especially combined with sulphur.

(14) SULPHUR.

Sulphur in some form is one of the best applications for ringworm. It is rarely used alone for small places, but constantly in ointments for extensive forms of the disease, and for young children. I prefer the precipitated sulphur to the sublimed. For small spots, it is hardly strong enough to use alone ; it may be added to "chrysarobine" ointment (p. 170), or used with salicylic acid, copper, etc.

The following ointment is sometimes useful :—

℞ Sulphuris Præcipitati	ʒjss. ad ʒiij.
Hydrargyri Ammoniati	gr. xv. ad xxx.
Acidi Salicylici	gr. xx. ad ʒj.
Olei Amygdalæ	ʒij.
Adipem Lanæ Hydrosum ¹	ad ʒj.
Misce. Fiat unguentum.	

Or it can be made up with benzoated lard.

I rarely use sulphur ointments to *small* places, except in young children.

(15) SULPHUROUS ACID.

Sulphurous acid (acidum sulphurosum, B.P.) is an excellent parasiticide, and is often used for small places, and even over the whole scalp. It can, as a rule, be employed undiluted. It should be thoroughly soaked into the places, and then a piece of lint, soaked in it, may be left on under oil-silk. If used, it is important to constantly soak the lint with sulphurous acid, or, if this be too strong, with a mixture of sulphurous acid and water.

Some advise glycerine to be added : this is, I think, a mistake, as the sulphurous acid and water evaporate and leave the glycerine ; and thus, by degrees, the lint and parts

¹ "Lanoline."

get saturated with glycerine, instead of with sulphurous acid. It is important to remember that, unless the lint be constantly soaked, and an oil-skin cap worn, sulphurous acid soon becomes a valueless remedy, from rapid evaporation.

Sulphurous acid should be *freshly made*, as it soon loses strength, both by evaporation and by the acid becoming oxidised into sulphuric acid, which is an irritant.

(16) THYMOL.

Both thymol and menthol have been recommended for ringworm by Malcolm Morris,¹ but the former is the better parasiticide. They may be dissolved in alcohol and ether, with or without chloroform; or the three liquids may be used in equal proportions, with thirty grains of thymol to the ounce. This solution can be thoroughly soaked into small places. I have used it, but prefer other treatments. Thymol may also be dissolved in turpentine (ʒss. to ʒj. in ʒj.—Crocker).

(17) OIL OF TURPENTINE.

Turpentine is rarely used alone, but often with other drugs, as creasote, iodide of sulphur, etc. Crocker advises perchloride of mercury (gr. iij.), rectified spirit (ʒj.), and oil of turpentine (to ʒj.). (See p. 182.)

Vidal thinks the parasite can be destroyed by the deprivation of air. He first applies turpentine, and afterwards paints on tincture of iodine. Iodised vaseline is then put on, and the parts are covered with gutta-percha, closely applied, and bandaged on. Every night and morning

¹ "Clinical Lecture on Ringworm," *The Lancet*, February 12th, 1881; and *Brit. Med. Jour.*, June 17th, 1882.

the places are well washed and dried, and the process repeated.¹

I do not think the fungus can be killed by simply preventing air from getting to the follicles,² for I tried constant application of remedies under india-rubber caps (see p. 143), and I have kept the whole scalp covered with tar for months without any result. The freshly developed hair-substance provides everything the fungus requires.

The following treatment was advised some years ago. Turpentine is to be freely poured over the whole head, and well rubbed in with the fingers. Then it is to be washed off with hot water and soap, and tincture of iodine applied. This is to be repeated once or twice a day.³

This treatment, like so many others that have been published, is *said* to cure ringworm "in ten days"! This is simple nonsense, for, like most of the other unfailing specifics, it almost always fails to cure the disease.

(18) VESICANTS.

Good vesicants, at a very early stage, may possibly stamp out the disease, but they very rarely do so, and practically I never use them now, for I think there are much better ways of treating small places.

A vesicant (such as strong acetic acid, or even glacial acetic acid), even when applied to a patch a few days old, very rarely cures ringworm; and certainly, by forming scabs, it delays the employment of remedies which penetrate into the follicles.

It is most important to remember that *glacial* acetic

¹ *Congres. Intern. de Derm. et de Syph.*, 1889.

² See "The Treatment of Ringworm," Colcott Fox, *Brit. Med. Jour.*, August, 1893.

³ *The Lancet*, February 20th, 1886.

acid often causes a permanent scar; and I have seen more scars made by medical men applying glacial acetic acid than from any other treatment, so that I never use it now. I have, moreover, so often failed to stamp out very recent small places with strong acetic acid, even with three or four grains of perchloride of mercury added to the ounce, that I now think it a mere waste of time to employ it. One of the old plans was to use blistering fluid (liquor epispasticus). But blistering large surfaces is very painful, and not without risk, and, in my opinion, unjustifiable with young children.

If a blister be tried, it should be pricked when it has risen, and some parasiticide, such as sulphurous acid, be used. Personally, I think it a useless treatment, and a loss of time. It has even been advised that crystals of carbolic acid be melted and applied hot.¹ This is a very dangerous remedy,² and may cause scars; I have seen it tried, and utterly fail even to cut short small recent places.

(19) REMEDIES NOT ADVISED.

Some of the above-mentioned treatments for *Tinea tonsurans* I do not think highly of; but the following I have never found do much good—*viz.*, petroleum oil (ordinary white lamp oil), permanganate of potash, perchloride of iron, nitrate of silver, and resorcin.

Hydronaphthol has also been advised as a "specific" for ringworm, specially as hydronaphthol plaster, with a hydronaphthol jelly round it.³ I have tried it, and found it practically useless. Sulphuric acid, *diluted*, has also

¹ *The Lancet*, May 8th, 1887.

² See my reply, June 4th, 1887.

³ "Hydronaphthol as a Specific in the Treatment of *Tinea tonsurans*," *The Lancet*, November 30th, 1889.

been suggested ; but it is a dangerous remedy, as it may cause scars. It is also painful, and I cannot advise its application.

A treatment was published in 1885, which is known as "Harrison's treatment."¹ I tried it very carefully, but it seldom cures, is extremely painful, and often causes scars. In fact, the largest scar I have ever seen, after the treatment of ringworm, was due to a nurse leaving on the potash solution too long. I did not see the case for months after the scar had formed. It was then about three inches by two, and evidently permanent. As I have seen such disastrous results from carrying out this treatment, I never use it now.²

It consists in first soaking the part with a solution of iodide of potassium in liquor potassæ and water, and then applying a solution of perchloride of mercury in spirit and water, so that iodide of mercury (see p. 180) is formed in the follicles. The application causes great pain, and crusts form.

Again, an application has been suggested, which is to be made by adding a drachm of calomel to one ounce of tincture of iodine, shaking well, and letting the sediment settle.³ The clear liquid is employed.

I cannot advise this preparation to be used, as it is a saturated solution of iodide of mercury. This can easily be seen, as crystals of iodide of mercury form on the sides of the bottle. It is also a very strong solution of *perchloride* of mercury, and the application might be dangerous, if used to large places (see p. 182).

¹ *Brit. Med. Jour.*, September 5th and December 5th, 1885.

² See *Brit. Med. Jour.*, Colcott Fox, August, 1893.

³ *Brit. Med. Jour.*, November 21st, 1885.

CHAPTER VIII.

THE TREATMENT OF EXTENSIVE FORMS OF TINEA TONSURANS.

BORIC-ACID LOTION—OLEATES OF MERCURY AND COPPER—GAS-WATER
—CARBOLIC ACID, CITRINE, AND SULPHUR OINTMENT—TREATMENT
FOR YOUNG CHILDREN—WHEN TENDER AND SORE—GENERAL
DIRECTIONS—ISOLATION—HAIR-CUTTING—WASHING—APPLICATION
OF REMEDIES—EPILATION—PREVENTION OF SPREADING—PREVENTIVE
OINTMENTS AND LOTIONS—CAPS—GENERAL AND CONSTITUTIONAL
TREATMENT—DISINFECTION—SCURF AFTER RINGWORM.

WHILE small or moderate-sized patches can generally be cured in a few months under efficient treatment, the extensive and chronic forms of the disease are often most difficult to get well. Unfortunately, many children are allowed to get into this state before they are well taken in hand. A large number of the cases I see are in this condition, and the parents are greatly astonished when they are told it may take six or nine months, or even longer, to cure the children; for they imagine, as the disease has been treated so long, it is "nearly well," and only wants "a little more treatment."

When I first wrote about the treatment of ringworm in 1880, I advised oleate of mercury as the best remedy we possessed for penetrating into the hair-follicles. Since then, oleate of copper has been used as well, but I still think there is more chance of curing extensive forms of the disease with oleate of mercury than with oleate of copper.

Besides the oleates, there is a good treatment by "the

boric-acid, ether, and spirit lotion," and also by "gas-water." Then there are numerous ointments made with sulphur, sulphur and salicylic acid, "chrysarobine" and salicylic acid, etc., described under sections (13), p. 183 ; (14), p. 185 ; and (15), p. 185.

Thin advises sulphur (ʒij. to ʒiij.), carbonate of potash (ʒss. to ʒj.), and benzoated lard (to ʒj.).

For young children, I generally try sulphur and ammoniated mercury first (see later on), or boric-acid lotion.

Ointments and lotions generally take many months to do much good ; and, as a rule, they do *not* completely cure the case, but leave some patches (often the original places), or some isolated stumps, which have to be cured later on with croton oil.

When I get a very extensive case of Tinea to treat, where formalin and croton oil are out of the question, I generally advise a trial with the boric-acid lotion first, or gas-water, because sometimes these remedies work wonders, and smooth, bare places form, and the disease gets *completely* cured, which is very rare indeed with ointments or oleates.

Again, if they cure, or are commencing to do so, it is very evident in about three months ; while sulphur ointments and oleates may often be rubbed in for six months, with very little result.

The constant application of salicylic acid in spirit may also be tried (see p. 183), but I prefer the following :—

(20) BORIC-ACID LOTION.¹

This lotion is still a favourite one with me ; for though, like all other treatments, it often fails to do much good,

¹ *Brit. Med. Jour.*, suggested first by Cavafy, June 24th, 1882.

I have seen more cases completely cured by it than by any other treatment for *extensive* forms of the disease. I have often seen the small-spore form, implicating most of the scalp, cured in three months, which is a very rare event with other treatments, even for small places, except with formalin or croton oil.

Of all treatments, this is certainly the most agreeable, as it causes no pain or irritation, and it can do no possible harm. If it at all influences the case for good, it generally completely cures the disease, and does so in a few months, without leaving numerous isolated stumps for the croton-oil treatment afterwards.

The Treatment.

℞ Acidi Borici	ʒj. vel q.s.
Ætheris Methylati	ʒx.
Olei Rosmarini	ʒij.
Spiritus Methylatum	ad ʒxl.
Misce. Fiat solutio saturata limpida.	

This lotion has to be made up in large quantities at a time, as it must be very freely used ; hence, it is very much cheaper to employ methylated ether and spirit, and the oil of rosemary is useful to counteract its disagreeable smell.

For some years, I have often added a little salol to the lotion, commencing with three grains to the ounce, and increasing it, if the scalp will bear it ; if not, I reduce the quantity, or leave it out. I have also tried a few grains of salicylic acid, but this generally causes too much irritation, when used so many times a day. In using either, begin with a small quantity, so as not to form scales, or cause any irritation.

The lotion first removes the accumulation of sebaceous

matter and epithelial *débris* from the openings of the follicles, and also the fatty materials out of the follicles, and thus allows the parasiticide to enter deeply. I do not believe this lotion cures by killing the fungus *in situ*, but by causing some alteration in the nutrition of the hairs, or depriving them of something ; for it often causes the hair-bulbs to atrophy, and the hairs to come out—forming, in fact, a temporary Alopecia, as described in Chapter XII. Undoubtedly, the formation of *artificial Alopecia areata* is the best way to remove the diseased hairs, and to cure ringworm. Possibly, Sabouraud's discovery (p. 151) may supersede all the treatments now used, if by the injection of any toxin the hairs can be loosened.

The head should be shaved, except a fringe, or the hair very closely cut ; and this must be repeated once or twice a week. The closer the hair is kept during the treatment the better.

The following directions should be given, and thoroughly carried out ; the addition of salol, etc., should also be regulated from time to time, lest it produce too much irritation. Smooth bare places ought to form in time, if the case is doing well.

The scalp must be most thoroughly washed with hot water and soap every morning, to remove all the scurf and sebaceous matter, etc. A dabbing or sucking motion of a sponge is best. I prefer a potash soap, and Hudson's extract is very useful, or a mixture of pure soft soap (2 parts) and spirit (1 part). Five or ten per cent. of carbolic acid may also be added. I do not think the kind of soap makes much difference, so long as the head is thoroughly cleansed, and no accumulation of scurf and fatty matter is allowed to remain over the mouths of the follicles. This part of the treatment is often shirked, and the lotion

is simply applied over a layer of unremoved sebaceous material, which is a waste of time.

After well drying the head with a soft towel, it is best to wait half an hour, say for breakfast, as the lotion often pains if dabbed in directly after washing the head.

The lotion should be well dabbed and pressed *into* the follicles, all over the head. This is best done with a small sponge, for ten minutes at a time. I always advise the nurse to fold up a towel lengthways, about three inches broad, and place it round the child's head, just below the scalp, with the two ends behind. By holding the two ends firmly with the left hand, close to the head, not only is a good hold obtained of the head, so that it can be kept still, but any lotion which runs down is caught in the towel, and does not get into the eyes, or on the neck.

The lotion cannot be dabbed in too much. It does not cause pain, and is simply allowed to dry on the head, leaving a little white deposit, which does no harm if it falls about. I order this lotion to be used about eight times a day—that is, every hour and a half, or as frequently as possible. The oftener it is done the better. Care must be taken not to use it near a light, on account of the ether; though I have never heard of any accident happening. The sponge should be freed from grease every morning, by washing it in soda and water. If only a portion of the scalp has to be treated, the lotion should be used all over once a day, to prevent any spread.

While this treatment is being carried out, no grease of any kind should be used; and, if the case does well, in from two to four months the places get bare, and then by degrees new downy hair commences to grow. As before mentioned, sometimes this treatment causes the hair to rapidly fall out, and leaves smooth bald places resembling

Alopecia areata (see Chapter XII.). If this happen, when all the diseased hairs are out, a stimulating lotion, as used for the treatment of *Alopecia areata* (acetic acid and cantharides: see Chapter XII.), should be applied.

Any light cap can be used by day, but I prefer a silk "fisherman's" (see "Caps").

Then there is the question, What is it best to apply at night? No ointment should be employed, and I generally use sulphur. Precipitated sulphur may be made into a paste with water, and rubbed in, or it may be mixed with sulphurous acid and water. Sometimes I have been able to use turpentine and spirit with sulphur, but this generally sets up too much irritation. A closely fitting cap must be worn at night (see "Caps").

This treatment is one way of epilating, by dissolving out the fat from the hair-follicles, and thus loosening the hairs; and, if this lotion would only generally produce these smooth bare places, it would be the surest and best way of treating ringworm. But, like all other lotions and ointments, it often completely fails, and even after three months the places will be still covered with diseased stumps. If so, the treatment should be changed; for I have never seen this remedy cure the complaint, unless there be a decided change for the good in three months.

(21) TREATMENT BY THE OLEATES OF MERCURY AND COPPER.

I have sometimes seen oleate of mercury cure the most inveterate and extensive cases of ringworm which had existed for years, and on which all sorts of other remedies had been tried in vain. It causes very little pain, and there is no staining, or injury to the skin.

I first drew attention to this treatment in 1880.¹ The old way of preparing it was as a solution in oleic acid (5 or 10 per cent.), and acetic ether was generally added in the proportion of one part to seven of the oleate. This preparation is not a pure oleate, and certainly is prone to decompose into oleic acid and metallic mercury, which is deposited at the bottom of the bottle.

In 1882, I advised pure oleate of mercury to be dissolved in heavy petroleum oil²; giving the following reason for discarding the old preparation in oleic acid, as follows: "The chief drawback to its use is the constant formation of yellow crusts on the diseased patches, and even on the non-infected portions of the scalp. These scabs have to be continually picked and scaled off; and, though they often bring away many diseased stumps with them, it is a constant annoyance both to patient and nurse."

Oleate of mercury is now made by a process of double decomposition from sodium oleate, in a purer form than ever, according to the formula of Wolff, and Shoemaker of Philadelphia.³

When lanoline was first employed, it was hoped that, at last, some fat had been discovered which would penetrate deeply; but, though I prefer it (mixed with almond oil or oleic acid) to lard for most ointments, it is very doubtful whether it penetrates better than the old ointment bases.

For some years, I have been using a mixture of oleic acid and anhydrous lanoline, and I prefer this with oleates

¹ *The Lancet*, January 24th and 31st, 1880.

² "Therapeutic Memoranda," Aldersmith, *Brit. Med. Jour.*, October 7th, 1882.

³ "Oleates: Further Investigations into their Nature and Action," Shoemaker, meeting of Brit. Med. Assoc., *Brit. Med. Jour.*, October 18th, 1884.

rather than the mixture of lanoline and almond oil. I commence with the following prescription :—

℞ Hydrargyri Oleatis Absoluti ¹ (<i>Corbyn</i>)	ʒjss. ad ʒij.
Adipis Lanæ ²	ʒjss.
Acidum Oleicum	ad ʒj.
Misce. Fiat unguentum.	

The anhydrous lanoline and the oleic acid should be melted together, and then, when nearly cold, the oleate should be mixed in.

If this cause any irritation, a little more lanoline should be added ; but, by degrees, the scalp will bear it, and then later on the lanoline can be lessened ; but the oleic acid should not be in sufficient quantity to produce any distinct crusts.

I do not hesitate to order 25 per cent. of oleate of mercury to the scalp, to children over ten years of age, provided I can keep a good look-out on the case ; and, for moderate-sized places, I often employ 33 per cent.

The Treatment.—The places must be marked out, or the head shaved, etc. ; but the best plan is to carefully mark out the places, and to use a strong ointment to them alone. I never have oleate used all over the head in full strength, if I can mark the places. Then carbolic glycerine (1 in 8) may be used to the rest of the scalp, once a day, to prevent any spreading. The ointment should be well rubbed into the places morning and night, for half an hour at a time, with the finger, protected with a thin india-rubber finger-stall, covered over with a little flannel cap, or with a small sponge-mop. There is no occasion to leave any excess of the ointment on the surface of the

¹ I always use this special preparation, made by Corbyn & Co., 300 High Holborn, London.

² *Anhydrous* lanoline.

head, as the portion that cures the disease must be rubbed *into* the hair-follicles.

A piece of thin *waxed* tissue paper should be placed over the head, and a cap should be worn (see "Caps"), and especial care taken that the oleate does not run on to the face or pillow-case at night, as it may produce much irritation.

If too much oleic acid be used, there form over the places yellow crusts, which are very troublesome, and have to be removed with the point of a pair of forceps, or by other means. It also causes tenderness and irritation at first, especially if the child has a delicate skin; but all these disadvantages are now avoided by commencing with some anhydrous lanoline, and very gradually increasing the strength of the oleic acid.

During the treatment, the hair on the diseased patches, or over the entire top of the head, if many places exist, should be kept closely cut. This should be continued about twice a week, for at least three months, or until most of the diseased stumps have come out, and croton oil can be employed to quickly finish the cure. It is advisable to keep the rest of the hair about half an inch long, if the patient be a boy (see p. 156).

Formerly, it was advised not to wash the head very often with water, but to use methylated spirit; latterly, I have changed my opinion, and I have the head thoroughly washed every other day, have epilation carried out, and then often order an ether-and-spirit lotion (1 to 2 parts) to be soaked in, to remove any grease, before the oleate is again rubbed in. With small places, epilation once or twice a week is very useful indeed, for many of the diseased stumps may come out (*vide* "Epilation").

It is extremely rare for oleate of mercury to cause any ill effects, any more than citrine ointment, or other preparations of mercury; and, although I have employed it

most extensively for over twenty-three years, I have only seen slight mercurial symptoms caused by its use, and in a very few instances. "Pure mercuric oleate," Shoemaker remarks, "is slow to give rise to systemic effect. Large quantities can be applied over the general surface, either in children or adults, with great impunity."

Parents are generally frightened by the English name—"oleate of mercury"—and imagine the general health of the child is sure to suffer, if any preparation of mercury be employed. I certainly have seen a few children who have appeared to decline in general health while under treatment by oleate of mercury ; but it is quite the exception, and, as a rule, it does no appreciable harm, especially if my suggestion be followed, to use strong oleate on the patches only, and not all over the scalp, unless absolutely necessary. Of course, the patient must be carefully watched from time to time by the medical attendant, and care taken that no distinct mercurial absorption take place, and the remedy stopped at once if there is the slightest tenderness, or swelling of the gums, or other evidence of mercurialism.

After from about four to six months of this treatment, a complete cure may be effected ; but, unfortunately, this is not the general result. Very often I find the patches are much reduced in size, so that I am able to commence the croton-oil treatment, which I always do as soon as I possibly can. Sometimes the case may be reduced to a number of disseminated stumps, which I needle out week by week, as advised in the following chapter. If there be no decided improvement in four or five months, I try other treatments.

OLEATE OF COPPER.

This is now made by Shoemaker's process, and has been very strongly advised for ringworm. In fact, when it first

came out, it was thought to be almost a specific. This is generally the first announcement with any new remedy, but time soon shows it to be incorrect. I have not found oleate of copper so reliable as oleate of mercury. Some authorities advise both to be used in the same ointment, and there is no objection to this plan.

Weir,¹ in an article on oleate of copper, remarks: "We all remember the old-fashioned cure for ringworm, consisting of a copper penny dipped in vinegar." "The legitimate successor of the 'penny-vinegar cure' (ointment of oleate of copper), the newer preparation not only combines all the essentials of the latter, presented in a neat and available form, but offers the means of effecting cures with far greater uniformity of results than has ever been obtained before, no matter what the remedy."

The Treatment.

℞ Cupri Oleatis	ʒj. ad ʒiij.
Olei Amygdalæ	ʒij. ad ʒijss.
Adipem Lanæ Hydrosum	ad ʒj.
Misce. Fiat unguentum.	

All the ingredients should be melted together in a hot-water bath. Oleate of copper may also be mixed with oleic acid and lanoline, or simply with benzoated lard.

It is used just in the same way as oleate of mercury, but there is no danger of any symptoms from absorption, and the only objection to its use is its brilliant green colour; but, as the good done by it depends upon the amount forced *into* the hair-follicles, the excess, after it has been well rubbed in, may be wiped off.

At times it produces irritation of the scalp, especially if oleic acid be used. In this event, the ointment must be

¹ *New York Med. Jour.*, August 30th, 1884.

diluted with more lanoline, or lard, until the skin will bear it. I have seen it cause so much irritation, with pustules and crusts, that it had to be entirely discontinued. In such cases, I have found that oleate of mercury could be borne very much better than oleate of copper. Very often, little "blind boils," due to some folliculitis, form, and these may cause pain, and be very troublesome, but they do no harm, and often loosen the stumps. They usually subside while the treatment is continued.

I have used oleate of copper very extensively, but I cannot say I am pleased with the result, for it generally fails to cure chronic and extensive ringworm, even after it has been rubbed in for many months.

Crocker speaks well of this parasiticide, and says, if 25 or 35 per cent. be employed, it very often causes a slight amount of kerion, which does a great deal of good.

(22) GAS-WATER.

Gas-water is a very old and good remedy. It is really a solution of sulphide of ammonium in an excess of ammonia ; therefore, an alkaline solution of sulphur. It can easily be procured from any gas-works, as it is a waste product.

The Treatment.—Shave or cut the hair close, and wash every day, as described under "Boric-Lotion Treatment." The gas-water should be well dabbed in from three to four times a day (for the scalp will rarely bear it oftener), and a sulphur lotion may also be used at night. No grease should be employed. Very often it causes some redness and irritation at first, and the solution may have to be diluted with water, as the strength varies very much.

The great objection is the smell, which is so offensive that it can hardly be used in a small house. If there

be a garden, with conservatory or outhouse, there is no difficulty, as the smell soon passes off. I have known the neighbours send the sanitary inspector in to examine the drains, when a child was under this treatment. Before ordering it, parents ought to realise what a nuisance the smell may be. Very often this treatment will be found to cure extensive cases of ringworm, even after boric acid has failed, and it may even cause an artificial Alopecia (see Chapter XII.) ; I have, however, as often seen it fail, and some other treatment prove successful. It is impossible to say beforehand what is most likely to cure these extensive cases, so that first one and then another form of treatment may have to be tried.

(23) CARBOLIC ACID, CITRINE, AND SULPHUR OINTMENT.¹

The following ointment used to be a very favourite one of mine for extensive ringworm, but I do not often employ it now, and more often use salicylic acid and sulphur :—

℞ Acidi Carbolici	ʒj. ad ʒijss.	} See below.
(Calvert's No. 2.)		
Unguenti Hydrargyri Nitrasit ³	ʒij. ad ʒijss.	
Sulphuris Præcipitati	ʒjss. ad ʒij.	
Adipem Benzoatum	ad ʒj.	
Misce. Fiat unguentum.		

¹ See "Ringworm: its Diagnosis and Treatment," *The Lancet*, January, 1880; and "A Report of the Treatment of a Very Extensive Outbreak of Ringworm," Aldersmith, *Brit. Med. Jour.*, December 16th, 1882.

² The pure crystallised carbolic acid must be employed, or the ointment will change colour.

³ It is most important that the citrine ointment should be quite free from any excess of nitric acid. Most ointments in common use turn brown or black when the carbolic acid is mixed with them.

In writing a prescription, it is important to tell the chemist *not* to apply any heat, and to mix the melted carbolic acid with the lard and sulphur first, and to rub in the citrine ointment last.

If this preparation turn a dark brownish colour within a week, there is certainly something wrong with the purity of the citrine ointment; for, if mixed as advised, it will keep of a yellowish, slightly brown colour for a week or two.

It is advisable to have this ointment made fresh every week or ten days.

Proportions.—These vary according to the age of the patient, and the extent of surface to which it has to be applied. If used all over the scalp, there must be less carbolic acid, than if rubbed into a few places only.

A larger proportion of citrine ointment should be used than of carbolic acid; and it is advisable to commence with a weak ointment, and to increase the strength by degrees. Even one-third of carbolic acid and citrine ointment may be used to moderate-sized places in children over ten, but *not* to a large extent of the scalp, as symptoms due to absorption of the carbolic might occur (see p. 166).

The Treatment.—Shaving, and washing every morning as usual; while the ointment should be well rubbed into the follicles twice or even three times a day, and great care taken as to the amount of carbolic acid used.

The scabs, which usually form during this treatment, will turn a dark brown colour, especially if the ointment be used after being made a week. These scabs should be removed so soon as they appear.

As before stated, most cases of extensive Tinea only improve under all these treatments, the places being reduced sufficiently to employ croton oil, which is always my sheet



anchor in finally curing most cases I have to treat. If this cannot be tried, they may remain uncured for years, in spite of the constant application of all the so-called "specific treatments" (see notes on p. 60).

TINEA IN VERY YOUNG CHILDREN.

Of course, the remedies selected, and the quantities of the active ingredients, must vary according to the extent of surface involved, and the age of the child.

For small places, I often employ the following ointment:—

℞ Chrysarobini (<i>Kemp's</i>)	gr. xv. ad xxx.
Acidi Salicylici	gr. xv. ad xxx.
Sulphuris Præcipitati	ʒjss. ad ʒij.
Olei Amygdalæ	ʒij.
Adipem Lanæ Hydrosum	ad ʒj.
Misce. Fiat unguentum.	

If more extensive forms have to be treated, I avoid "chrysarobine," and sometimes use the following:—

℞ Sulphuris Præcipitati	ʒj. ad ʒij.
Hydrargyri Ammoniati	gr. x. ad xx.
Creasoti	m. xx.
Adipem Benzoatum	ad ʒj.
Misce. Fiat unguentum.	

Or salicylic acid may be used instead of creasote. The sulphur and bicarbonate of potash ointment (p. 191) may also be employed. The boric-acid lotion is also very useful, especially if the whole scalp has to be treated (p. 191).

Ringworm in young children, as a rule, is much easier

to cure than in those who are older; but, at times, it is most difficult to get well, especially if of the large-spore form. I now have a child, aged two, who has many places, due to the *Megalosporon endothrix*, *resistant* fungus, and, so far, it has resisted all sorts of treatment for many months. I cannot employ croton oil, and formalin is also objected to. This case may go on for many months, or even a year or more.

I have also found iodide of sulphur useful in some cases, and Coster's paste, if the places are not too extensive.

℞ Sulphuris Iodi	gr. xx. ad xl.
Creasoti	ʒj. ad ʒij.
Acidi Oleici	ʒiij.
Adipem Lanæ Hydrosum	ad ʒj.
Misce. Fiat unguentum.	

TREATMENT WHEN THE SCALP BECOMES TENDER AND SORE.

Sometimes the places get very tender and sore under some ointments, chrysarobin, etc., and the child cannot bear any rubbing in of the remedy.

This rarely happens; but, if it do, it is advisable to stop the application for a time, and try some less irritating treatment. I believe constant bathing with hot boric-acid lotion, and the application of a mixture of boro-glyceride and water, is one of the best plans, especially if there be any tendency to impetiginous eczema.

At night, a little ammoniated mercury may be used, with some white vaseline; but I have found nothing suit these cases better than constant bathing with hot boric acid and water. By degrees some spirit may be added, and perhaps the "boric-acid, spirit, and ether" lotion used.

TREATMENT OF CRUSTING IMPETIGINOUS ECZEMA, WITH
RINGWORM.

It is very rarely that ordinary ringworm takes on the character of a rapidly spreading impetiginous eczema. It sometimes happens that most irritating parasiticides set up this trouble, and the disease may rapidly spread under ordinary treatment, with crusts, and pus oozing from beneath them. Such cases are very troublesome to manage, and the disease sometimes spreads, in spite of efficient treatment.

Of course, the majority of cases with pus formation are due to the *Megalosporon ectothrix* fungus; but still, the fungus may be the ordinary *Microsporon*, or even the *M. endothrix* variety (see p. 75).

Treatment.—It is well at once to find out the form of fungus causing the trouble; for, if due to the *M. ectothrix*, very often many of the hairs are getting loosened, and they may be extracted forthwith. In many instances, after removing the crusts with carbolic oil, and poulticing, I have even added fuel to the fire, and, by judiciously using a little croton oil, have set up kerion, and rapidly cured the disease. I recently had a case of one large patch, which had been under treatment for some time, due to the *Microsporon*. Part was practically cured by the formation of pus, etc., but the greater portion was full of diseased stumps, which easily broke off. I at once painted on croton oil (as described later on), and caused kerion, and in ten days the boy was quite well, and in six weeks the place was covered with new hair.

But great care has to be exercised; and, if the case is a genuine one of rapidly spreading impetiginous eczema

with ringworm, croton oil might be most disastrous, as it would probably spread the disease. In such cases, the first thing to do is, to cure the impetiginous eczema. If the places are at all extensive, it is of the utmost importance that the hair be cut off. If only a few patches exist, the hair must be cut from them, and for an inch around, the rest of the hair being kept only about an inch long. All the crusts must first be removed by soaking them in oil (in which may be a little menthol or carbolic acid), and by poulticing them at night.

Some boro-glyceride may be put on the poultices, or a little carbolic oil. In the morning, the places should be well bathed with hot boric acid and water, and the scabs removed. After they have been cleansed, white precipitate powder in white vaseline is the best application at night, and the constant soaking with hot boric-acid lotion, or equal parts of spirit and water, saturated with boric acid, by day. Boro-glyceride mixed with water is an excellent application between the times of bathing. The general health must also be seen to, and simple aperients given, together with good plain food.

When the eczema has abated, and all the crusts have been removed by poulticing or bathing with warm boric acid and water, and the inflammatory symptoms have passed away, the best treatment is the boric-acid, ether, and spirit lotion, which rarely causes any irritation, and often proves effectual when ringworm has been spreading with crusts.

In fact, I find the constant application of boric-acid lotions, and white precipitate ointment, the best applications for ordinary impetigo.

GENERAL DIRECTIONS DURING TREATMENT.

ISOLATION, ETC.

A child with ringworm ought to be isolated so far as possible, if there are other children in the house. A separate bedroom is of great importance, while separate places for washing, and towels, flannel, brushes, comb, etc., are essential.

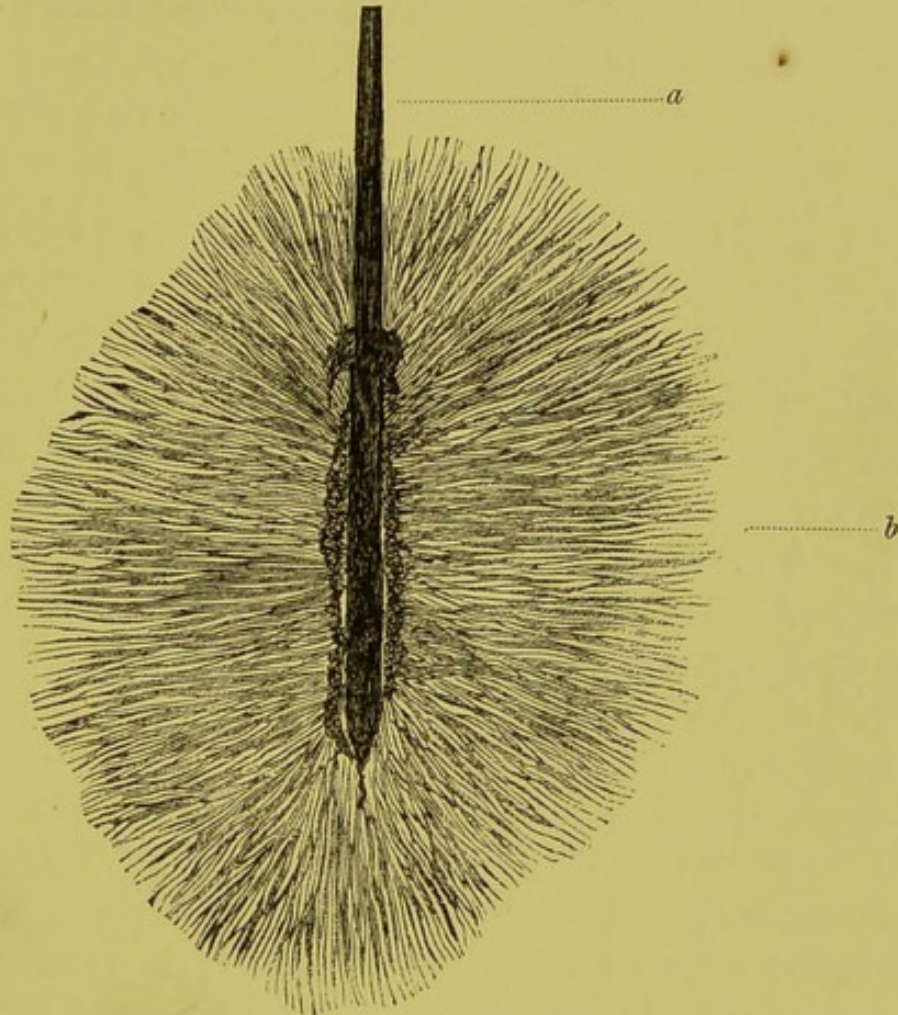
When under proper treatment, and a cap, with waxed tissue paper underneath it, is worn, there is not much danger in the patient simply walking about, and having lessons and meals with other children. The essential thing is to prevent games or any practices which would lead to contact with the head of the affected child; but, practically, I very rarely indeed find that ringworm spreads, if simple and ordinary precautions be taken. Crocker also agrees with this, and says: "When these measures have been rigidly carried out [that is, those just mentioned], I have never known the disease spread to others, even when they have lived in the same room."

Thus, it is not at all necessary that a child with ringworm, under proper treatment, and with all due precautions taken, should live an isolated life. On the other hand, I do not think it is right to send children uncured to school. That is a different matter (see Chapter XI.).

It is best not to brush the head, so as to distribute the spores; and the child should be warned not to scratch its head, as this often spreads the disease by the direct implantation of the fungus. This is especially dangerous, if there be any pus formation. The danger of any spreading is reduced to a minimum when a good preventive ointment is used, and a cap worn.

In proof of this statement, let me call attention to a

plate in Thin's work on ringworm. It shows, what I have so long affirmed, that, under efficient treatment, the spores in the upper parts of the hairs that break off are usually dead, and, therefore, unable to convey the disease, even if they get on to a child's head.



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FIG. 5.—A RINGWORM STUMP (FROM A CASE OF TREATED RINGWORM), CULTIVATED ON GELATINE FOR SIX DAYS AT ORDINARY ROOM TEMPERATURE.¹

(a) Free surface of the hair-shaft.

(b) Abundant growth of mycelia, as seen under a low magnifying power.

Thin, referring to a hair taken from a case under treatment, and cultivated in meat-gelatine, says: "At the end

¹ From *Pathology and Treatment of Ringworm*, by George Thin, 1887.

of from five days to a week, the hair presents a somewhat beautiful appearance. An immense number of mycelial threads have grown out like a brush from the shaft. If the hair selected is a stump from a head that has been treated for ringworm, the free part of the stump remains sterile, whilst round the root the growth is abundant. This appearance is illustrated in Fig. 5."

HAIR-CUTTING.

During treatment, the hair should be kept shaved or very closely cut over the scalp (except the fringe), or on the patches, once or twice a week ; and the rest of the hair, if it has not been removed and the patient is a boy, should be worn from about half an inch to one inch long. But it is advisable to let the hair grow for a week before the case is examined by the doctor to see how it is progressing ; for, if the hair be newly cut, it is impossible to see the number of stumps (see p. 155).

WASHING.

Some advise constant washing of the head during treatment, while others discard its use altogether, and believe that it helps to spread the disease by carrying the spores over the head. I certainly do not believe it spreads ringworm, if proper parasitocides are employed.

Malcolm Morris says : " Parts that are the seat of ringworm should never be washed with water ; the disease is always spread by this process. The application of mild antiseptic washes is, however, permissible." ¹

I cannot at all agree with this, for I believe, that if spreading occur after washing, it is due not to washing, but to

¹ *Diseases of the Skin*, 1894.

leaving the scalp after washing without any parasiticide over it. I have had most of my cases thoroughly washed for the last twenty-five years, and have never seen any spread of the disease from it, proper precautions having been adopted.

I order a soft potash soap (and Hudson's extract is very useful), or the spirit and soft soap mentioned on p. 193. Jamieson advises a super-fatted potash soap. Carbolic acid may be added (10 per cent.), or Jeyes' soap used.

After washing, the head should be dried with a *soft* towel, and some such parasiticide as the ointments mentioned on p. 159, or carbolic glycerine (1 in 8), well rubbed into the roots of the hair. If the hair is long, this can be done by turning it over and over with a comb, and rubbing the ointment into the roots. Again, it is always a good plan to first wash the places, and then use fresh water, etc., for the rest of the head. When there are only a few patches, it is sufficient to wash the entire head once or twice a week. The diseased places may be washed every other day, or, with some treatments, every morning. Under some special forms of treatment, the whole head has to be thoroughly washed every morning.

APPLICATION OF REMEDIES.

Ointments and lotions, as a rule, are not properly applied, nor is sufficient time spent by the attendant on the care of the case. They are generally *simply rubbed on to the places*, instead of being *thoroughly rubbed into the hair-follicles*.

It should always be remembered that, to secure success in treatment, much time must be spent in the proper application of remedies. The parasiticide, whether in the form

of a lotion or an ointment, ought to be well rubbed, dabbed, and pressed into the hair-follicles, for from ten to thirty minutes, two or three times a day.

EPILATION.

Epilation is strongly recommended as a most valuable help in treating small places of ringworm, but it is not a necessity with many treatments, although perhaps advisable, if the places are small in extent. The objections to its use are the time it takes and the pain it causes. Many say it is quite useless, as the hairs break off near the mouths of the follicles; but it must be remembered that the diseased hairs plug the orifices of the follicles, and, if we can remove only a small portion of the stumps, we enable the ointment to be the better rubbed in.

Very often such treatment as oleate of copper, Coster's paste, or iodide of sulphur in creasote, gas-water, etc., may loosen the stumps, and then epilation is most valuable. The best cases to epilate are those with the *M. ectothrix* and the *endothrix, resistant* forms of fungus.

If the places are at all extensive, I rarely advise epilation, as the time required for it can be much more profitably spent in rubbing in the remedy; but, if there are only a few places, and the child can bear it, I do advise it, as it probably hastens the cure, especially if the stumps are at all loose, and can be extracted entire.

The first time I see a small recent patch, I always epilate at once, and for a quarter of an inch round it (see p. 157), for then many of the diseased hairs can be removed; while, with extensive ringworm, under gas-water, or boric acid, oleates, etc., it is rarely worth the time and trouble. It is also useless if the hairs are very rotten, so that they break off on a level with the surface of the skin,

which is often the case in chronic "black-dot" ringworm (*M. endothrix, fragile*).

Epilation should be done with a broad-pointed pair of forceps: some advise broad and straight points, others broad and curved (see p. 158). It is best to pull the stumps gently, with a steady motion, and in the direction in which they protrude. *They must not be jerked out.* The forceps can be cleansed each time, by wiping them on a small sponge, placed ready for the purpose in a basin of water.

Epilation, to be of much good, must be resorted to over and over again, so long as any diseased hairs appear. The operation is painful, even more so than simply using croton oil.

After partly loosening the stumps with croton oil, I often paint a solution of cocaine (from 5 to 10 per cent.) on the place before epilating; or put on a solution mixed in lanoline a quarter of an hour before.

After epilation, it is advisable to use some parasiticide, and it is worth remembering that carbolic glycerine often eases the pain. In fact, I very often have it well soaked into the patches (1 in 5) before commencing the operation, as the sensibility of the part is much lessened by its use.

In France, they epilate by means of a plaster cloth. The hair is cut short, and the plaster applied in strips. After a few days, the strips are suddenly torn off, pulling out some of the hairs. This is very painful, and I have never tried it. Crocker's salicylic-acid collodion is also used for epilating (see p. 184).

PREVENTION OF SPREADING.

During the treatment of the diseased places, the rest of the head must not be forgotten. It often happens that

ringworm exists on other parts of the scalp, in a state not recognisable by the eye.

Therefore, it is most important not to devote all the attention and treatment to the places distinctly seen ; for while these are being cured, if precautions be not taken, other small spots, where the disease has been overlooked in its incipient stage, make their appearance ; and the medical attendant may find, when he has cured the first patches, that he has several more to deal with. *The whole scalp should be examined now and then during treatment, and some parasiticide always used all over the head, even when only a single patch of ringworm exists.*

Only a few days ago, I had a boy brought to me, certified to be cured and fit for school, who had been treated for two years. Certainly, the original patches were cured ; but no parasiticide had been used over the head, and, to the dismay of the mother, I found seven small recent places scattered over the scalp, due to omitting this simple precaution.

PREVENTIVE LOTIONS AND OINTMENTS.

When boric-acid lotion, gas-water, or oleate of copper, etc., are used, if there are only a few places, and the hair has not been entirely removed, some of the lotion or ointment can be rubbed into the rest of the scalp, once a day, during the treatment, to ensure the destruction of any conidia that may be about. If this be not done, the disease may spread, or, more likely still, minute places just commencing, which have been overlooked at the first examination, will develop ; but, if a parasiticide is used all over the head, this will be prevented, and they can also be seen, and cured.

If strong remedies, or oleate of mercury, be used to the

patches, some other preventive should be used all over the head once a day, directly after washing, if we wish to stop the spread of the disease.

The following ointments and lotions may be used for this purpose :—

The sulphur and salicylic acid, and the sulphur and white precipitate and creasote ointments, mentioned on p. 159. Carbolic glycerine (1 in 8). Carbolic-acid lotion (1 part in 40 to 50 of water). Salicylic-acid lotion or ointment (gr. x. to xx. in ʒj.). A solution of chlorinated soda, diluted with from four to seven parts of water. A saturated solution of boric acid in spirit and water, equal parts. Hyposulphite of soda solution (ʒjss. in ʒj.). Also the following :—

℞ Hydrargyri Ammoniaci ¹	. . . . .	gr. x.
Hydrargyri Oxidi Rubri ¹	. . . . .	gr. v.
Adipis Benzoati	. . . . .	ʒj.
Misce. Fiat unguentum.		

CAPS.

Day-Caps.—If there are only a few places, and no other children in the house, it is not necessary for a cap to be worn during the day; but, if the disease be at all extensive, and the hair has been removed, or if an ointment be used, it is better to use a silk or cotton “fisherman’s cap,” which easily slips on, and hangs down with a tassel. It is not at all unsightly, and may be obtained in silk in many colours. A cricket cap will also do, or the old black-silk cap, but this is unsightly.

Some *waxed* tissue paper ought always to be put inside

¹ *To be finely levigated.*

the cap, if any ointment be used. The lining of ordinary caps should be removed from time to time, or the cap boiled, if possible. The tissue paper is important, to prevent spreading to other children, and should be changed every day.

Night-Caps.—In using an ointment, Goa powder, sulphur, oleates, etc., it is necessary to exercise great care, to prevent the preparation from getting on to the forehead or face during the night. Again, a night-cap will prevent the pillow-case getting soiled, and the face from getting irritated by the child lying on it afterwards. An ordinary white cotton night-cap does very well, especially if the edge is fixed by a double turn of a bandage round it.

Oilskin caps were formerly used over the cotton ones, but it is much better to use some waxed tissue paper, or even gutta-percha tissue, inside the cap.

If a poultice, or many small ones, have to be kept in position on the head (as required in the croton-oil treatment), an excellent cap can be made with a round piece of linen, having a tape run in two inches inside the edge. This can be securely fixed in position by tightening the tape, and tying it under the chin. A double turn of an ordinary bandage round the edge will help to keep the cap from slipping during the night.

If only two or three poultices are applied, they can be kept in position by using a strip of linen, with a tape run in at each end. The strip is then placed over the poultice, or poultices, the ends gathered in with the tapes, and the tapes tied under the chin. A turn of bandage may also help to secure it for the night.

It is not necessary to leave much ointment on the surface of the head; for it is evident that the good results

obtained from these remedies depend entirely on the amount which is rubbed *into* the follicles, and not upon what is left smeared on the surface of the scalp. Therefore, almost all the ointment used should be rubbed in, or removed, and should not be left on the head to saturate the edges of the night-cap.

Very special precautions must be taken when Goa powder or "chrysarobine" ointment is used, or else a child is almost certain to let the cap slip during the night, and thus get the irritating and staining parasiticide on to its face. Sometimes the edge of the cap, when using oleate or ointments, will get saturated with the remedy, and cause much irritation upon the more delicate skin of the forehead.

The caps should be changed every two or three days, and the soiled ones washed. Some prefer to use a large cotton handkerchief, which should be folded in a triangular shape, and the long side placed over the forehead so that the handkerchief covers the head, with the right-angled corner behind; then the two other ends can be tied round the back of the head to make it into a cap.

GENERAL AND CONSTITUTIONAL TREATMENT.

Internal remedies have no direct effect in curing ring-worm, as it is essentially a local disease, due solely to the fungus, which must be killed, or removed with the hairs by causing a temporary Alopecia. I see the most obstinate and rebellious cases in perfectly healthy children (see p. 40); and I have never found tonics, arsenic, or cod-liver oil, when not required for the general health, help to cure this disease.

I have tried the internal administration of sulphur, but

have not seen it do any good ; and, if much be given, it soon causes symptoms that render it necessary to stop it.

Change of air is often advised. I think it is absolutely useless ; and I see just as many bad cases of ringworm from the sea-side, and the country, as from London. Some people imagine that a change to the sea-side will do good, and influence the disease, also that bathing in the salt water will cure it. All such ideas are mere delusions ; and, very often, from the neglect of parasiticides, the disease simply spreads.

I have often been told that a saturated solution of common salt will cure ringworm. I have tried it, but have seen no good result.

DISINFECTION.

It is advisable to disinfect any articles that might convey the disease to other children. After the case is well under the influence of some parasiticide, coats, comforters, neckties, etc., may be baked.

Linen and underclothing may be boiled. Caps should have the linings removed and destroyed ; or, better still, be themselves destroyed.

Brushes and combs can be cleansed now and then with carbolic lotion (1 in 20), and all towels used should be boiled.

At first it is often advisable to apply some preventive ointment or lotion to the heads of the other children, when one in a family has ringworm. The ointment with white and red precipitate, to be found on p. 215, does very well ; or carbolic glycerine (1 in 8), or carbolic lotion (1 in 40 to 50), may be used.

Thorough washing of the non-infected heads with

carbolic-acid soap or Jeyes' soap is also advisable, and a little carbolic oil or glycerine (1 in 8) may be put on afterwards.

Care should be taken that any poisonous application be safely put away after use.

SCURF AFTER RINGWORM.

As a rule, there is no scurf on the skin after ringworm is cured, if the head has been free from scurf beforehand. Scurfy places are always suspicious, and the scales should be examined if there be any doubt. Sometimes a patch will remain scurfy for some time after the disease is quite well; and, in such cases, nitrate of mercury ointment, diluted with from five to seven parts of white vaseline, is very useful. Glycerine jelly may be used, with a little boric acid in it.

Chronic scurf, however, is very likely to be due to *chronic* ringworm. Many of the cases of so-called "scurf after ringworm" are only inveterate forms of the disease. Some of the cases of ringworm I find on examining boys for schools have been thought to be "only a little scurf left." I often see cases that have been treated for months or even years for chronic scurf, where there are hundreds of diseased stumps to be seen. I have so often referred to this before that it may seem idle repetition; but the fact cannot be too strongly urged, that numerous children are said to be cured from Tinea, and are given certificates to return to schools, when, instead of the case being simply "scurf," it is ordinary chronic ringworm—*viz.*, scurfy patches with long hairs growing freely, but with numerous isolated stumps also.

A mother sometimes writes as follows: "My child

had ringworm two years ago, and was cured ; but ever since then he has had a scurfy head, and in some places the hair does not grow as well as I should like it to do. Can you advise me any treatment to get rid of this troublesome scurf?"

Therefore, I say medical men should be very careful, and not immediately conclude a case is only scurf, or eczema ; but should most thoroughly examine the scalp with a lens, to see if there are a few isolated stumps, or even the black dots, scattered about, and concealed by the long hairs, or any scales, before concluding the case is well and fit for school.

CHAPTER IX.

THE CROTON-OIL TREATMENT OF TINEA TONSURANS.

THE ARTIFICIAL PRODUCTION OF KERION—THE TREATMENT OF DISSEMINATED RINGWORM—CROTON-OIL NEEDLING—TREATMENT OF TINEA KERION.

Kerion is a special inflammatory condition of the skin and the hair-follicles, which may arise spontaneously, especially with the *Megalosporon ectothrix* form of the fungus; but it is also seen with the *Microsporon*, and even with the *Megalosporon endothrix*, when under some irritant form of treatment. Sometimes kerion comes on quite suddenly, and the patches get tender, swollen, red, and infiltrated (see p. 95). If this complication should occur, it is very fortunate; for it appears to be Nature's way of curing ringworm, by causing cell-proliferation and exudation into the follicles, with subsequent loosening of the hairs, and their expulsion, together with all the fungus, leaving a temporary patch of Alopecia.

I first noticed this over twenty-three years ago, and then made experiments with croton oil, trying to artificially produce this folliculitis and exudation. Since that time I have constantly been in the habit of using this treatment, and called it "The Artificial Production of Kerion."

In 1880, I described this special treatment of ringworm

in *The Lancet*,¹ and many letters were written on the subject.²

Liveing also wrote in 1881: "Croton oil supplies us with just such a remedy as we want, for it has the property of reaching the disease, and setting up a deep-seated follicular inflammation which destroys the *Trichophyton*." . . . "It is now about four years since Aldersmith called my attention to the subject; and since that time I have adopted the croton-oil treatment in a fair number of carefully selected cases, and always hitherto with satisfactory results." . . . "If croton oil be used without discrimination, or a due regard to the age of the patient, and the extent of the surface involved, it is sure to be brought into unmerited disrepute, the fault being, not in the croton oil, but in the person who recommended it in unsuitable cases."³

Duhring wrote in 1886: "The remedy is a severe, but most useful one. Frequently it will cure when all other remedies have failed."⁴

This special treatment has been fully recognised by dermatologists; and at the annual meeting of the British Medical Association in 1893, after the notes on pp. 147-9 were read, Crocker remarked: "While, no doubt, croton oil was a dangerous remedy in unskilled hands, it was most valuable and almost indispensable in long-standing cases of disseminated ringworm, where there were multiple foci of small groups of hair-stumps, so rotten that they broke off at the slightest traction. A minute drop of the oil introduced by a needle to the bottom of the follicle enabled

¹ *The Lancet*, January 31st, 1880.

² *The Lancet*, April 10th, 24th, June 12th, 1880.

³ *Brit. Med. Jour.*, February 12th, 1881. See also letter by Magee Finny, February 26th, 1881.

⁴ *Diseases of the Skin*, 1886.

the stump to be removed entire, which was impossible by any other method except electrolysis, and this last procedure was too painful for any except nearly grown-up patients."¹

And Colcott Fox said, with regard to croton oil, he now never recommended it to be carried out by others. It was a powerful and most valuable remedy, but required experience and care. Nothing else he knew of could effect a rapid cure, and long experience had taught him its value.¹

The chief reasons why croton oil is not more extensively employed are, first, the great care and time that have to be spent upon the case by the medical man, for this treatment cannot be left to a nurse to carry out; and, secondly, the fear there is of inducing too much inflammation, with some slight sloughing of the surface of the skin, and consequent marking afterwards; but this does not happen if proper precautions be fully carried out.

There is no doubt the proper application of croton oil requires very special experience, and personal care on the part of the medical attendant. I do not produce any scars; but then, it must be remembered that I have had almost a daily experience in its use for twenty-three years, and with hundreds and hundreds of cases, which I could not have cured with simple treatments. In fact, very few days pass without my seeing children undergoing the croton-oil treatment.

I can most positively assert that, in attempting to imitate this curative action of Nature, we have the most valuable means at present known² at our disposal for curing small, and even moderate-sized, places of *Tinea tonsurans*, even when all other remedies, including formalin,

¹ *Brit. Med. Jour.*, August, 1893.

² See Sabouraud's suggestion, p. 150.

have failed. Again, by *needling* the individual hair-follicles, as will be described later on, it is easy to get rid of the isolated stumps, and black dots, seen in disseminated ringworm ; and also to remove the isolated stumps, which so often remain on the patches of ringworm after they have been treated for some time with ordinary parasiticides.

At first, and even in the last edition, I only advised the croton-oil treatment for "small patches of *chronic* ringworm, which have resisted all other treatments for months, or even years, and *not* in those cases where the disease extends over a large extent of surface."

Twelve more years' experience has taught me, that, *with proper precautions*, there is no more risk in treating small *recent* patches with croton oil, than *chronic* ones. And, as I find most of the treatments for ringworm usually fail to completely cure the disease, I now consider it only waste of time to try them ; and, if parents do not object, I at once use croton oil to all *small* places of ringworm, provided the child is old enough to bear it.

Croton oil, of course, must be used with *very great caution*, and only under the direct eye of the medical attendant, who must be prepared to give a large amount of time to the case, and most minute directions to the nurse or mother ; and he ought to see the child every few days. I have never seen any internal irritation, erysipelas, or other trouble from its use ; and, so far as I know, the only danger is slight sloughing of the skin, and the formation of a scar. This can be prevented by care and attention ; and, though I have often, by degrees, used croton oil over a large portion of the scalp, I never find that any scars are left by the treatment.

At times, the hair does not grow quite so freely again on the patches ; but there is hardly any distinct mark,

even when carefully looked for. In fact, I do not think I have ever made a mark so bad as is often seen from a fall, and a cut on the head. Certainly I have seen infinitely worse marks caused by using acetic acid.

I do not advise croton oil indiscriminately in ringworm, especially if there be a large extent of surface involved. But I have often to cure large places, where, after ordinary treatment, many of the hairs have grown again on the patch, while numerous isolated stumps are left. Very often it is necessary to reduce the size of the places first by other treatments, and then I try the oil first on a small place, and watch the effect. I always prefer to needle out the individual stumps rather than use oil over any large extent at a time. Often the majority of the stumps can be removed with croton oil, while those left have to be needled out afterwards.

As a rule, kerion is not produced by the application of croton oil, but only a pustular folliculitis; and the purulent inflammation spreads into the hair-follicles, and loosens the diseased hairs (see p. 232). Though no distinct swelling of the skin may occur, the hairs by degrees get loosened by the proliferation of the cells, and the discharge from the follicles, and they all come out with the root-sheaths and the fungus, leaving a smooth bare place, which soon heals when the oil is discontinued, and the case is cured. In about six weeks, new downy hair commences to grow, and increases in length at the rate generally of an inch in six weeks.

The application of croton oil, with constant bathing and poulticing, will almost always cure small patches of Tinea; and I hardly ever fail in accomplishing my object, by taking time over the case. Sometimes I rapidly put all the places under croton oil, if I see the case is doing well,

and no signs of any sloughing appear ; while in other cases I am anxious, and wait for new hair to grow on the first place, before attempting to go on with the others.

The following cases are, in my opinion, suitable for the croton-oil treatment :—

1. Chronic *small* patches of Tinea, due to any form of fungus, that have resisted treatment for some time ; especially where the patches have been reduced in size by treatment, and cannot be cured by ordinary parasiticides.

2. Any moderate-sized place, where time is of the utmost importance, where a cure is necessary as quickly as possible, and where there is no objection to a slight risk of the hair not growing quite so freely on the place afterwards.

3. Especially in cases where ringworm has been detected and properly treated for a time, until some new hair has made its appearance ; after which, treatment has been discontinued, although many diseased stumps remain. Months, or even years have passed, and the child is perhaps rejected at some examination, for admission into a school. One or more patches are to be seen where the hair is growing freely and firmly ; but on close inspection with a lens, some scurfiness and many broken hairs or stumps are to be observed, scattered among, and concealed by, the long hairs on the patches.

Such cases can generally be cured by croton oil, often by using the oil to distinct groups of stumps ; while hundreds of isolated stumps may be removed week by week by needling with the oil.

4. Small *recent* places, when the spread of the disease has been stopped, and a medical man is well acquainted with the method of using croton oil.

5. Needling the individual stumps with croton oil is

the only treatment worth following out in old cases of disseminated ringworm, especially the "black-dot" form, as the cases can always be cured, with time and trouble.

N.B.—Croton oil should not be used to very young children, chiefly because other remedies generally cure the disease, and because very young children rarely keep quiet and allow the medical attendant to properly look after the case; if needling be necessary, they will indeed rarely bear the pain, and keep the head quiet, which is essential. I have at times used croton oil to children only two years old; but I cannot advise others to attempt it, and it is better not to employ it on children under six, unless under exceptional circumstances.

I would earnestly warn medical men not to apply croton oil to spreading cases of ringworm, and not to use it at all unless they are fully prepared to spend a considerable time on the case, and carry it on till the case be quite well. Half measures only do more harm than good.

Again, if the oil is simply applied, and crusts allowed to form, there may be set up, not the deep folliculitis that is essential, but only a superficial crusting pustular eczema, which very often rapidly spreads the disease under the crusts. I well remember a medical man bringing his son to me in great alarm, some years ago. I found the boy's head covered with scabs and crusts, with the long hair all matted in, and the disease spreading as rapidly as possible. I learned that his father had simply painted on croton oil, without even marking out the places, using any parasitocides, or keeping the parts properly bathed and poulticed. In fact, ulceration, and scarring, would soon have followed, if this case had been neglected any longer. Such a misfortune could not have been put down to croton oil, but to simple carelessness in treating

the case. Such carelessness is generally due to thinking it an easy matter to properly carry out this treatment (see p. 223).

Sometimes, even when the case is being properly attended to, the parents imagine the doctor is making the child much worse ; they get alarmed, seek other advice, and may be told that their former medical attendant has been greatly over-treating the case, and has been using too strong remedies. Under soothing applications, the little patient gets well, and the second attendant gets the credit of curing the case, which was practically well when he first saw it.

I always fully explain to parents *beforehand* the reasons for adopting this treatment, and the results to be expected from it. Again, it must always be remembered that there is a possibility of slightly bare places being left after the application of croton oil, especially when only a deep pustular inflammation, and not true kerion, has been produced.

It is also important to bear in mind, that simple remedies will generally be efficacious in eradicating ringworm in young children, and that with them strong irritants should never be employed, unless absolutely necessary.

The Treatment.—Before commencing the treatment, every place should be accurately marked out, and the hair also cut for an eighth of an inch round the patches. There must, of course, be no spread of the disease going on.

It is best, for the first few days, to treat *one* place only, about the size of a shilling, and see what amount of inflammation the oil causes. I have even seen one application of croton oil cause kerion ; and one case I remember where one drop of oil caused such intense inflammation, with some slight sloughing, that I had to stop its use. Of

course, this is very rare indeed ; but, as it may happen, it is advisable to commence with a small patch.

The croton oil¹ should be well rubbed into the place with a very small camel's-hair brush ; but only a drop is required, as no excess must be left to spread to the surrounding skin, or to run down. If great care be not taken, and any excess be used, the pustulation will extend much farther than is required. Carbolic lanoline (ʒjss. in ʒj. of *anhydrous* lanoline) can then be painted round the place. This prevents the disease from spreading, and also the croton oil from extending beyond the place. A little piece of tissue paper can be put over the place, sticking to the lanoline, and the oil left to soak in, if a cap has to be worn at once ; or the oil may just be left exposed to the air for a time. I order a poultice to be applied to the place after three or four hours, and carbolic glycerine (1 in 8), or some oleate of mercury in almond oil (15 per cent.), to be applied to the rest of the scalp, once a day.

No treatment that will tend to prevent the formation of pus, as boric fomentation, should be employed ; but an old-fashioned linseed-meal poultice. I prefer this to be made with the ground dry meal, rather than the new-fashioned crushed linseed ; for the reason that it makes a soft, and *sticky*, poultice, which adheres to the place. This is of great importance ; for, if the poultice slips in the least, the pustulation will be produced where it is not required, and much pain and trouble caused.

A soft, sticky lump of poultice, about half an inch thick, should be placed directly on the patch, covering it, and extending for about half an inch around it. Then a

¹ I prefer croton oil to croton-oil liniment, as this has a tendency to run ; if it cause too much irritation, it can be diluted with a little oil, but I very rarely do this.

piece of oil-silk should be put over it, extending two inches beyond the poultice on to the hair. This will adhere to the hair, and can easily be kept in position by a handkerchief tied round the chin, or by using a strip of linen, gathered at each end with a tape. This will hold the poultice, and the tapes can be tied under the chin. At night, an ordinary white night-cap may be put on, and securely fastened, as it is of great importance not to let the poultice slip in the least (see p. 216). Even when several places are under treatment at the same time, a separate poultice should be applied to each place, and the whole covered with oil-silk. By these means six or seven can be kept in proper position, even during the night.

If a hard poultice be used, or any muslin be put between the poultice and the skin, it is almost sure to slip. Again, no linen or lint should be put over the poultice, as it only dries it; but the oil-silk should be put directly over the soft meal, so that it may keep moist all night.

The first morning.—The poultice must be removed, and the place well bathed with warm water, when a number of small yellow blisters will be seen. These may be pricked and any matter let out, and the place well bathed before it is again painted with croton oil. The pustulation may have spread beyond the place, but the oil must only be applied to the original patch, the position and size of which should be carefully noted. Carbolic glycerine or lanoline should always be smeared round the places, to prevent the croton oil from extending, and after the oil has soaked in for an hour or two, a poultice should be applied as before.

Then *constant poulticing* should be continued day and night, the place or places being bathed each time the poultices are changed, and any matter removed. Also, a little carbolic glycerine should be put round the places

every time, so that the edge of the poultice gets soaked with it. This will also prevent any spread of the disease. The poultices may be changed every four or six hours.

Second morning.—After bathing off any yellow exudation, it is advisable to pick off the raised epidermis, so that the true skin is exposed; and, if there is no swelling, nor the slightest appearance of superficial sloughing of the skin, the oil can again be applied.

If in doubt, a day may be missed, and the poulticing continued.

If all go on well, and there is no kerion set up (which is the exception), this bathing, poulticing, and daily application of a drop of oil after the yellow pustular exudation is removed, may be continued for from one to three weeks, according to the effect produced.

I always like to see the case on this day (the third), and then every three or four days for the first fortnight, until I feel certain it is going on well, and that there is no danger of any superficial sloughing; then once a week till cured.

Kerion.—If kerion be set up, the place gets distinctly swollen above the level of the surrounding skin, and it does not matter how much swelling occurs, even if it looks like an abscess forming. This swelling is the best sign possible; and the place may become very tender, puffy, and even at times boggy to the touch. It is covered with a yellow exudation; and on removing this substance with the point of the forceps, a sponge and warm water, the skin underneath will be found to be very red and tender, with a muciform or purulent discharge exuding from the follicles; and, what is more important, the hairs and stumps loosened. These either come away with the discharge, or can be easily pulled out. If the patch is very

much swollen, the hairs, on being extracted, come out from a considerable depth.

If kerion comes on, the croton oil must at once be discontinued, and soothing remedies applied, as simple bathing with warm boric-acid lotion, and constant poulticing, with some boro-glyceride on the poultice, till all the stumps are loosened. When this happens, the sooner they are all extracted the better. This does not cause any pain, as the hairs are simply lying loose in the follicles.

Directly all the hairs are removed, the swelling soon goes down under the above treatment; and, if any stumps remain, they can be extracted from time to time.

The parents, as a rule, are greatly alarmed if kerion is produced; so it is better to explain to them beforehand the reasons for adopting this treatment, and, the result to be expected from it. The condition is somewhat painful, and much resembles that caused by the formation of an abscess; the glands also often enlarge about the back of the neck, but only once have I seen an abscess. The swollen glands subside as the irritation goes down.

Kerion may be rapidly set up; at other times it is most difficult to induce. Croton oil may sometimes be applied over and over again, even for weeks, without causing the swollen, puffy state of the scalp desired. But, even if the infiltrated condition of the skin cannot be produced, and a deep pustular rash alone is formed, more or less inflammation and exudation are always set up, and the treatment very rarely fails, in time, in loosening the stumps, and curing the disease.

Folliculitis only.—In by far the greater number of cases, croton oil may be applied day after day, in minute quantities, and there is a certain amount of folliculitis set

up, but no real kerion, and the skin remains at the same level. A thick yellow incrustation always comes over the place, and should be removed daily by bathing, and very gently scraping the place with the blade of the forceps, as no scab must be permitted to form; for it is useless putting on the croton oil over a thick deposit of yellow matter. The skin will then be found to be very red; and, in time, on gently scraping it, a purulent discharge will be forced out of the follicles. When this commences, it is an excellent sign, and it is only necessary to keep up the irritation with very minute drops of oil once a day, or every other day. This purulent inflammation will extend by degrees into all the follicles, and then the hairs get loosened. Therefore, from time to time, the diseased hairs, which look white and much thickened, should be gently pulled. If they break off, the oil can be put on again; but, if they commence to come out, the croton oil should be discontinued. The poulticing, etc., is to be continued as before, till the stumps come out, or can be pulled out. Sometimes I apply a solution of cocaine (5 or 10 per cent.), and then extract the stumps.

During the treatment the pustulation, etc., will often extend around the places, especially if too much oil be used. This does not cause any spread of the disease, as carbolic glycerine should always be kept about the edges of the places; but this trouble may be avoided by putting some carbolic lanoline round the places, before the croton oil is applied.

When there is no kerion formed, *very great care* must be exercised to prevent the slightest superficial sloughing of the skin. If there is the least suspicion of sloughing of the surface, the oil must be discontinued for a day or two, mixed with equal parts of almond oil, and then

used every other day only. So long as the true skin is only intensely *red* underneath the yellow exudation, all is going on well ; but, if it appear to have a slight white skin—like the skin over an egg—adhering to it, there is danger, and the oil must be stopped at once, and soothing applications, like boro-glyceride and poulticing, applied. This is the difficult symptom to explain, and the proper and safe look of the skin can only be fully known by experience. It is by just seeing a case for a few minutes every three or four days, that I can tell at a glance how it is going on ; and I never think of taking any responsibility with croton oil unless I can personally see the case every few days.

Slight Marking.—It is after a deep pustular rash only, where kerion has not been set up, that slight marking sometimes happens. Some of the hair-follicles become obliterated, and new hairs do not replace all the diseased ones. Even if some of the hair-follicles be destroyed by croton oil, the majority of the hairs grow again. Therefore, when the place is well, and the hair has grown, it is recognisable only by the hair being slightly scanty on the patch, for no distinct bald place is left. After a few months it is generally very difficult to find the place, and the mark is so trivial that even the parents do not notice it. In fact, a scar equal to that caused by a cut on the head ought not to be made, if proper care be exercised. I have constantly used croton oil over most of the scalp by degrees, and not made any mark.

The simple application of croton oil, followed by a pustular rash and yellow crusts, but *without* the deep folliculitis and exudation from the follicles, is quite useless, for the stumps grow up again as diseased as ever. The most important point, in using croton oil, is not to be in

too great a hurry, if no kerion is set up ; but to continue the applications of minute drops, taking care that no sloughing is set up, till all the stumps get loosened.

If there are many places, the oil can be used by degrees to the others, when it is seen that the first is progressing favourably. I generally do a portion of a moderate-sized place at a time, and the largest I ever treated was about two and a half inches in diameter.

Especial care must be taken to prevent the poultices slipping, or the pustulation will be spread about the head. If the oil by any means get on the pillow-case, and the child rub its face on it, of course a pustular eruption will follow. I have seen cases where, through carelessness, the oil has been allowed to get on to the pillow-case, and during the night been rubbed on to the forehead and cheeks. If this accident happen, a crop of minute pustules will probably occur. When I first saw a case of this kind, it gave me great anxiety, lest some marking should ensue ; but, with soothing applications and simple ointment, the slight crusts are speedily removed, and no mark remains. Of course, *with proper precaution, this accident should never occur.*

When the hairs get loosened and come away, or are extracted, some long healthy ones may remain. It is not necessary to remove these, but only all the diseased stumps, unless kerion is set up. If this happen, the sooner all the hairs are removed the better, for they only act as foreign bodies, and must come out.

Isolated Stumps are often to be found about the scalp in chronic cases, as well as distinct patches. If so, they ought to be extracted while the patches are under the above treatment. The whole scalp should be most carefully

examined every week, and all the isolated stumps removed by croton-oil needling, as described later on. But, even when a case is apparently quite well, just one or two isolated stumps may appear from time to time. Hence, children, even when thought to be cured, should always be examined again, in two or three weeks ; and, if a stump is found, then again and again, till a month has passed by without one being discovered. By the neglect of this precaution, very often one single stump may be left, because broken off and not seen at the last examination, and this may spread the disease again (see p. 30).

I cannot speak too strongly about this, and the great difficulty of finding *the last* diseased stump, when the disease has been scattered over a large portion of the scalp. When there have been only one or two distinct places, there is less danger of isolated stumps ; but, if the case is an old chronic one, and stumps have existed in every direction, it must be most specially watched for some time.

If the patch be large, and many long hairs growing, with numerous isolated stumps scattered amongst the healthy hairs, it is not advisable to apply croton oil all over it, but infinitely better to needle out the stumps separately. Thus, a large temporary bald place is avoided. It is simply a matter of time and trouble, if the case consist of isolated stumps ; for it is only necessary to needle them all, and they will easily come out, and leave no scar. This treatment is not so painful as trying to produce kerion ; and I often needle from fifty to a hundred every week, when disseminated stumps are scattered over the head.

When once the stumps have come out, there is no fear of the new downy hair getting involved with the fungus. Besides, some carbolic glycerine, or some other parasiticide, such as oleate of mercury (15 per cent.) in almond oil,

ought to be applied all over the scalp, while croton oil is used, and continued till every stump has been removed.

Treatment when free from Stumps.—When most of the stumps are coming out, and the croton oil has been stopped, it is best to continue the poultices as before, with a little carbolic glycerine on them, bathing each time with warm boric-acid lotion, or applying boro-glyceride on the poultice. Then, in a few days, poulticing is only necessary at night, and bathing by day. When there is no danger of any crusts forming, simple bathing with warm boric-acid lotion a few times a day, and boro-glyceride, or carbolic glycerine, on the places, is sufficient. The places will remain very red for many days, and during this time any stumps that are left should be extracted; and, if they will not come out, they can be at once needled with croton oil. By degrees the redness passes off, and a smooth, bare, pale spot is left.

If every stump has been removed, the case is now cured; but very often a few may still be found at the edge, or just inside the long healthy hairs. These must be pulled out, or needled, if they break off. When the place is healed, and the skin normal again, I either have it painted every day with tincture of iodine till the new hair grows, or else apply the cantharides and acetic-acid lotion used for *Alopecia areata* :—

R Tincturæ Cantharidis	. . . . .	ʒij.
Acidi Acetici	. . . . .	ʒj.
Glycerini	. . . . .	ʒss.
Spiritûs Rosmarini	. . . . .	ʒj.
Aquam Rosæ	. . . . .	ad ʒviij.
Misce. Fiat lotio.		

Sig.—To be gently rubbed into the bald places, night and morning.

It is most important to examine the case every week or ten days, to get out the last diseased stump, and in about six weeks the new downy hair will appear.

I have tried placing a small cupping-glass over the place the first time, as described under "Creasote"; and by extracting the air, and allowing atmospheric pressure to force in the croton oil, I hoped to save time; but I cannot advise this treatment, because it is very difficult to prevent the oil getting beyond the patch. It causes some infiltration of blood into the subjacent tissues, and I think there is more danger of forming a scar.

CASES.

I will just mention a few typical cases of croton-oil treatment.

1. In 1895, I saw a little girl (aged eight), who had had ringworm for three years. She had one place about three inches in diameter, and several small places, due to the *Megalosporon endothrix*, resistant fungus. I knew by the history that ordinary parasiticides were useless, for she had been treated by three skin physicians without any success, and the parents were almost hopeless.

I explained the risk, advised croton oil, and commenced with one spot the size of a shilling in the centre of the large place. In three weeks, I had it free from stumps; but, as there was no kerion set up, and the place looked a little suspicious, as if the hair might not grow quite so freely as before, I waited for five weeks. Then, as a complete crop of fine new hair was just appearing, I commenced to treat the other places and the rest of the large patch, for I knew that the hair would grow properly, from my first experiment. In another month, the case was

practically cured, and a large, bare, red place was left. A few isolated stumps had to be needled out, and in another month the child was well. In six weeks from getting out the hairs, the new hair commenced to grow all over the places, to the great delight of the parents.

I specially mention this case, as it is a typical one, showing what can be done with care. One dermatologist had previously advised the parents not to allow croton oil to be used. When he afterwards heard that the child was cured, and the hair growing freely again after croton oil, he was much surprised, and I think has altered his opinion as to the value of this treatment. I firmly believe this child would have gone for years in much the same state, and have been prevented from going to school, if croton oil had not been used.

2. On January 7th, 1896, a boy (aged ten) was brought to me with one patch, two inches in diameter, and three small places (*Microsporon*), of three months' duration. I used croton oil at once, and by January 20th all was going on well; but there was no kerion set up, although he had had croton oil every day for thirteen days; but the skin was very red under the yellow matter. The treatment was continued for another week, and by that time almost all the stumps had fallen out into the poultices. A little oil was continued for a few days more, only where there were a few stumps left, and by February 3rd he was free from diseased stumps. The patches were not raised, but only covered with pus, and very red underneath it. By the 12th, under bathing and poulticing and carbolic glycerine, the places, though bare and red, were perfectly well, and not one diseased stump could be found. On February 26th, fine, new downy hair was commencing to grow, one-eighth of an inch long, over all the places, and

in a few weeks there was a good crop of healthy hair, and the boy was fit for school.

I might have wasted months in trying all sorts of lotions and ointments on this case, but I did not wait even a single day on first seeing the boy. There was no spread of the disease; and there very rarely is, if a good preventive be used all over the scalp during the treatment.

3. A boy (aged eight), with chronic ringworm over most of the scalp, of two years' duration. He was treated for a whole year with boric-acid lotion (three months), gas-water (six months), and oleate of copper (three months). He was very much better, but had a large number of isolated stumps left, and one patch about two and a half inches in diameter.

I then needled hundreds of stumps out with croton oil, and finally had to cure the one distinct patch, which had resisted treatment of all kinds for three years. Under croton oil, in about a fortnight, this patch was converted into distinct kerion, and cured. During the next month a few more stumps were needled, and the boy was quite well.

I could not have accomplished this result without needling, and using croton oil to the patch. No mark was made.

The following is a case of *recent* ringworm:—

4. On April 16th, 1896, a boy (aged seven) was brought to me with one patch of ringworm, one inch and a half in diameter, and four small places. The disease was only two or three weeks old, and had not been treated at all; in fact, it had only just been discovered. I marked the places, and prevented any spread by sulphur, and used croton oil at once to all the places, applying it every day for a fortnight. Still there was no swelling of the skin, and the stumps broke off easily on epilation. Some matter, however, was just commencing to exude from the follicles, when they

were gently scraped. In another week, all the stumps were loosened, and I was easily able to extract them. Croton oil was then stopped, and the next week a few more stumps were removed, and the boy was cured. In six weeks from the date of the stumps coming out, new downy hair was growing freely all over the places. Under ordinary treatment, this boy would have been placed under ointments or lotions for two or three months; and even then it is probable the case would not have been cured. Instead of this, in two months from the date I first saw him, he was well and fit for school, and no mark was caused.

5. About a year ago, in consultation with a medical man from the country, I saw a little boy, aged eleven. He had about fifteen places of ringworm, and it was necessary to cure him in six months to get him into a school. I explained this treatment, and my medical friend tried croton oil for the first time, with complete success. In four months, the boy was brought to me again, with all the patches bare and smooth, and some new hair commencing to grow on most of them. The boy was quite well, and in a few more months even the position of the patches could hardly be made out, as not the least mark remained.

6. A boy had one spot of Tinea (*Microsporon*), which had been treated at school for two months without any result. The place was covered with stumps. When I first saw him, I applied croton oil; and, as no kerion formed, a minute drop was used daily for twenty days. The result was that folliculitis was gradually set up, and at the end of that time the place was very red, but entirely free from stumps. The boy was cured. Ointments or lotions might have been used for months without any result, and yet in three weeks he was quite well.

It would be a mere waste of time to enumerate the cases I have treated and cured by croton oil. They are hundreds and hundreds in number during the last twenty-three years.

Of course, the croton-oil treatment is somewhat painful; but the pain is not acute, and is more the pain of a sore place. It is much relieved by bathing and carbolic glycerine afterwards. I have tried cocaine, but it appears to stop the pus formation and the loosening of the stumps, and greatly retards the rapidity of the cure. I rarely use it, except when the stumps are partly loosened, so that they can be extracted under it without any pain.

If time be given, and the stumps are fully loosened, there is no pain in gently extracting them, but, as a rule, most of them come out into the poultices.

THE TREATMENT OF DISSEMINATED RINGWORM.

CROTON-OIL NEEDLING.

The best way to remove the isolated stumps in disseminated ringworm, is to run the point of a specially made needle, first dipped in croton oil, into each follicle containing a diseased hair.

If there are only a few stumps, this operation is easy, and the case may be quickly cured; but at times there are a large number of stumps, or black dots, scattered all over the scalp, or on one or more large scurfy patches, and then it may take weeks or even months to needle them all out. This is the only way to cure such cases, when they have resisted ordinary treatment for years; and I often needle from fifty to a hundred stumps at a time.

If they are situated all over the scalp, it is best to do one side first, so that the child can lie on the untreated

side of the head at night. There are many things essential to properly carry out this treatment.

Head-Rest.—The first is a good head-rest, as described on p. 154. Without some firm support for a child to rest its head on, it is impossible to keep it quiet, which is essential in order to find the stumps, and then to needle the follicles without pricking the skin. Besides, a certain amount of pressure must be put on the head, and this cannot be done unless it be supported.

The Needle.—This is especially made for the purpose, and consists of a long handle terminating in a fine end,

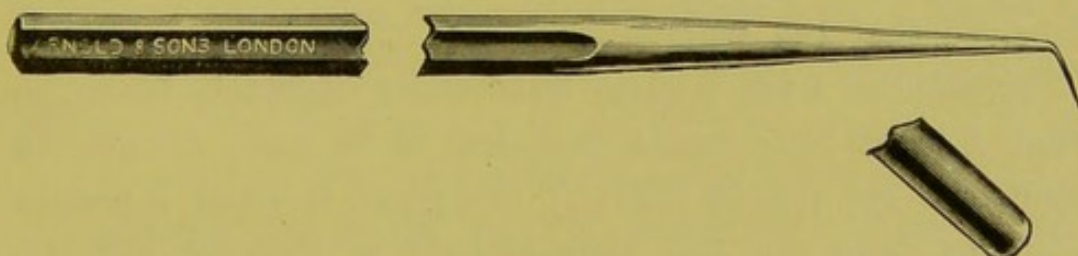


FIG. 6.¹

which is bent at an angle, so that it can easily be passed into the follicles. The point is fine, almost as fine as a hair, but *blunt*. I always rub the point flat, with a rounded edge, on an oil-stone. If it is sharp, it will easily penetrate the follicular wall, and cause pain and bleeding.

Fig. 6 shows this needle, with the point magnified. In former years, I used a thicker gold needle, but the one described is infinitely better. It causes no pain simply to pass the fine end into a hair-follicle, by the side of a diseased stump; but it certainly does, if the wall be pricked, and the point passed outside into the skin. This little operation can easily be accomplished by practice. I find no difficulty in rapidly running the needle into the follicles,

¹ This needle is made by Messrs. Arnold & Sons, Smithfield, E.C.



and leaving a minute amount of croton oil in them ; but I own it requires much time, patience, and practice.

The Forceps advised are those shown on p. 66. They are made with a slight curve towards the ends, which are strong, yet fine, and have minutely serrated points. These forceps are useful for turning over layer after layer of the hair, while the stumps are looked for with a lens, and needled as they come into view.

The Lens (see p. 66) is a botanical glass, of two inches focal length. It should be held between the first finger and the thumb of the left hand, about two inches from the scalp, and the eye should be about two inches from the lens, so that the stumps come into focus.

Sometimes I use a glass fixed into a spectacle frame, so that I have both hands free, but it is more difficult to keep the stumps in focus if the glass is fixed a certain distance from the eye, than if held as directed, and the rest of the fingers used to hold back the hair, and to steady the glass against the head. I have tried all sorts of glasses on stands, but prefer the above method.

The directions given on p. 65 will enable the operator to go over the whole head by degrees. The child should be close to a window, with a good light, which should fall on the right-hand side when the child is sitting with its back to the examiner.

It can also be done with a good artificial light. The light can be concentrated, and the heat removed, by passing the rays through a large glass ball, filled with cold water, as used by dentists.

The apparatus I have, with reflector and globe, enables me to needle very easily even on foggy days.

If the stumps are situated on a distinct patch, the head

must be placed against the head-rest, so that the place is well in view, with the light coming full on it. If scattered over the head, the right side may be treated first, and then the left.

Layer after layer of the hair should be turned upwards (in the wrong direction) with the blade of the forceps, while the hair just turned up is held down with the second to the fourth finger of the left hand, until the whole of the scalp has been examined. During the examination, a minute inspection should be made with the lens for any stumps or black dots. When one is detected, the forceps can be put down on a table on the right-hand side of the examiner, the needle taken up, the point dipped in croton oil, and then very gently passed into the follicle by the side of the diseased stump.

I think it is much safer and better to use a mixture of carbolic acid and croton oil (1 of carbolic to 7 of croton oil), and I have it coloured with alkanet root, so that, when a follicle is needled, the place can afterwards be seen by the red colour. This prevents the same stump being needled twice.

If croton oil cause too much irritation, I use equal parts of creasote and croton oil; but I prefer the former, if the scalp will bear it.

The needle should be boiled, or the point heated in the flame of a spirit lamp, before using; and I always put a few drops of the carbolised oil into a small receptacle, before using it, and thus avoid dipping the needle into the stock-bottle.

I have never known any trouble follow needling, and, if blood be drawn, no harm can be done, as the needle is always disinfected before using it for another child.

It is of the utmost importance to realise the exact

direction in which the hair-follicles lie, before attempting to pass the needle into them. This varies considerably, according to the part of the scalp needled. At the top they may be almost perpendicular, but at the sides they lie obliquely; much more so than is usually suspected. In some places, they lie nearly parallel with the surface of the skin, so that the needle passes in almost level with the surface. It is easy to tell the direction, for it is always exactly the reverse of the way in which the healthy hairs lie after emerging from the follicles (not the *diseased* hairs, as they may be bent).

At the sides and back of the head, where the hair lies very close to the skin, the needle will often have to be passed almost directly upwards. The pain of needling is caused by forgetting all this, and passing the needle regardless of the direction in which the follicles lie, so that the wall is punctured. Then a troublesome little pustule may form, and even a very small abscess in the skin.

It has taken me many years to thoroughly understand the way to needle, and it is most difficult to describe it to others. Only continued practice will enable the operator to properly pass in the needle; and very little pain is caused, if it is only run into the follicle. It can be passed some way in, and then, by a gentle movement in and out, the oil on the point can be worked into the follicle, by the side of the diseased stump. If this be done, it will almost certainly set up folliculitis, and slight pustulation, loosening the hair, which will come out during the following week while bathing the head with hot water, or it can be extracted with the forceps.

When commencing croton-oil needling, it is not advisable to have the hair cut too short, but to keep it about two inches long. The stumps are then more easily observed,

as the long hair is held back with the fingers ; if the hair be very short, it is impossible to hold it down.

If some of the stumps are loose, it is well first to try and pull them out with the forceps, and, if they break, the follicle must at once be needled. I often replace the broken-off piece of hair, immediately it breaks, so as not to lose the position of the stump ; but this must be done immediately, as the follicle soon closes. Then it is difficult to find the place, and to run the needle in. Therefore, I have my needle ready by my side, already dipped in oil ; and, if a stump break, I keep my eye on the point, through the glass, while I put down the forceps, take up the needle, and run it in without losing sight of the minute place for a single instant. If the eye be taken off the spot, it is impossible to find the place again, and the stump cannot be needled till the next week.

If most of the hairs break, it is useless to waste time in trying to pull them out, but each one should be needled as it comes into view.

General Directions.—The needled places can be bathed many times a day with hot water, which eases the pain of the small pustules, and helps to get out the stumps. Then carbolic glycerine (1 in 7 or 8) should be put on, and even a stronger solution to the small spots (1 in 5), as this also eases the pain and irritation.

If there is any spread of the disease under carbolic glycerine, I use oleate of mercury in almond oil (15 per cent.).

If a large number of stumps have been needled on any distinct patch, it is advisable to treat it as if croton oil had been painted on—*i.e.*, to bathe freely and poultice, so that the loosened stumps may easily come out. This should

especially be done at night, and at any time if much pain or pustulation occur.

The case ought to be treated once a week ; and the medical attendant should remove any stumps that have been previously needled, and have not come out, or needle them again if they break off, at the same time that he looks out for fresh stumps, and needles them as they are detected.

This weekly examination should be continued until every stump has been removed ; but towards the last, once in ten days or a fortnight is sufficient. The case ought to be watched until a month has passed without a single stump being discovered, and then it may be considered well. If I send a boy back to school after removing, as I believe, the last stump, I always like to see him again in a month, to be certain that not one has been missed. Medical men who have not had any experience in these cases may think this unnecessary, but I can assure them that it is not at all unusual for a stump to be broken off, and so overlooked at an examination, and then in another week or two to be detected. It is through the neglect of this precaution that children are certified to be well, and then after a time the disease is said to *commence* again. The truth is, a stump was left, and the disease has spread from it. Ringworm, especially in these inveterate cases, will often spread, if even one stump be overlooked ; and it is most difficult to be certain every one has been removed, even if twenty minutes be spent in going over the whole scalp with a lens. I cannot speak too strongly about this, and the advisability of examining every case, though supposed to be perfectly free from stumps, in another month.

This croton-oil needling is a most valuable treatment for suitable cases ; and I have often succeeded in curing

extensive cases of disseminated ringworm, when they have resisted all other treatment for years. It is well for medical men to remember, that it is useless for them to attempt to cure this variety of chronic ringworm by means of croton-oil needling, unless they have a proper needle, lens, forceps, and some form of head-rest. Good eyesight, and plenty of time and patience to devote to the case, are also necessary.

Antimony.—In the last edition, I advised a paste of terchloride or antimony to be applied to very small places, which could not be cured by croton oil, if it was absolutely necessary to get the child well, and *a scar* was not objected to. This paste produces a slough, and cures the place, causing a distinct scar. I never employ it now, and prefer electrolysis, if I cannot cure a small place with croton oil, which is very rare indeed. Of course, antimony is not to be thought of, except for very small places, and such can always be cured by croton oil or electrolysis, and with much less scar than the paste formerly advised.

ELECTROLYSIS.

Single isolated stumps can easily and effectually be extracted by electrolysis, just in the same way as superfluous hairs are removed from the face. I have done this for many years, and it is useful for removing a few scattered stumps. Very often no new hairs take the place of those removed by this method, so it is advisable not to do many close together, lest a mark be left. It does no harm to destroy a hair here and there over the head, as no definite mark results. The operation is somewhat painful; but still, children often prefer the pain of electrolysis at the time, to the pain and trouble of folliculitis

after croton-oil needling. Young children will rarely keep the head quiet, and bear the necessary burning pain.

It is very useful indeed for removing the last three or four stumps, when it is desired to get a boy fit for school as quickly as possible. The diseased hair is removed at the time ; and there is no danger of it growing again in a diseased condition, if properly removed by electrolysis.

This operation requires care and experience. Only a weak current should be used at first, or the little patient may be frightened, and refuse to keep quiet while the follicle is slightly cauterised. Again, I have seen a strong current cause unpleasant symptoms and giddiness, and once a boy fell down as if he had been struck.

The needle must be shaped at the end like the needle for croton oil. It should be made of iridio-platinum (not steel), and mounted in the usual holder, which should be connected with the *negative* pole of a small constant battery. It is also best to have a spring on the side of the holder, to connect and disconnect the current.

The battery ought to be a small Leclanché. At first I use from four to six cells, and, if the patient can bear it, even eight or ten. The weaker the current, the less the pain, but the longer it takes to loosen the stump. The number depends also upon the strength of the battery, as this varies very much.

The patient should hold a wetted carbon, or metallic holder covered with wash-leather, in one hand, connected with the *positive* pole of the battery.

The usual directions with regard to light, position, head-rest, etc., should be observed, as if the stumps were to be removed with croton oil ; and then, the needle should be passed gently and deeply into the hair-follicle, by the side of a diseased stump, by keeping the point parallel

with the direction in which the hair is protruding from the skin. I prefer to dip the point in water just before introducing it, and complete the circuit *after* the needle is in position. In a few seconds, minute bubbles of gas will be seen to froth up by the side of the needle, but the burning has to be continued for from about thirty to fifty seconds before the stump is sufficiently loosened. The object is only to loosen the stump, so that it can be extracted; and not to destroy the papillæ, so that the hair cannot grow again, as if operating to permanently remove superfluous hairs from the face.

Only experience will teach how long it is necessary to keep the needle in. The current should be stopped before the needle is removed, and then the stump must be carefully extracted with the forceps. If it will not come out, the needle must again be introduced, and the current passed through it. If the stumps are very rotten, as in the "black-dot" form, it is often impossible to get them out, so the follicle must be sufficiently cauterised to cause the stump to be expelled afterwards.

For the following few days, hot-water bathing, and a little carbolic glycerine, will ease any pain there may be.

If many stumps have to be removed from a *small* patch, a strong solution of cocaine (from 10 to 15 per cent.) may first be well soaked in.

Of course, the removal of a number of isolated stumps by electrolysis takes a long time, but it does not produce scars, like the treatment by terchloride of antimony.

This method of treatment is suitable, as a rule, only in cases in which the diseased hairs are few in number, and scattered. But I remember the case of a boy (aged fourteen), who had one patch of ringworm the size of a two-shilling piece, from which I could not get out the

stumps with croton oil, even after weeks of painting. It was absolutely necessary to cure the case, even at the risk of a scar, as his father wanted him to go to school. I was fully prepared (with the father's consent) to make a small scar, and I removed all the hairs from the patch by electrolysis, expecting to make a decided scar; but, to my surprise, a number of the hairs reappeared, showing that hairs can often be removed by this method, and yet grow again. This boy was easily cured; and, after a few months, it was very difficult to see any distinct mark. This case made me entirely give up using terchloride of antimony, as the scar caused by that treatment is very decided.

THE TREATMENT OF TINEA KERION.

If kerion occur idiopathically, as a variety of ringworm, the treatment of the case requires great care. All irritating remedies should be avoided. The swollen places can be well bathed with warm boric-acid lotion, and as many of the diseased hairs as possible at once extracted. This removes a large proportion of the fungus, with the hairs and the root-sheaths. Often the hairs will be extracted from a great depth, due to the swelling of the part.

Some of the stumps get embedded in the swelling, and can only be extracted later on, when they appear above the surface of the skin. I think the best application is boro-glyceride, with boric-acid fomentations, or even a poultice at night, with some boro-glyceride on it.

The most important thing is to get out all the hairs as soon as possible, as they act as foreign bodies. This done, the swelling will rapidly go down. It is a great mistake to leave the hairs to come out by themselves.

When the swelling has completely subsided, the place can be painted with iodine, or a lotion of cantharides used, as before described.

It will be well here to caution any one against mistaking kerion for an abscess, and opening it. This mistake is likely to be made, and most certainly should be avoided, as it would probably be followed by troublesome suppuration.

In severe and protracted cases of kerion, especially if they are not properly treated, the hair-follicles may be destroyed, and permanent baldness result.

CHAPTER X.

THE TREATMENT OF TINEA CIRCINATA, ECZEMA MARGINATUM, TINEA SYCOSIS, AND TINEA TRICHOPHYTINA UNGUIUM.

THE TREATMENT OF TINEA CIRCINATA, OR RINGWORM OF THE BODY.

RINGWORM of the body, as usually seen in children, especially the slight forms due to the *Microsporon* or the *Megalosporon endothrix*, is generally quickly cured by any parasiticide; but the extensive and severer varieties, due to the *Megalosporon ectothrix* fungus, are more difficult to eradicate.

If the patches are small, and situated on the neck or the body, a very good plan is to paint them, and for a quarter of an inch around them, every day, or every other day, for three or four applications, with one of the following parasiticides:—

[1] Acetic acid (2 parts), iodine liniment (1 part);
[2] Acetic acid; [3] Iodine liniment (I prefer the mixture No. 1); [4] Coster's paste,¹ made with oil of Cade—

℞ Iodi ʒij.
Oleum Cadinum ad ʒj.
Misce.

¹ "Coster's paste" is made with colourless oil of tar. I prefer the oil of Cade for ringworm of the body, as it forms a stiffer paste, especially after being made and exposed for a time to the air. This thicker preparation is not so apt to run as the ordinary Coster's paste.

The first three, if applied to the face, generally cause too much irritation. Therefore, I prefer the modified Coster's paste, or tincture of iodine (2 parts) mixed with acetic acid (1 part).

The following are also very useful :—

[5] Boric acid (gr. xij.), proof spirit (ʒj.); [6] Sulphate of zinc (ʒj.), water (ʒj.); [7] Carbohc acid (1 part), glycerine of starch (3 to 4 parts); [8] Sulphurous acid; [9] Ammoniated mercury (gr. xx.), precipitated sulphur (ʒj.), benzoated lard (to ʒj.); [10] Red iodide of mercury (gr. j. or ij.), in benzoated lard, or in proof spirit (ʒj.).

[11] The application of Goa powder or chrysophanic-acid ointment to the face or neck is not to be recommended for simple cases, as it produces much discoloration, and often severe irritation and swelling of the eyelids; and I have many times seen impetiginous eczema caused by its use. But it is a valuable parasiticide, and is highly esteemed in Eastern countries, especially for the more inveterate varieties of body ringworm. Kemp's "*chrysa-robine*" can be safely used for patches of Tinea which are not situated on the face, and there is no doubt that it is a very efficient remedy.

If it be employed, the proper way to use it is to well wash the place with soap and hot water, and then, after rinsing, while the patches are still moist, to rub a little of the powder into the ringworm with the tip of the finger, or a small mop, or to rub it in with a little lemon juice. It can be done either way for a few minutes, and repeated the following day. Two or three applications are usually sufficient to cure the disease. Care must be taken not to leave any excess of the powder, which may fall off the skin when dry. This may be prevented by painting a little flexible collodion over the

place, or by using some "chrysarobine" in a thin solution of gutta-percha in chloroform (gr. v. in ℥j.). A plaster containing chrysarobin may be used, but I prefer the first plan, and "chrysarobine" to the ordinary Goa powder, or to an ointment made with chrysophanic acid, which generally causes more staining and irritation, and even impetiginous eczema. If it be used in an ointment, from five to ten grains to the ounce is generally strong enough for ringworm of the body.

The choice of a parasiticide should depend upon the age of the patient, the extent and the seat of the disease, the state of the skin, and whether inflamed or complicated with eczema. Very simple remedies, such as white precipitate ointment and sulphur, are generally sufficient for young children, and undue irritation should be avoided.

In a recent case, a few applications of the remedy are often sufficient to destroy the fungus, while with old and extensive forms it may take some time.

The scalp of a child who has *Tinea circinata* should be carefully examined, as the slighter affection may only be secondary to ringworm of the head.

THE TREATMENT OF ECZEMA MARGINATUM.

Sulphurous acid is one of the best applications. This preparation should be *freshly made*, as the acid gets weaker by keeping, and also becomes partly oxidised into sulphuric acid. It should be well sponged on the parts for fifteen minutes many times a day.

An ointment may also be used with oil of Cade (℥ij.), and precipitated sulphur (℥ij.), in one ounce of lard. Or a solution of hyposulphite of soda (℥ij. in ℥j.) can be applied on lint under oil-silk, for at least an hour at a time, night

and morning, after the parts have been thoroughly washed with soap and water, and a little dilute acetic acid sponged on. "Chrysarobine" may also be used, or boric acid, iodide, mercury, etc., as before advised.

This affection is difficult to cure, and the edges of the patch must be watched for some time, as some of the fungus may be left, and the disease may spread again.

PREVENTIVE TREATMENT.

In all forms of ringworm of the body, it is advisable to have the body linen and flannels boiled; and a bath should be ordered, and the body washed with carbolic-acid soap (10 per cent.). The bath should be repeated every two or three days, if the disease is at all extensive or recurrent.

Isolation is only necessary for a short time, as the fungus is soon destroyed. When the place is thought to be cured, a little vaseline can be applied, and the edge watched, to see if there is any spread of the disease (see p. 135).

THE TREATMENT OF PARASITIC SYCOSIS.

This form of ringworm is almost as difficult to cure as *Tinea tonsurans*, for the fungus is deeply situated in the follicles, and in the hair-substance.

The treatment depends on the condition of the case, whether recent or old, and whether complicated with crusts and tubercles.

In slight cases, especially when it is desired to try and treat the case without causing any disfigurement with ointments, etc., I have had great success with the constant

application of the boric-acid and spirit lotion (see p. 191). This can be soaked in many times a day, even while the patient is attending to his ordinary avocation. The lotion soon dries, and the white powder can be wiped off the chin, and at night some sulphur may be rubbed in. The hair with this treatment may be kept closely shaved, as epilation can rarely be done.

In ordinary cases, especially if there are crusts forming, I generally order oleate of mercury. It should not be used quite so strong as advised for the scalp, and it is better mixed with almond oil and lanoline, for oleic acid causes too much irritation (see p. 196).

Systematic epilation is of great value in treating ringworm of the beard, as very often many of the hairs are loosened, or can be loosened by appropriate treatment. Epilation, therefore, should be done from time to time, while some parasiticide is well rubbed in. The hair should be closely clipped after epilating.

If pus and crusts have formed, they should first be removed by soaking with carbolic oil (1 in 12), poulticing, bathing, etc. If poultices be employed, a parasiticide must be used at the same time, or the disease may spread. If the parts are swollen, and some folliculitis or kerion set up, the inflammation may even be increased by oleate of copper, sulphur, etc., and all the hairs loosened, and thus the disease quickly cured.

Many of the parasiticides suggested for *Tinea tonsurans* may be employed, as oleate of copper, sulphurous acid, citrine ointment, sulphur and carbolic-acid ointment, sulphur and white precipitate ointment, or iodide of mercury ointment.

Malcolm Morris advises chrysarobin ointment (gr. x. to xxx. in ℥j.).

THE TREATMENT OF RINGWORM OF THE NAILS.

The nails should be softened and well scraped, and then acetic acid and iodine may be employed, or sulphurous acid constantly soaked in. Iodide of mercury solution may be used, or the nails softened by "Harrison's treatment" of iodide of potassium in liquor potassæ, and then a solution of perchloride of mercury soaked in, so as to form iodide of mercury.¹ The two solutions suggested are:—No. 1. Solution—Iodide of potassium (gr. xxx.), liquor potassæ (ʒiv.), rectified spirit (ʒiv.); and No. 2.—Perchloride of mercury (gr. iv.), rectified spirit (ʒiv.), water (ʒiv.). The second is soaked in ten minutes after the first has been applied.

Resorcin has also been suggested; but, whatever parasiticide is employed, the nails should be thoroughly scraped, so that the fungus can be reached and killed. An india-rubber covering to the ends of the fingers has been advised by Sabouraud, with the constant application of a solution of iodine and iodide of potassium.²

¹ *Brit. Med. Jour.*, December 5th, 1885. (See p. 189.)

² *Ann. de Derm. et de Syph.*, January, 1896.

CHAPTER XI.

RINGWORM AND SCHOOLS—MEDICAL CERTIFICATES.

RINGWORM IN SCHOOLS—MEDICAL CERTIFICATES—GENERAL RULES TO BE OBSERVED IN SCHOOLS—GENERAL RULES TO BE OBSERVED BY PARENTS—PRECAUTIONS TO BE ADOPTED, IF RINGWORM APPEARS IN A SCHOOL—WHEN MAY A CHILD WHO HAS HAD RINGWORM MIX AGAIN WITH CHILDREN?

RINGWORM IN SCHOOLS.

IF ringworm is to be kept from spreading in any boarding school or institution, it is essential that no children be admitted with this complaint, and allowed to mix with the other children.

For many years, all sorts of plans of half isolation have been attempted ; but, now and then, ringworm will spread in schools, if any uncured cases be admitted. This rule may seem to be very hard on the individual child who has Tinea, for it often happens, that the disease cannot be completely eradicated in time for the child to be admitted into the institution or orphanage ; but I consider the rule necessary for the safety of the majority of the school children.

There has been a strict rule for many years, that no child suffering from ringworm in any form is to be admitted into Christ's Hospital ; and, if any boy or girl accidentally contract the disease from without after admission, he or

she is to be sent home till cured. This is the reason why this large institution has been for some years, and is still, free from this troublesome disease.

The chief difficulty is, to decide what is to be done with children who have only a few isolated stumps remaining, which might easily be removed by proper treatment—*viz.*, croton-oil needling. Such cases are sometimes admitted into institutions to be treated, when the time arrives that a child must be taken in or the presentation lost. This plan was tried for many years at Christ's Hospital, and the result was, that we always had some chronic forms of Tinea under care and treatment; for many of these cases relapse, and the disease spreads again. Even when chronic or disseminated cases appear to be quite well, and are admitted, they often break out again, perhaps from one stump having been overlooked (see p. 30).

Therefore, all children, who are supposed to be cured, after having had ringworm, and have been admitted into any school or institution, ought to be carefully examined from time to time, for some months, by the medical officer. If the disease again appear, the child ought to be strictly isolated, or sent away.

MEDICAL CERTIFICATES.

On the first admission of a boy or girl under fifteen years of age to a school, a medical certificate ought to be required, stating that a careful examination has been made of the head, and that no trace of ringworm can be detected.

An ordinary medical certificate, saying a child is "in good health and free from infectious and contagious disease," is hardly sufficient, as it is highly probable it

has been given without any *special* examination of the whole scalp. In large schools, public institutions, orphanages, etc., where there is a medical officer attached, this certificate can be dispensed with, as he should most carefully examine the head of every child prior to admission, and reject any children suffering from *Tinea tonsurans*. The probable percentage of such rejections may be seen on p. 48.

I have already referred many times to the fact that children are constantly sent to schools with medical certificates—stating that the ringworm is cured—when they are still suffering from *Tinea* in a highly contagious form (see pp. 59, 62, 64, 100, 105).

Outbreaks in schools are often due to the admission of such cases. Some years ago, I examined all the boys belonging to a first-class school (where there had been previously several cases of ringworm) at the commencement of a school term, and found ten out of forty-eight boys suffering from *Tinea tonsurans*. Some of these boys had been sent back to school with medical certificates saying they were cured of the complaint.

The most suspicious certificate is one in which it is stated that a boy is free from ringworm, but still has a little "*chronic scurf*" or "*eczema*" remaining, and that the ointment advised had better be employed to prevent any recurrence of the disease. If ringworm is cured, a pupil does not require an ointment containing a parasiticide, to apply to "*scurf*" or "*eczema*."

I still so frequently have children brought to me, where grave mistakes have been made, and incorrect medical certificates given, that I feel I must once more write most definitely on this subject.

If medical men would only consider what disastrous

consequences may follow such a certificate, I feel sure they would pay more attention to this subject. Sometimes the principal of a private school is seriously embarrassed, and put to great annoyance and pecuniary loss, by an outbreak of ringworm, due to no lack of precaution on his part, but simply to his implicit belief in a medical certificate.

Again, a succession of cases in a school, in spite of every precaution being taken (including immediate and complete isolation, thorough disinfection, daily examinations, and the use of a preventive ointment), may be due to a boy who all the time is actually under treatment for a spot of supposed scurf or chronic eczema. Possibly he may have returned with a certificate saying he has only a patch of "scurf" or "eczema." Even the very means employed to prevent the spread of the disease, after it has appeared in a school—*viz.*, a nurse rubbing the head of every boy with a preventive ointment—may actually be the cause of a succession of fresh cases.

I once saw half the boys in a preparatory school inoculated with ringworm in this way; for it happened that one had distinct Tinea (though under treatment for "scurf"), and the nurse undoubtedly over and over again caused fresh cases by first rubbing the head of this boy, and then one that was free.

I will just mention two incorrect certificates which came under my notice last week (April, 1897).

A boy was sent to me from the seaside to be examined on his way to a private school, as the head master would not accept the boy, although certified to be cured, unless passed by me. I found a dozen places of Tinea, including one large patch, with numerous broken-off diseased hairs. Any nurse would easily have seen that the boy had ringworm, and yet he had been passed by a medical man,

who had given him a certificate, with which he would have been passed into this school, if the head master had accepted it.

Again, two girls were brought to me for an opinion. They had recently been attending the out-patient department of one of the large London hospitals, and had received a certificate that they were cured from ringworm, in order that they might be admitted into an orphanage. The medical officer of the institution refused to admit them, as he maintained they still had Tinea. A dispute had thus occurred between the people interested in the children and the committee, and I was asked to decide whether the children had ringworm or not. On examination, I found both the children had numerous typical small patches of ringworm (common *Microsporon*), with hundreds of broken-off hairs, which, under the microscope, were found to be loaded with fungus. In fact, it did not take me half a minute to decide that both were still uncured. It is strange that it could be possible for such a mistake to be made, and that such very typical cases could be overlooked by any medical man. If there had not been a competent medical attendant to this orphanage, these children would have been admitted, and would probably have caused an outbreak of ringworm.

I might write pages narrating similar cases. In January, 1897, a boy was brought to me, having been refused by the medical officer of a large school, on presentation for admission, as he still had ringworm. This boy had been treated by a medical man, who had *certified* that he was well and fit for school. I found about seven moderate-sized and typical patches of small-spore ringworm. Any one, who had the slightest idea what Tinea is like, ought at once to have recognised that the places were still

uncured. I heard that his sister had also been "cured," but still had a scurfy head. On seeing all the children (four in all), I found every one had well-marked *Tinea tonsurans*; and the child with the "scurfy head" had ringworm over the greater part of the scalp.

I feel certain that a very large number of the children said to be cured, and even certified to be so, are still suffering from *Tinea*.

That these mistakes are so often made with typical cases of the disease greatly surprises me; for, if medical men would only realise how very easy it is to detect ringworm by the fragile broken-off stumps, they would have no difficulty in arriving at a proper diagnosis. I have over and over again called attention to these facts; and in 1885 wrote: "I trust my medical brethren will forgive me for speaking so strongly on this matter, but I can assure them it is only from a sense of duty, and with a thorough knowledge of facts which justify the foregoing remarks."¹

At one of the last examinations at Christ's Hospital, I found two boys with *Tinea*, who had just been certified to be cured by their medical attendants. One had only a few stumps left (*Megalosporon endothrix, resistant*); but the other had numerous patches of small-spore *Tinea*, with the usual scurfy or scaly appearance; and hundreds and

¹ In a letter in *The Lancet*, February 27th, 1886, I said, "Even this year I have seen at least twenty such certified cases, and know that the principals of some schools have grievously suffered from these errors"; and June 4th, 1887, "No end of cases are said to be cured when the disease is only in its most ordinary chronic form. Then the doctor who certifies such cases to be well gets the credit of quickly curing ringworm; while those who refuse to certify, if there are any diseased stumps remaining (and it is often most difficult to detect them), are thought not to be able so successfully to cope with the disease."

hundreds of typical broken-off fragile stumps in every direction, which, under the microscope, were found to be saturated with fungus. I do not think I could possibly have found a more typical and common case of *Tinea* to show a class of students. Most mothers would have known its nature; yet a medical man said it was cured, and fit to come into Christ's Hospital! Therefore, I am sorry the experience of the past twelve years will not permit me to modify what I have before published; and, if medical men only realised how unfair and unjust these incorrect certificates are, both to head masters of schools and to the parents of the other children, they would hesitate before certifying, that a child who has recently been under treatment for ringworm is "cured and fit to mix with other children."

At least two weeks ought to elapse without a single diseased stump being detected before any certificate is given. In fact, I rarely feel justified in stating more than the fact, that I have examined the head, and cannot detect any evidence of ringworm at the time of my examination. I absolutely refuse to sign a certificate saying a boy who has recently had *Tinea* is cured, and cannot possibly convey the disease to any other children.

This is far too strong a certificate to expect any medical man to give; for, even after weeks have passed by, and no stump has been found on re-examination, I have many times known the disease to reappear, probably from some microscopic portion of fungus remaining in a follicle (see p. 30).

After giving a certificate, I generally ask to see the child again in three or four weeks, to be sure no error has been made; and then, if one or two stumps have reappeared, they can easily be destroyed by electrolysis.

GENERAL RULES TO BE OBSERVED IN SCHOOLS.

The school matron, or other person in charge of young boys or girls, ought to examine the head of every pupil directly they return to school after the holidays ; as during their absence they may have contracted ring-worm.

In large institutions, this examination may be repeated a few times during term time, and any child with a suspicious spot should at once be sent to the medical officer for his opinion.

Children at school ought always to have separate sponges, washing flannels, towels, brushes, combs, etc. It is also a good plan to have all hair-cutting operations done within the school, whereby contagion from without may be avoided.

GENERAL RULES TO BE OBSERVED BY PARENTS.

Parents should be very careful not to receive any children who are suffering from ringworm into their houses ; nor even those who have recently had the complaint, unless they are known to be really cured. Parents should also have their children examined on returning from school ; and, if there is any suspicious place, it ought to be seen by a medical man.

Many people prefer to have the hair-dresser come to the house, rather than run the risk of having children's hair cut with scissors and brushed with brushes, etc., used for other children ; but this precaution is rarely adopted, till after they have had the sad experience of a child suffering from this trouble

PRECAUTIONS TO BE ADOPTED, IF RINGWORM APPEAR
IN A SCHOOL.

When a case of *Tinea tonsurans* is detected in any school, besides the general rules of isolation (see p. 208), the most important point of all is the thorough inspection of every child in the school by some medical man experienced in the recognition of this disease.

Every case of ringworm, however slight, ought to be isolated in a separate room or building. The clothes should be disinfected, the bed linen, etc., boiled, and the comb and brush of the child disinfected with carbolic lotion (1 in 20).

The first question for the school authorities to determine is, whether the case or cases are to be treated at the school or to be sent home. In ordinary private schools, I believe by far the safest plan is to send the children away at once; but very often an attempt is made to treat the cases without any proper arrangements, and the disease spreads. If the disease spread in spite of isolation or sending the pupils home, a preventive ointment should be used to the heads of the non-infected children, as greasy applications are of use in preventing any spread. It is of importance that the nurse who does this should not be the one attending to the cases of ringworm. All the heads may also be well washed once a week with Jeyes' or carbolic-acid soap.

But by far the most important point of all is the examination of all children supposed to be free from ringworm; as I have rarely been called in to examine a school where ringworm was spreading, without finding some child with *Tinea* who was thought to be free. In fact, it may be laid down as a rule, that, if ringworm

continue to spread in spite of isolation, there is probably some undetected case amongst those children supposed to be healthy (see p. 101).

The nurse who is in attendance on the children who are free should be taught how to recognise the disease in the earliest stage, so that she can at once send any child with a suspicious spot to the medical attendant.

If ringworm spread in spite of the above precautions, thorough disinfection of the rooms, linen, clothes, etc., should be carried out; but a very long experience has taught me, that the spread of ringworm is easily stopped, *if all* the cases are detected and isolated; and that the disease is not spread by dust, etc., flying about, but by *undetected Tinea* amongst the supposed healthy children.

WHEN MAY A CHILD AGAIN MIX WITH HEALTHY CHILDREN?

The most difficult point of all is, to decide when a child who has had ringworm may again mix with children. It is, no doubt, the safest plan to keep the patient separate till absolutely well; which can only be determined by the complete absence of stumps and black dots for some weeks, and the growth of the new downy hair on the patches, as before described (p. 105).

The question is now and then raised, whether children under proper treatment can give the disease to others, especially if they only have a few stumps left. No doubt, it is possible (p. 208), though generally from the neglect to thoroughly rub in some parasiticide on the place; but there is no doubt that ringworm is almost always contracted from cases not under any efficient treatment (see p. 34).

It is quite useless for school authorities to refuse to allow a child, who has perhaps only one or two stumps to be detected from time to time, and is under constant care and treatment by croton-oil needling, and with some parasiticide applied at night, to attend a day school, if they permit other children, who have untreated and chronic forms of the disease, to return and freely mix with the healthy children. There is no doubt as to which class would do the most harm. There was a correspondence on this subject in *The Lancet* (commencing February 11th, 1882), suggesting that, if the spores were mechanically fixed by fat, the disease would not spread; but the reply was easy—*viz.*, “The old system of covering the patches with ointments of various kinds has been tried for years in the schools of England, and with what success every medical officer knows well.” Again, what would schoolmasters say, if boys were returned to day schools wearing caps, showing that they had some contagious complaint? Or what would the parents of the other boys in the school have to say on the subject? Would that school be likely to increase in number the following term? *Isolation* is the best way of stamping out this complaint in our public and private schools, and I think that children who are not free from this trouble (so far as it is possible to tell) ought not to be sent even to day schools; but I must admit that, at times, a case appears to be perfectly well, and a certificate is given, and yet one stump may reappear. But, if such cases be re-examined, this may be noticed and removed.

Until, however, something is done to prevent all cases of ringworm attending day schools, and to supervise the lower-class schools, board schools, etc., there is little hope that this scourge will be lessened.

It is certainly not right to subject healthy children to the risk of taking such a troublesome disease as ringworm. So that, while fully believing that by far the majority of cases are contracted by contact with those who have *untreated* ringworm, and that it is generally possible to treat one or two cases in a family or school without the complaint spreading, I do not think it right or just to expect principals of schools to receive children with evident ringworm among their healthy pupils, even though they are under the most efficient treatment, and wear caps.

There is one point of especial importance in deciding whether it is at times justifiable to allow a child with a few disseminated stumps to attend classes with children who are free from ringworm (especially in day schools)—*viz.*, the age of the children with whom the uncured case will have to mix. It is a well-known fact that ringworm spreads much more readily amongst children under eleven than amongst those who are older, and that the disease is rarely contracted after the age of fourteen. Therefore, while a pupil, with a few stumps remaining, under constant care and supervision, and with the full knowledge and approval of the principal of the school, might possibly be permitted to attend classes where all the pupils were over fourteen years of age, it would hardly be right to permit it, if the children were under that age.

Again, the variety of the fungus must be taken into consideration; as the *Microsporon* is rarely contracted after fourteen years of age (p. 21), while the *Megalosporon* may be, even up to fifteen or sixteen (p. 22).

The "Medical Officers of Schools Association" has decided, that children ought *not* to be returned to schools until quite well; and the resolution to that effect will

be found on p. 105, quoted from *A Code of Rules for the Prevention of Infectious and Contagious Diseases in Schools*.¹

¹ Third Edition, J. and A. Churchill. This Code ought to be in the hands of all school authorities. It has been adopted by most of the public and large schools of England.

CHAPTER XII.

ALOPECIA AREATA.

SYNONYMS :—*Alopecia circumscripta* ; *Porrigo decalvans* ; *Tinea* (?)
decalvans : FR. *Alopécie* : GERM. *Fuchsräude*.

ETIOLOGY AND PATHOLOGY—PARASITIC OR NON-PARASITIC NATURE—
IS THERE ANY CONNECTION BETWEEN TINEA TONSURANS AND
ALOPECIA?—MIXED CASES OF ALOPECIA AND RINGWORM—DIF-
FERENT OPINIONS—THE SUPPOSED MICROBIAL ORIGIN OF ALOPECIA
—SABOURAUD'S VIEWS—IS TRUE ALOPECIA AREATA CONTAGIOUS?
MAY CHILDREN WITH ALOPECIA ATTEND SCHOOLS?—CLINICAL
CHARACTERS—THE STUMPS—MICROSCOPICAL EXAMINATION—DIAG-
NOSIS FROM TINEA TONSURANS—HOW LONG DOES IT TAKE TO CURE?
—THE TREATMENT OF ALOPECIA AREATA.

Alopecia areata or circumscripta, formerly called *porrigo decalvans*, or *tinea* (?) *decalvans*, is an affection of the skin characterised by the appearance (very often suddenly) of one or more circumscribed, smooth, bald, shining patches, varying in size, and accompanied by atrophy of the hair-follicles and the hairs.

Radcliffe Crocker has divided *Alopecia* into four distinct classes : *viz.*—

I. *Alopecia universalis*, complete and rapid *Alopecia*, often associated with loss of some of the nails.

II. *Alopecia localis seu neuritica*, due to an injury to a nerve, or from a blow on the skin.

III. *Alopecia circumscripta seu orbicularis*, which consists of very small places. They are much depressed below the

level of the skin, and the prognosis is very unfavourable. And—

IV. True *Alopecia areata*.¹

ETIOLOGY AND PATHOLOGY.

The etiology of true *Alopecia areata* has for years been, and still remains, a disputed matter.² The view held by most dermatologists for the last twenty years is, that it is a non-contagious tropho-neurotic affection, associated with an atrophied condition of the hair-follicles and of the hairs, and often of the whole of the textures of the scalp. Its origin is supposed to be some peculiar functional nerve disturbance, causing impaired or defective nutrition of the hair-follicles and of the hairs. Some observers believe that it is due to a fungus, like the fungus in *Tinea tonsurans*, and that there is an intimate relation between the two diseases. The latest view is, that it is caused by a definite micro-bacillus, the same as found in ordinary seborrhœa (Sabouraud); and that there is a close relationship between seborrhœa and *Alopecia areata*.

There is no doubt that *Alopecia* may be due to nervous causes, to sudden grief, to fright, to mental shock, or to some mechanical injury; and I shall show that it can also be produced by the constant application of some lotions, containing parasitocides, which certainly would not favour the multiplication of micro-organisms. In most cases, no appreciable cause can be definitely assigned for the attack. Some observers, who believe in its contagious nature, have described outbreaks of the affection in schools and regi-

¹ *Diseases of the Skin*, 1893.

² See "Discussion on *Alopecia areata*," *Pro. Inter. Med. Cong.*, p. 158, 1881.

ments ; but personally, I have never seen any spread of this disease.

A partial form of *Alopecia* is sometimes observed on the back of babies' heads, due to pressure and rubbing (see p. 117). It may arise also from twisting the hair, and from the pressure of the chignon, in women.

As the etiology of *Alopecia* is so disputed, it will be best to review the different opinions held, ending with the latest conclusions of Sabouraud.

In the beginning of the century, Willan and Bateman classed this affection under *porrigo*; and Willan, in 1814, remarked : " In the *porrigo decalvans*, the hairs suddenly fall off, leaving bald patches, which are neither inflamed nor discoloured." Bazin was a supporter of the parasitic theory, but Neumann considered it non-parasitic. Bazin called it "*teigne pelade*," and many in France considered it to be parasitic.

A remarkable outbreak of the so-called *tinea decalvans*, at Hanwell School, is reported by Hillier, who also believed in the parasitic and contagious nature of this disease.¹

In 1872, Duckworth strongly advocated the *non*-parasitic nature of *Alopecia areata*, giving his reasons for holding this opinion.² He thus refers to the report of the outbreak at the Hanwell School : " The remarkable series of cases reported by the late Dr. Hillier, in a large school at Hanwell, has no doubt influenced the opinion of the profession upon the subject of the contagiousness of area. Dr. Bristowe is disposed to believe that these cases were probably examples of ringworm. The two diseases sometimes co-exist. Mr. Hutchinson states that area rarely shows any tendency to spread by contagion ; but he has recorded

¹ *Handbook of Skin Diseases*, 1865.

² *St. Barts. Hosp. Reports*, vol. viii., p. 162, 1872.

three cases, occurring in one family, in which he found epiphytic elements. I am unable to offer an explanation of these cases, which are carefully recorded by this most able observer, and I can only express my belief that they may have been 'mixed' cases of area and *Tinea tonsurans*."

Then, in 1873, Tilbury Fox wrote as follows: "At the present time, there is a 'dead set' made by almost every writer on diseases of the skin against the parasitic nature of *tinea decalvans*, and I believe I stand alone in my opinion of its parasitic nature:—now I am quite ready to admit that this parasitic disease is not common (far from it), and that the majority of cases of circumscribed baldness observed in the head are not parasitic at all. But I cannot but state that I have found fungus elements without doubt."¹

Liveing read a paper at the International Medical Congress, in 1881, on the causes of *Alopecia areata*, advocating its non-parasitic nature.

Duckworth also wrote in 1883: "This is a disorder which has been the subject of much study and debate. For a long time this disease was supposed to be a form of ringworm, and a definite epiphyte was described and depicted as its cause. Of late years, this view has been discarded, and the theory of defective innervation has been invoked to explain the phases of the derangement. Later still, this theory has been assailed, and certain bacteria have been described as the vicious agents, thus restoring the parasitic idea. For myself, I hesitate to accept the latter theory, believing it to be inconsistent with clinical observation, as applied to the whole phenomena of the disorder."²

Duhring, in 1886, said: "It is non-parasitic in its nature,

¹ *Diseases of the Skin*, 1873.

² *Ed. Med. Jour.*, January, 1883.

and is not contagious." . . . "The suddenness of the attack, an important feature in the history of many cases of the disease, can be accounted for only by regarding the nervous system as at fault."¹

Thin wrote in 1887: "Cases are occasionally described of *Alopecia* and ringworm existing on the head of the same child at the same time. There is no reason why the two diseases should not co-exist. Where ringworm is very common, it would be extraordinary if, from time to time, a ringworm child did not, as well as any other child, contract *Alopecia areata*. But, without throwing any doubt on the fact of their occasional co-existence, I am satisfied from observation of alleged cases that some of them at least are cases of ringworm in which baldness caused by *Trichophyton* has been mistaken for *Alopecia*. There is absolutely no connection between the two diseases."²

Jamieson remarks: "It is a singular thing that those situations, which have been mentioned as the ones first affected with *Alopecia areata*, are the very ones on which ringworm of the scalp is rarest." . . . "So far, I have not been able to find the *Trichophyton* in the root-sheaths of any hairs examined, taken from recent cases."³

During the last few years, the parasitic nature of *Alopecia areata* has again been strongly urged. The question is of very great importance, especially to medical officers of schools.

Abraham, writing on this subject in 1893, remarked: "The former theory (the parasitic) has had its chief votaries in France, the latter (neuropathic) in Germany; but we find, even in these countries, that accurate observers

¹ *Diseases of the Skin*, p. 450, 1886.

² *Pathology and Treatment of Ringworm*, p. 40, 1887.

³ *Diseases of the Skin*, p. 472, 1894.

have from time to time objected to the prevalent view, and have stated their opinion that some of the cases are probably of neurotic and others of parasitic origin. For instance, in France, such men as Leloir, Brocq, and others admit a tropho-neurotic group of cases; and, in Germany, Lassar, Unna, Eichhoff, and others now allow that many cases of *Alopecia* are parasitic. In America, and in this country, medical opinion is much divided; but here, as elsewhere, the dual theory appears to be rapidly gaining ground."¹

Jonathan Hutchinson has reported some cases where there was supposed contagion.² He considers there is an intimate relation between *Alopecia* and *Tinea tonsurans*, and remarks, that *Alopecia* is "in fact a sort of modified ringworm, or at any rate a sequel to that disease," and that it often occurs in those who have previously suffered from ringworm.³

Besnier⁴ also relates some cases of supposed contagion; and Bowen⁵ reports an outbreak in an orphan asylum in the U.S.A. Other observers have reported cases of outbreaks of *Alopecia*, especially in France.

Radcliffe Crocker is the chief exponent in England of the view, that *Alopecia areata* is contagious⁶; and in his work, has given very fully his reasons for considering this disease to be parasitic, and intimately related to ordinary *Tinea tonsurans* in etiology.

Crocker says: "It [*Alopecia areata*] might with pro-

¹ "Remarks on Alopecia areata," *Med. Press and Cir.*, November 22nd, 1893.

² *Trans. Path. Soc. Lond.*, vol. xiii., p. 266.

³ *Arch. Surg.*, 1890-91.

⁴ *Sur. la Pelade*, Paris, 1888.

⁵ *Brit. Jour. of Derm.*, March, 1894.

⁶ *The Lancet*, vol. i., pp. 478, 533, 1891.

priety, in my opinion, be called *Alopecia parasitica*, or the old name *tinea decalvans* might be revived." . . . "It forms at least 95 per cent. of all cases of *Alopecia*." . . . "In a large number of cases, it can be shown that contagion is the probable cause." He refers to some, and specially mentions Hillier's report (see p. 275), and remarks : "He [Hillier] found in the root-sheaths of two or three hairs a number of spores of a fungus, having all the appearance presented by the fungus of *Tinea tonsurans*, and many atrophied hairs." Crocker then refers to some of his own cases, and remarks, concerning the hairs found round a patch of *Alopecia* : "One pulled out of the border showed distinct fungus-elements, indistinguishable from those of *Tinea tonsurans*."¹

The important question at issue is this : Is a case such as that described by Crocker (where "distinct fungus-elements, indistinguishable from those of *Tinea tonsurans*," were found) one of true *Alopecia areata*? I say most decidedly *it is not*; but it must have been one of *Tinea tonsurans*, with *Alopecia* coming on, or a case of "bald ringworm." Instead of the majority of smooth bare places on the head being distinctly of a parasitic nature, or "bald ringworm," I maintain that such cases are rare, and that by far the greater number of bald patches (true *Alopecia areata*) are not in any way due to the fungus of ringworm, and are not contagious.

My own opinion is, that much confusion has been caused by the mixed cases of *Alopecia* and ringworm, many cases of which have been reported. There is also a form of *Tinea* called "*bald Tinea tonsurans*" by Liveing (see p. 97), who says : "*Tinea tonsurans* occasionally produces perfectly smooth, bald, shining patches of skin, bearing a

¹ *Diseases of the Skin*, Second Edition, 1893.

very close resemblance to *Alopecia areata*, for which they may easily be mistaken. It is the occasional development of these temporary, smooth bald patches in common ringworm, which has given rise to the erroneous belief, that there is a parasitic disease called *tinea decalvans*, distinct on the one hand from *Tinea tonsurans*, and on the other from *Alopecia areata*: no such disease really exists."¹

Fox and Blaxall also remark: "Possibly some of those mysterious epidemics of supposed *Alopecia areata* associated with ringworm fungus may be of this nature" (referring to the *peladoid* form of the *Megalosporon endothrix*, *fragile* variety: see p. 88). . . . "Every one knows a variety of *Alopecia areata* in which clavate stumps exist on the margins of the patches, whilst the surface is frequently riddled with black dots, corresponding with the follicles. We have given these cases special attention, and made an exhaustive examination of the plugs, but have never been able to find or cultivate any ringworm fungus."²

There is also a paper by Dubreuilh and Freche on "bald ringworm."³

IS ALOPECIA CAUSED BY THE HYPHOMYCETES?

The first question I would answer is, whether *Alopecia* is in any way due to a vegetable parasite, of the nature of the *Microsporon* or the *Megalosporon*—the *Hyphomycetes*, as believed by some dermatologists. Let me again mention, that I have frequently seen *mixed* cases of *Tinea tonsurans* and *Alopecia areata*—*i.e.*, both diseases existing on a child's

¹ *Handbook of Skin Diseases*, 1887.

² "Plurality of Fungi causing Ringworm," *Brit. Jour. of Derm.*, July—September, 1896.

³ *Brit. Jour. of Derm.*, p. 421, 1896.

head at the same time. I wrote on this subject in 1885.¹ Stowers has also reported some cases.² I saw a remarkable case a few years ago. A child was brought to me with several patches of genuine *Alopecia areata*, which had recently been cured, and the new hair was growing freely on all the places. She was not sent to me for this trouble, but for ringworm; for this child had recently been infected with genuine *Tinea tonsurans* from her sister, who had taken the complaint from an outside source. There were four distinct places of *Tinea tonsurans* on this child's head; and, what was very peculiar, there was one patch of ringworm, with the usual characters and the hairs breaking off short, in the centre of an old patch of *Alopecia areata*, which at that time was quite well, with the hair growing on it. It was not new, fine, downy hair, which is very rarely involved by the fungus of ringworm, but hair about half an inch long.

I have also caused a condition exactly resembling true *Alopecia areata* to come on, during the treatment of *Tinea tonsurans*. There is no doubt that patches of small-spore and of large-spore ringworm may pass into bare, smooth, shining places, which are practically not to be distinguished from true *Alopecia areata*. I have seen many cases of this "artificial" *Alopecia areata* developing on the patches of *Tinea tonsurans*, caused by the "boric-acid, spirit, and ether" treatment, and also by the "gas-water" treatment. They were at the last just like ordinary cases of *Alopecia areata*. I will describe two cases.

The first (published in the third edition in 1885) was seen by me in June, 1882, when I prescribed oleate of

¹ *Brit. Med. Jour.*, June 20th, 1885.

² *The Lancet*, February 26th, 1881; and *Brit. Med. Jour.*, July 4th, 1885.

mercury for a little girl (aged 11), who had chronic ringworm, in patches, all over her head. The case was a very severe one, and had been at that time under treatment for over a year. In October, the treatment was changed to thymol; but by January, 1883, there was no appreciable change in the state of the scalp, and the stumps were one mass of fish-roe fungus. Boric-acid, spirit, and ether lotion was then ordered.

In March, many of the original patches of ringworm were changed into places resembling true *Alopecia areata*. One long bald place extended from back to front above the ear; while some of the places were like ordinary chronic ringworm, and numerous diseased stumps were to be found with fungus upon them. In fact, the case was a complete mixture of patches of *Tinea tonsurans* and of artificially produced *Alopecia*. By May, there were only bald, bare, shining patches, practically indistinguishable from ordinary *Alopecia areata*, and many characteristic club-shaped stumps (!) were to be seen, especially at the circumference of the patches, which were enlarging like ordinary *Alopecia*. The stumps, under the microscope, were like those described on p. 306, with deposits of pigment in them. A few stumps also showed the fungus of *Tinea tonsurans*.

In June, the case was one of artificially produced *Alopecia areata*, and the patches had much extended in circumference. My note-book says: "Ten bald, shining, typical patches, one large place five by two and a half inches, a few club-shaped stumps to be seen, especially at the edges of the patches; no fungus to be detected on any of them."

I doubt if any one, who had not seen this child some months previously, would have imagined that the places

had originally been patches of ordinary chronic ringworm, which had been converted into bald, smooth, shining places by treatment.

When all the diseased stumps had disappeared, I stimulated the scalp with turpentine, and, in a month, new downy hair was commencing to grow over all the places, and the little girl was cured. There was no relapse, and by September the hair was growing very freely.

This is a remarkable case, showing how the artificial formation of *Alopecia*—possibly by depriving the diseased hairs of their fatty materials—cured the ringworm patches, by causing the diseased stumps to rapidly fall out. In fact, this is one way, and certainly one of the best ways, of epilating—*viz.*, by producing great dryness of the part.

If this case had been first seen in May, 1883, it might then have easily been mistaken—as I think some cases are now—for *Alopecia areata* with fungus, “like the fungus of *Tinea tonsurans*,” on some of the hairs. Since that date, I have seen many other cases; and a somewhat similar one was reported by Liveing.¹

A boy had seven spots of *Tinea tonsurans*; and in a fortnight, while under simple treatment, they were all converted into patches of *Alopecia*, becoming perfectly smooth, bald, and shining. In this case, the bald patches were strictly confined to places previously affected with *Tinea tonsurans*.

The following two cases were due to the action of “gas-water.” In October, 1891, a boy was brought to me suffering from severe chronic ringworm over most of the scalp, in decided patches: a case that might, under ordinary circumstances, have taken a year or more to cure, as he had already had the disease for some years. The gas-

¹ *Brit. Med. Jour.*, April 8th, 1882.

water treatment (see p. 201) was ordered, and by December the patches were getting bare through the hair and stumps falling out. In January, 1892, the case was one of mixed ringworm and *Alopecia*, some of the places having club-shaped stumps without fungus on them, and other patches having ordinary stumps, still saturated with the ringworm fungus. By March, the boy had typical *Alopecia areata* in large patches, over the greater portion of his head. The places were exactly in the position of the old ringworm patches, but they were decidedly larger. At that time, I could not find any ringworm stumps at all; and the case would, if seen then for the *first* time, have been taken for true *Alopecia areata*. I then discontinued the gas-water treatment, and used a cantharides and acetic-acid lotion. Seven weeks after that (*i.e.*, at the end of April), the new downy hair was commencing to grow freely over most of the patches; and in another month the boy was rapidly getting well, without a trace of the original ringworm to be detected.

In March, 1895, I exhibited a remarkable case of this nature before the Dermatological Society of London, and it was reported as follows:—

A child was exhibited “who had suffered from ringworm for two and a half years. When first seen, a year ago, the scalp was almost covered with *Tinea* (*Trichophyton megalo-
sporon endothrix*, of the *resistant* variety).”

“Treatment with sulphur and white precipitate ointment for six months made no impression on the disease, and six months ago the head was still almost completely covered with *Tinea*. Gas-water (sulphide of ammonium, with an excess of ammonia) was ordered. After four months’ treatment, there was a great and peculiar change. Very many of the diseased stumps had fallen out, but hundreds

of them had atrophied, and there was a complete mixture of ordinary thick ringworm stumps and atrophied stumps. The former easily broke off, leaving the root part in the hair-follicles, and when examined they were found to be saturated with the *Trichophyton*. The atrophied stumps, on the contrary, easily came out with entire small roots, and were similar to the atrophied stumps commonly seen in *Alopecia areata*. Most had some brown pigment in the centre, and at the ends. Some had distinct bulbosities; and when broken off at these places, the ends were frayed out like stumps from true *Alopecia*—many having the usual (!) shape" (see Plate VII.).

"By this time the scalp was semi-bare, and had a very curious appearance, many long normal hairs being present; but there were hundreds of these atrophied stumps, as well as many diseased and thickened stumps also."

"On carefully examining a number of these atrophied stumps, most were found to be quite free from the *Trichophyton*; but some had chains of the mycelial spores just at the free end of the stump, showing that these atrophied stumps had formerly been diseased hairs. But now, from treatment,¹ atrophy of the roots had come on, the fungus had ceased to grow near the bulb, and thus by degrees the stump had grown up a little, with the end near the bulb quite free from the *Trichophyton*, though a few chains remained at the distal end."

"In five and a half months, there were still many hundreds of the atrophied stumps to be found, and a few diseased hairs; but numerous fine downy hairs were growing. The case was then seen by Dr. Colcott Fox, and

¹ *Viz.*, under the action of a parasiticide, which would surely prevent the multiplication of micro-organisms, and the formation of any toxin (see Sabouraud's view).

both observers found the *Trichophyton* in the distal ends of some of the atrophied stumps."

"On the day of exhibition, Dr. Aldersmith had most carefully examined the child's head; and, while finding the hundreds of atrophied stumps now to be seen, could detect only a very few genuine ringworm hairs. One was exhibited under the microscope, showing the hair to be saturated with the large-spore variety of the *Trichophyton*."

"The exhibitor said he had seen this curious result a few times from treatment, chiefly from boric-acid, ether, and spirit lotion, and also from gas-water. If it could only be produced, it was a good way of curing ringworm; for, if the diseased hairs could only be caused to atrophy, the fungus seemed to die out, and the atrophied stumps come away. When the case is put under a stimulating plan of treatment, the new downy hair soon grows, and the case is cured."¹

I also once observed, that a most extensive case of *Tinea* under my care was cured by the child getting a severe attack of typhoid fever, followed by complete *Alopecia*. In a few months the hair grew again, and she had no trace of ringworm, as all the diseased stumps had come out.

If this "*artificial Alopecia areata*"—as I have called it—accidentally come on during treatment, it is a most fortunate thing, as the whole of the places generally follow suit when one undergoes this change, and the case gets well. In fact, my chief experiments during the last few years have been an effort to discover something that will always cause the diseased hairs to fall out from the patches of ringworm; for I fully believe this troublesome disease will in time be cured by this method, and not by discovering new parasiticides.

¹ *Brit. Jour. of Derm.*, April, 1895.

I have many times most carefully examined the club-shaped stumps, and also the surrounding hairs, from patches of true *Alopecia areata*, and have never discovered any fungus like the fungus of ringworm, small-spore or large-spore. Therefore, I feel positive that genuine *Alopecia areata* has nothing whatever to do with the fungus of *Tinea tonsurans*, but that "it is the occasional production of 'bald ringworm,' with stumps like the atrophied stumps in *Alopecia areata*, and a few diseased stumps containing the true fungus of ringworm, that has led to the erroneous opinion that there is a fungus present in some forms of *Alopecia areata*."¹

Again, the clinical characters and termination of *Alopecia* do not at all resemble those of parasitic origin. It is liable to recur, even after some years. A short time since, I saw a young lady with commencing symmetrical patches of *Alopecia* on the back part of the scalp. She had consulted me for the same trouble at least five years before, and had been free in the meantime. She had never had ringworm, nor had there been any cases in the family. The view of the non-parasitic nature of *Alopecia* is strengthened by the fact that there is often temporary loss of sensibility over the patch, while the skin is much less sensitive than usual to irritants, and even to the action of blistering fluid. Again, the skin suffers no less in many cases than the hair-follicles, and often undergoes atrophy in all its textures; and, on recovery, all the tissues revive together. The patches may also follow the track of a nerve, and very often are symmetrical, like ordinary baldness: which would not be the case, if a fungus, like the fungus of ringworm, were the cause. I have also many times seen cases of *Alopecia* which had been treated

¹ See *Brit. Jour. of Derm.*, Aldersmith, April, 1895.

for some time by anti-parasitic remedies (such as carbolic acid and sulphur), and which had actually spread under such treatment, rapidly get better, when a simple stimulating application, such as cantharides, was employed. This appears to me a strong argument against the view that this affection is due to any fungus, or even primarily to micro-organisms.

Crocker also remarks of *true Alopecia* : "Of course, it is not contended that it is really contagious like ringworm, only that under certain circumstances it may be communicated from person to person."

I have had a very large experience in treating hundreds and hundreds of cases of *Tinea tonsurans* in private families, and have never noticed any connection, direct or indirect, between *Alopecia areata* and *Tinea tonsurans*. I have not found that brothers, sisters, mothers, or attendants upon cases of ringworm have contracted *Alopecia* ; nor have I ever seen a case where I was unable to say definitely (with the aid of the microscope, and after watching it for a week or two), whether it was true *Alopecia areata* or bald *Tinea tonsurans*.

Therefore, while fully admitting that some cases of *Tinea tonsurans* may pass into bald, smooth, shining patches, just like *Alopecia areata*, I entirely deny that *true Alopecia areata* ever develops into *Tinea tonsurans*, or gives the latter disease to any one else. If all the patches of ringworm get completely changed into an artificial *Alopecia* (as sometimes happens), and no diseased hair or fungus is left, the ringworm is cured, and the case may then be considered to be *Alopecia*, and not *Tinea*. It then requires stimulating treatment ; and the new downy hair will grow in a few weeks. So soon as it is certain that no fungus exists, a child may mix with other children without any

fear of conveying ringworm or *Alopecia areata*; but there must be no mistake in the diagnosis, and not a trace of fungus must remain. As it is often a very difficult matter to be quite certain about this, time should be given for repeated observations.

In any case of baldness, if there be present on the hairs fungus which cannot be distinguished from that of ringworm, we may reasonably conclude that it is the latter disease; and, if *Alopecia* be coming on, the sooner we help nature, and get all the ringworm hairs away by causing an "artificial *Alopecia*," the better for the patient.

Crocker also remarks: "The difficulty is that the organism has only been found by a favoured few, and they are not agreed as to its morphological characters. This is the weak point of the case, and I cannot hope that my views and arguments will carry conviction for a long time to come."¹

A discussion took place before the Dermatological Society of Great Britain and Ireland, in November, 1896, on the subject of *Alopecia areata* and *Tinea tonsurans*. Dr. Abraham showed a girl with two small spots—one of *Alopecia areata*, and one of *Tinea tonsurans* (large-spore). I cannot see that such cases in any way prove that the two affections have anything whatever to do one with each other, or that *Alopecia* is contagious; for mixed cases have often been reported. I have also seen smooth bare places in the large-spore form very much like *Alopecia* (see p. 88). Dr. Stowers remarked that some twelve or thirteen years ago he contributed to *The Lancet* a description of three or four cases of the co-existence of *Alopecia* and *Tinea tonsurans*, which were especially interesting because patches of the two disorders evidently occurred *separately*, and afterwards

¹ *Diseases of the Skin*, 1893.

coalesced. When the baldness was established, the fungus of ringworm could be found at one corner, while at the opposite end there was no fungus, but the ordinary *Alopecia*.¹

I remember some years ago a medical man coming to me with a typical patch of *Alopecia areata* on the chin. He informed me, that a well-known dermatologist had seen him and said it was due to ringworm. Asked why, he had replied, "Have you been attending a case of ringworm?" The medical man said, "Yes—of course, I see cases now and then." "Then you must have caught it," was the reply. Surely this sort of evidence is worthless, for it has never been shown, that medical men attending cases of ringworm are more liable to get *Alopecia* than those who never see it. If in any way due to the fungus of ringworm, it seems strange that I have never had *Alopecia* myself!

I will now quote some more recent opinions on the etiology of *Alopecia*. Writing of ringworm, Malcolm Morris says: "In some cases, the affected hair falls out spontaneously, smooth bald places being left, without the previous formation of a ring or patch. This condition is evidently that described as *tinea decalvans* by Tilbury Fox; it is not, however, a distinct disease, but a variety of *Tinea tonsurans*, called by Liveing *bald ringworm*. This is the form of ringworm in which spontaneous cure often takes place with great rapidity, thus giving an undeserved reputation to various quack remedies."

Morris also remarks: "A fact in some degree confirmatory of the neurotic origin of *Alopecia areata* is its occasional association with leucoderma. The parasitic theory at present rests more on clinical than on pathological evidence. Some years ago, Kazanli reported the discovery of a

¹ *Brit. Jour. of Derm.*, January, 1897.

microbe which he believed to be specific, and micrococci have been found by Robinson and others in the root-sheaths of the hair around the affected areas, and also in the lymph-spaces of the corium and sub-papillary layer ; but the few investigators who have seen these micro-organisms are not agreed as to their characters, and, even if their existence be admitted, there is no clear proof of their causal relation to the process. There is some reason to believe that the affection may, in certain circumstances, be transmitted from one patient to another, and in France epidemics of *pelade* are not infrequent in schools and in regiments." . . . "Definite proof of contagion is still wanting, however ; and it is certain that, even if the affection be contagious, such a combination of conditions must be required for it to take place that transmission is altogether exceptional."¹

Liveing also refers to Crocker's cases of "eight children in one family, who, while at the seaside, had each a few perfectly bald spots on their heads ; they were quite bare from the first." The governess also contracted the disease, which was considered to be *Alopecia* ; and her sister, who slept with her, also had similar spots. Crocker says : "The hairs round were loose ; there were no short hairs, but one pulled out of the border showed distinct fungus-elements, indistinguishable from *Tinea tonsurans*. In no case were there more than three spots, and they were all small. In one child, there was a history of a red ring on the side of the cheek." Liveing then remarks that he has met with similar cases, "in a school of about forty-five girls, where there were upwards of twenty girls affected with small bald spots on the head, mostly free from stumps ; there were, however, in a few cases a sufficient number of stumps full of ringworm fungus to make the diagnosis

¹ *Diseases of the Skin*, 1894.

certain." . . . "The appearance of most of the children would have deceived any one had the *cases occurred singly*." He also mentions a boys' school, where he saw sixteen cases of bald ringworm, which had at first been thought to be *Alopecia areata*, and pronounced non-contagious. He writes, that there is one point in common in these curious outbreaks of bald ringworm—*viz.*, that "the spots were for the most part small, and by no means always circular at the margin, like area. On the contrary, some of the spots were angular, and others narrow and long like scars; indeed, the shape of the bald spots was in most cases not like those of typical area." Liveing then remarks how closely these cases resemble *Alopecia areata*, so much that an isolated case can with difficulty be diagnosed, unless some diseased stumps are to be seen.

Liveing also remarks: "The old idea that the disease [*Alopecia areata*] was due to a parasitic fungus has now been given up, in consequence of the complete failure of all attempts to demonstrate the fungus."¹

Pye-Smith does not believe in the parasitic nature of *Alopecia areata*; and, after remarking that Bazin was a supporter of the parasitic theory, says: "The French dermatologists call many cases *pelade* or *teigne pelade*, which in England or Germany would be regarded as true ringworm in its later stages." He also says it "is not contagious," . . . "and is not curable by any anti-parasitic treatment." And, again, he remarks: "It is true *Alopecia*, anatomically identical with the other forms of atrophy of the hair, though differing in its origin and course. It is independent of the presence of a fungus."²

¹ Quain's *Dictionary of Medicine*, 1894, article "Alopecia areata."

² *Textbook of Medicine*, Fagge and Pye-Smith, vol. ii., p. 872; *Diseases of the Skin*, Pye-Smith, p. 226, 1893.

A case of the so-called contagious or parasitic *Alopecia areata* was exhibited before the Dermatological Society of London, in February, 1897, by Dr. Crocker, and was examined by Sir Dyce Duckworth and myself, amongst many others. It was a typical case of ordinary *Alopecia areata*, with many bald places, and a number of broken-off hairs and ! shaped stumps. I examined the stumps the same day, and failed to detect the slightest evidence of any fungus on them by a most careful microscopical examination. I also examined many of the long hairs, which came out easily with atrophied roots.

In the report given of the meeting, it is stated that "Dr. Crocker pointed to the occurrence of such groups of cases, which seemed to be rare in England, but comparatively common in France, as exceedingly strong proof from the clinical side that the disease was induced by some parasitic cause, and became under certain circumstances contagious. Dr. Crocker's diagnosis was generally agreed to, and the case gave rise to much conversation. Dr. Colcott Fox considered the lesions typical of *Alopecia areata*, and suggested to Dr. Crocker that the case was an excellent opportunity for attempting the proof of the relation of the disease to the ringworm fungi. He was familiar with groups of cases, such as those mentioned by Dr. Crocker, and had met with a similar little epidemic of ten cases in the newspaper department of the General Post Office, but prolonged search had convinced him that no hyphomycete was present."¹

The only suggestion offered at the meeting, that this was a form of *contagious Alopecia*, was founded on the man's own statement, that the spots developed after his hair was clipped by a barber at Aldershot, and that nine

¹ *Brit. Jour. of Derm.*, March, 1897.

other men in his regiment had the same kind of bare spots after they had been clipped by the same barber. Not one of these other nine men had been seen by the exhibitor; and no proof existed that the cases were genuine *Alopecia areata*, that they were not simply marks which may possibly have existed before, and which often become apparent after close clipping.

It is obvious, that in such cases the diagnosis of *Alopecia areata* is hardly more than a presumption, and that the facts on which it was based do not constitute evidence which could be accepted by scientific observers.

So far, neither Sir Dyce Duckworth nor I have ever seen *true Alopecia areata* where there was any *positive* evidence that the disease was caused by contagion from some other person.¹

As Galloway has recently written concerning the etiology of *Alopecia*: "It is no wonder then, therefore, that the parasitic hypothesis did not meet with general acceptance; for, although the general clinical evidence in favour of the parasitic hypothesis is considerable, the difficulty of tracing the infection in any individual case is great; and, even admitting that certain of the cases diagnosed as *Alopecia areata* may be examples of 'bald ringworm,' the repeated examinations of numerous cases by many skilled observers have long since satisfied the majority that a hyphomycete is not the cause of *Alopecia areata*."²

THE SUPPOSED MICROBIC ORIGIN OF ALOPECIA.

The presence of a specific micro-organism has been suspected for years (see Bazin's view, p. 275). Thin, in

¹ I have Sir Dyce Duckworth's consent to publish his opinion of this case with my own.

² *The Practitioner*, p. 520, May, 1897.

1881¹ and 1882,² said he had found certain bacteria between the root-sheaths and the hair-shafts, in hairs extracted from the margins of patches of *Alopecia*, and he believed that *Alopecia* was caused by some micro-organism.

In 1888, Kazanli of Odessa reported, that a micro-organism was always present in *Alopecia*. He described it, and believed he had discovered the specific microbe of this affection.³

The latest investigations published are those of Sabouraud; and, if corroborated, they may throw much light on this difficult subject.

In the first papers, on the histology and bacteriology of *Alopecia*,⁴ Sabouraud states, that besides the numerous common bacteria to be found in the follicles, there are large numbers of a small bacillus, which he calls "the micro-bacillus of *Alopecia areata*"; that this bacillus is indistinguishable from the bacillus occurring in seborrhœa oleosa, and also in the comedones of acne. Sabouraud also says: "I have been able to state that the micro-bacillus of seborrhœa, unique in kind, and innumerable in amount in the lesions, is the constant microbic feature of this affection, without, nevertheless, being able to prove that it is its cause, since I have not been able to reproduce with it at will the type of the disease in which it is met."⁵

Sabouraud says, that if a section be made through the skin affected by *Alopecia* in its early stage, the hair-follicles are

¹ "On Bacterium decalvans: an Organism associated with the Destruction of the Hair in *Alopecia areata*," *Pro. of the Roy. Soc.*, p. 217, 1881.

² *Brit. Med. Jour.*, vol. ii., pp. 783, 828, 1882.

³ See *Brit. Jour. of Derm.*, February, 1889.

⁴ *Ann. de Derm. et de Syph.*, vol. vii., pp. 253, 460, 677, 824, 1896.

⁵ *Annales de l'Institut Pasteur*, February, 1897. See "The Bacteriology of Baldness," *Brit. Med. Jour.*, April 24th, 1897.

found to be invaded by the same micro-bacillus as is found in seborrhœa, while round the affected area the follicles are not infected. He has found this condition present in all the cases he has examined. He has also obtained, in animals, patches of *Alopecia* by injecting cultures of the microbe. Hence, he considers seborrhœa and *Alopecia areata* are "essentially identical"; and "in any explanation which is advanced of *Alopecia areata*, the consideration of this organism is rendered necessary, because, whether it is proved to be specific or not, it is constantly found in the affected skin only at the time and in those parts where both clinical and histological observation have shown the disease to be active."¹

Galloway, after summarising Sabouraud's researches, says: "The experimental evidence from inoculation is still wanting; and this failure is not to be wondered at, considering the different characters of the skin in man and animals; but this very fact should act as a deterrent to such dogmatic statement of the results as is indulged in by Dr. Sabouraud."

Galloway quotes Sabouraud's conclusions—*viz.*: that "seborrhœa oleosa and *Alopecia areata* are essentially identical processes. The patch of *Alopecia* is nothing else than an attack of acute circinate seborrhœa; and, conversely, bald persons would not have become bald but for a diffuse attack of chronic *Alopecia areata*. I readily appreciate that this statement will seem quite subversive of accepted ideas, and even monstrous by dermatologists, and I imagine it will be received with incredulity."

Sabouraud writes in a very dogmatic style, and has

¹ See *The Practitioner*, "Seborrhœa and Alopecia areata," by Dr. J. Galloway, May, 1897; also "The Bacteriology of Baldness," *Brit. Med. Jour.*, April 24th, 1897.

lately published another article¹; and Galloway gives his last conclusions in *The Practitioner* in the following words :—

“1. The specific micro-bacillus of seborrhœa oleosa, when it gains access to one of the pilo-sebaceous follicles, produces within it four constant results :—

- (a) Hypersecretion of sebum.
- (b) Hypertrophy of the sebaceous gland.
- (c) Progressive atrophy of the papilla.
- (d) Death of the hair.”

“These phenomena result from seborrhœic infection either of the so-called smooth parts of the skin or of the hairy areas.”

“2. In the hairy scalp, this infection chooses as its favourite site the vertex, and the depilatory effect of the seborrhœa produces the baldness. Ordinary baldness is, therefore, nothing else than seborrhœa oleosa of the vertex, which has assumed a chronic form.”

“Seborrhœic infection is not only indispensable to the production of baldness, but this infection continues as an intense, pure, and permanent condition even when baldness is clearly and definitely established.”

“3. Ordinary baldness is, therefore, a perfectly well-characterised disease due to a specific micro-organism.”²

Another account of Sabouraud's views on the etiology of *Alopecia* is given by Wickham, who says : “Sabouraud came to the conclusion, that, if the loss of hair in this disease is due to microbial intoxication, the toxins of the

¹ “On the Nature, Causes, and Mechanism of Ordinary Baldness,” *Ann. de Derm. et de Syph.*, March, 1897.

² “Seborrhœa and Alopecia areata,” *The Practitioner*, May, 1897 (quoted by permission).

micro-organisms would be capable of inducing *Alopecia*." Wickham remarks that Sabouraud noticed that *Alopecia* always started from a central point, and spread as oil runs in a fabric; that "the local development indicates that the micro-organism resides in the active peripheral zone, and more exactly in the dilated orifices of the hair-follicles." He then states, that Sabouraud was enabled to isolate this special bacillus, and by injections to cause bald places in rabbits; that he then noticed the bacillus to be the same as the one found in the comedones of acne (Hodara's), and also the same as the bacilli found in every form of seborrhœa; so that he came to the conclusion, that the bacillus of the seborrhœic cocoon and the acne bacillus are identical. This made Sabouraud at first doubt if this microbe were also the cause of *Alopecia*; but further researches led him to the conclusion of the microbial origin of baldness—*viz.*: that this special bacillus is the cause of both seborrhœa and *Alopecia*, or "that consequently seborrhœa and *Alopecia areata* have a common origin from the same micro-organism."

Sabouraud cultivated the microbe, filtered the solution through porcelain, and inoculated a rabbit; and Wickham states: "The rabbit at once commenced to shed its fur, and within forty days from the date of inoculation general *Alopecia* was established."¹

On reading the above, the thought came to my mind that perhaps cultures from ordinary microbes of the skin might also cause loss of hair, and I found the following words by Lockwood: "The pathogenic properties of the microbes of the skin seem to be considerable. When cultures which had been inoculated with the contents of the sebaceous glands were introduced into the subcutaneous

¹ *Brit. Med. Jour.*, April 24th, 1897.

tissue of mice, they killed the animals in three or four days, causing œdema, suppuration, and ulceration, *with loss of hair.*"¹

These articles are all that are published so far. Whether Sabouraud will be able to produce in an animal, *or in man*, a definite patch of *Alopecia areata* with the club-shaped stumps, by the injection of the toxin of the micro-organisms found in seborrhœa, remains to be seen. We shall see also whether such injections will produce a temporary loss of hair on a patch of Tinea, and thus cure this disease.

The weak point of the argument, in my opinion, is that the same micro-organism is to be found in common seborrhœa and in ordinary baldness, as well as in the comedones of acne. If *Alopecia areata* were *solely* due to such a common microbe, it would surely be much more common than it is, especially as so many people have seborrhœa. Lately, in examining some boys for admission into Christ's Hospital, I noticed that almost half had distinct scales of seborrhœa, but there were no cases of *Alopecia areata*.

Again, Wickham says: "In hairy scalps which have been once invaded, the microbial affection remains endemic and settled, so that a hair once shed is never renewed"! Surely, this is carrying this view a little too far. People constantly get partial baldness from seborrhœa, and under stimulating treatment the hairs grow again. We know also, as clinicists, that the hair almost always comes again on patches of *Alopecia*, whether treated or not (see p. 310), especially under stimulating treatment. Then, again, how are the typical patches of *Alopecia areata* I have often produced by lotions and gas-water (pp. 281-286) to be

¹ *Brit. Med. Jour.*, May 28th, 1897.

explained on the microbic theory? I have actually produced patches that could not be diagnosed from ordinary *Alopecia*, with the typical club-shaped stumps. These experiments alone show that an artificial *Alopecia areata* may be caused without the toxins of the micro-organisms found in seborrhœa, for it is hardly likely they would develop under such treatment.

I have lately written: "I do not believe in the new view that ordinary *Alopecia areata* is a contagious disease, and solely due to any special micro-organisms. Of course, micro-organisms may easily be found on the skin; but, if they are the same as those seen in seborrhœic plugs, and *Alopecia areata* is due simply to their toxin, why is not *Alopecia areata* commonly seen in those who suffer from seborrhœa? Then, surely, it would be a very common disease, and possibly few people would have any hair left."¹

Again, I have not noticed any connection between *Alopecia areata* and ordinary baldness. Those who have had patches of *Alopecia* are not more liable than others to get general baldness. Why not, if the bacilli be present, and they be the exciting cause? These special micro-organisms may always be present in *Alopecia areata*, but I cannot yet agree with the hypothesis that they are the cause of this affection, especially as *Alopecia* may be very sudden in its onset (the hair even falling out in a single night), and at times so extensive, that all the hairs of the body are shed. Even then (as in the case mentioned on p. 310) the hair may suddenly grow again.

Of course, it is well known that seborrhœa often leads to baldness, and is probably due to micro-organisms; but this is no evidence that seborrhœa and *Alopecia areata*

¹ *Brit. Med. Jour.*, May 1st, 1897.

are caused by the same micro-organism. Pathology does not consist solely of microbes.

The latest article on this question is by Leslie Roberts, who, after describing Sabouraud's researches and facts, says: "Starting from the simplest and most obvious fact, it is incontrovertible that the surface fat is largely increased in *Alopecia areata* and in seborrhœa." . . . "It has long been the custom to regard this fatty metamorphosis as the essential point of seborrhœa; but its presence in pelade was entirely overlooked, or, if recognised, considered merely as something casual and accidental. Another event common to the processes of seborrhœa and pelade is the diminished formation of hair, ending finally in the complete arrest of the hair-forming function." . . . "What is the relationship between these two common events—between the fatty metamorphosis and the fall of hair?" . . . "I cannot see how we can avoid the conclusion that these two processes, the fatty metamorphosis and the keratin metamorphosis, are the two scales of the balance of forces; so mutually adjusted that, when one is up, the other is down, or, to put it more scientifically, any preponderance of the one is accompanied by a diminution in the other." What then causes this hypertrophy of the sebaceous gland? "By what *mechanism* is the diminished or arrested hair-formation brought about? The proof that the micro-bacillus is the cause of the hypertrophy has, for the present, broken down experimentally. Possibly the future may substantiate it. But what causes the special development of the sebaceous glands in the lunago follicles? Is this also due to the micro-bacillus? Although I do not assert it, it is by no means disproved, as yet, that the micro-bacilli are anything more than saprophytic, and may act as false clues to investigators. The real cause of the

defluvium may, possibly, be in the fat itself which modifies the epithelial processes.”¹

Leslie Roberts believes that *Alopecia areata* is one of the clinical manifestations of seborrhœa, inasmuch as the fatty flux, or metamorphosis, is the central histological event in the process of *Alopecia*, as in that of oily seborrhœa. But this still leaves open the question—What is the *original cause* which produces the fatty metamorphosis?

MAY CHILDREN WITH TRUE ALOPECIA AREATA ATTEND SCHOOLS?

This is a very practical and most important question, especially when it is remembered that Crocker says *parasitic Alopecia areata* “forms at least 95 per cent. of all cases of *Alopecia*”! Obviously, if this opinion be correct, or if *Alopecia* be ringworm in disguise, no case ought to be admitted to schools.

I have always allowed boys with *Alopecia* to mix with the other boys in Christ’s Hospital, and have never refused to admit children into the junior school who have had this affection, but I have never heard of nor seen any spread of the disease, nor have such cases ever given ringworm to other boys in the school. These facts appear to me to disprove Crocker’s theory.

If a distinct fungus can be detected in any case of bald, smooth, shining places, indistinguishable from the fungus of *Tinea tonsurans* (no matter how bare the places may have become), call the disease by its proper name—*viz.*, bald ringworm. And if skilled observers cannot detect any

¹ “Seborrhœa and its Consequences,” by Leslie Roberts, *Brit. Jour. of Derm.*, June, 1897.

fungus, why should the case be called "a sort of modified ringworm," or "tinea decalvans," and the patient, if a child, be prevented from attending school?

I feel sure that I should have heard, if *Alopecia* had been regarded as a form of ringworm, or considered to be contagious, by the medical officers of our public schools. *Alopecia* is not even mentioned in *The Code for the Prevention of Infectious and Contagious Diseases in Schools*, published by the Medical Officers of Schools Association.

I have acted on this rule for the last twenty-seven years, and feel positive, that if cases of *Alopecia areata* were in any way due to the fungus of ringworm, I should long ere this have got into serious trouble from such cases developing into ringworm; or by communicating this disease in schools, after I had certified the children to be not suffering from any contagious disease. I know of no single instance in which I have sent a boy or girl back to school with *Alopecia areata*—and I have certified and sent back a very large number—where I have ever heard of any spread of that disease, or of Tinea being contracted from it.

Of course, after Sabouraud's investigations, it cannot be doubted that micro-organisms exist in *Alopecia*. But are they distinctive? Are they the cause, or are they *secondary*? It is admitted that the same organisms can also be found in the comedones of acne, in all cases of seborrhœa, and in ordinary baldness. If so, will it be suggested that seborrhœa and ordinary baldness are contagious? Are boys or girls who have seborrhœa to be kept from schools, as well as those with *Alopecia*? Then, what about the masters? Are all masters who have the misfortune to have bald heads or seborrhœa to be debarred from teaching? This, it seems to me, would be the logical outcome of refusing to admit to schools boys who have true *Alopecia*, if this affection

be primarily due to microbes to be found in common seborrhœa and baldness, which can be passed on from person to person.

Of course, the question of contagiousness is one of degree. There are many, I know, who affirm that they have seen *Alopecia* pass on from brother to sister, and in France it is said to be contagious at times. If it be, I feel sure it is only very slightly so, and that practically we need not in England isolate people who have it.

Even if Sabouraud's view be proved to be correct, it will not in the least show this disease to be contagious in the ordinary acceptation of the term ;—certainly, no more contagious than seborrhœa or baldness.

Hence, with regard to the practical question, whether medical men may still certify a case of true *Alopecia areata* to be "non-contagious" and "fit to attend school," I have no doubt that, with our present knowledge, they are fully justified in doing so. It would be hard and unjust for medical officers of schools to refuse to receive such cases.

I am glad to note, that in the last edition of Quain's *Dictionary of Medicine* (1894), the definition of *Alopecia areata* is : "A non-contagious atrophic disease of the hair."

CLINICAL CHARACTERS.

One or more white, shining, bald, more or less circular patches are to be seen, sharply defined from the rest of the hair. They are generally circular when small, but may become elongated or irregular, especially on the sides of the head, above the ears.

They range from the size of a sixpence to that of the palm of the hand, or even larger. The places may coalesce,

and form large patches on one side, or both sides, of the head.

The place or places are generally perfectly smooth and shining, like a billiard ball, instead of being scaly or scurfy. As a rule, there is no change in the colour of the skin: at first, it may be slightly red, but later on it is generally whiter than normal.

No ordinary stumps like those observed in *Tinea tonsurans* are to be seen; but generally a few club-shaped ones are to be found at the circumference of the patch, and they sometimes exist in large numbers, even over most of the patch. The stumps are specially seen at the side where the patch is enlarging. The long hairs round the patches, especially where the places are extending, are often loose, and easily come out when pulled, having partly atrophied roots. As a rule, the skin is less sensitive to irritants than on the unaffected parts of the scalp. The skin is not raised, and after a time it gets slightly thinner, and somewhat adherent to the tissue underneath.

There may be only one or two places of baldness, which are generally situated on the side of the occiput, on the vertex, or above the ears. They may at times be found quite at the lower and back part of the scalp, where patches of ringworm are very rare. They are generally seen on the scalp, but they may occur on the beard, eyebrows, moustache, or whiskers, and patches may even be detected on the arm or on the body, including the axillæ and pubes.

The place or places may develop very suddenly, and sometimes the hair falls out in a single night, when the disease may spread very quickly; or the places may come by degrees, and spread very slowly. If on the occiput,

the places are often symmetrical ; where the disease is extensive, it is usually more or less symmetrical.

As the disease spreads, the hairs around easily come out, and, by the patches uniting, large irregular places are formed. The adjacent long hairs can usually be extracted with ease, if the disease be spreading ; but at other times they are quite firm. Sometimes a place will be found to be spreading at one end, with numerous ! shaped stumps, while the fine, new downy hair is appearing at the other end.

The Stumps.—A few small broken hairs are generally to be seen at the edges of the patches ; and, very often, these “stumps” expand towards their free extremities, forming club-shaped stumps about an eighth of an inch long. The ends are usually larger than the root part—like a note of admiration (!) without the dot.

These stumps are very easily extracted *entire* on traction *instead of breaking off*, as stumps almost always do from patches of ringworm. The roots are found to be small and shrivelled. Under the microscope, the bulb is observed to be atrophied ; sometimes a little swelled at its upper portion, and then tapering and much reduced in size. The shaft is often found to be dilated, and darkened in places, forming bulbosities, which are deeply pigmented in the centre, with a large amount of dark granular matter, like pith, which is also seen here and there in the centre of the hair, as well as in the oval swellings (see Plate VII.). The free end is somewhat club-shaped, more opaque and pigmented, and often exhibits clusters of fibres radiating outwards in a brush-like form. The dilated portions are caused by the separation of the fibrillæ by the dark granular matter ; and the brush-like condition of the free end is produced by the fracture occurring through this part of

the hair. No conidia or mycelium can be detected in the stumps, nor in, nor on, any of the surrounding long hairs. In any doubtful case, the stumps should be washed with ether, as before described (p. 109). Micro-organisms are present (see p. 295).

At times, the hairs in *Alopecia areata* are half broken or bent over at right angles at one of these pigmented spots, about an eighth of an inch from the surface of the scalp. If the hair be examined at this point, it will have the appearance seen in Plate VII.

Sometimes the short broken-off hairs—especially if the place has been freely epilated—look more like minute black dots, or are so short that it is almost impossible to get out a small portion for microscopical examination. A place may have a number of these black dots, closely simulating “black-dot ringworm” (see p. 88). Sometimes these minute black dots are due to dirt in the hair-follicles after the hair has been removed by epilation, but oftener from minute portions of pigmented atrophied hair. The long hairs round the patches, especially if they are spreading, have atrophied roots: in fact, atrophy of the hair-follicles and the hairs is constant.

When the disease is getting better, the hairs round the patches cease to come out easily when pulled, and new, fine downy hair commences to grow at the circumference, and by degrees over the entire surface, of the places. The new hair is generally pale, or even white at first, and may remain so for a long time. I have seen cases where the hair remained permanently white on all the places. A short time since I was consulted by a gentleman who each year for several years had had fresh patches of *Alopecia areata*. The hair had grown each time white, and this appeared to be permanent, so that the head was marked

by several patches of perfectly white hair. (This yearly recurrence is also against the parasitic view.)

Alopecia may occur at any age, though it is more common in children and young adults. It is more often, too, seen in males than in females.

It may vary in degree of severity, from one small place to the complete loss of every hair on the body, including the eyelashes and the hair from the axillæ and pubes. Malcolm Morris relates a case where the entire hair of the body was shed in forty-eight hours. In such cases the nails may come out also. Is a sudden case like this due solely to the action of microbes? I had a boy in Christ's Hospital some years ago who had complete *Alopecia*, every hair falling out, and the nails being partly shed. After two years, the hair grew again as freely as ever.

Alopecia often relapses, even after new hair has commenced to grow, and may recur even after years of freedom. It also has a disposition to appear on different members of the same family. Sometimes half an eyebrow or half the moustache will fall. I once saw a man who lost half his moustache for a few months at a time for some years in succession. That could not possibly have been due to any fungus, nor solely to micro-organisms. For why should they attack, without some exciting cause, the same place each year?

THE DIAGNOSIS OF ALOPECIA AREATA FROM RINGWORM.

There is little fear of *Alopecia areata* being mistaken for *Tinea tonsurans*, when it extends over a considerable portion of the scalp; but the disease formerly called *tinea decalvans*—viz., small patches of *Alopecia areata*—

may be thought to be ringworm¹; and sometimes distinct patches of ringworm, which are smooth and shining, are thought to be only *Alopecia*. I have seen many cases where at first sight it was extremely difficult to decide, as the patches were somewhat scurfy, and contained many long hairs and numerous club-shaped stumps, and (what is still more deceptive) a large number of minute black dots (see p. 280). In 1896 I saw two cases which had been treated for months for *Tinea tonsurans*, and the places had been thoroughly plucked. The outer parts of the patches were covered with short broken-off hairs, and most were so short that it was necessary to let them grow for a week before I could extract them for microscopical examination.

In April, 1897, I had a boy brought to me with typical symmetrical *Alopecia areata*, which had been treated for ringworm for two months with parasiticides, and had spread under this treatment.

As a rule, the suddenness of the attack, the smooth white skin, the absence of scales and of fungus, and the presence of the typical club-shaped stumps, with pigmentation of the shaft, will distinguish this affection. It must be remembered also that the stumps from *Alopecia* come out with *entire and atrophied roots*.

But, as there are mixed cases of *Tinea* and *Alopecia* seen at times, as well as cases of *Tinea* passing into *Alopecia*,

¹ "As exception to this statement was taken by one of the reviewers of the second edition of this work, I feel bound to say that what I have stated is correct. I have had many cases (both in adults and children) sent to me during the last year, as ringworm, which were only *Alopecia*; even two adults during the past week."

The above note, which was appended to the third edition in 1885, I must again fully endorse. What has been said above as to the difficulty of diagnosis and mixed cases fully explains the fact.

and also genuine cases of "bald ringworm," it is most essential to make a very careful examination of the whole scalp, and to be absolutely certain there is no complication with *Tinea tonsurans*, before any certificate is given that it is a "non-contagious" affection, and that a child with *Alopecia areata* may return to school.

HOW LONG WILL IT TAKE TO CURE?

Alopecia areata may last almost any time, and no definite opinion can be given as to when it will get well; but, though the disease is often very tedious, the prognosis is generally favourable. If there be no thinning of the skin, the chances are in favour of the hair growing again under proper treatment in from three to four months; but new places may appear, and very frequently many months, or even a year, may elapse before the hair grows fully again, and no fresh places make their appearance. In the universal case, mentioned on p. 308, all treatment had been left off for nearly a year, when the hair suddenly commenced to grow again. Why was this, if the microbic theory be true? Why did this case get better, while ordinary baldness is permanent?

In some rare cases, the hair is never restored. The younger the patient, the more favourable the prognosis; while the thinner the skin becomes on the patches, the less the mobility of the skin over the tissues underneath it, and the more cupped the places are from atrophy, the worse the prognosis.

THE TREATMENT OF ALOPECIA AREATA.

Parasiticides, in my opinion, are unnecessary, and I have often seen the disease spread while they have been used.

The treatment can be restricted to the use of *local stimulants*, in order to cause the follicles to form new downy hairs.

I think, with Malcolm Morris, that "all these remedies act in the same way—that is to say, by increasing the flow of blood to the part, and then by improving the nutrition of the hair-follicles."¹

The general health should be attended to, and tonics, such as quinine, strychnine, iron, and cod-liver oil, given, if necessary ; but the local treatment is by far the more important, and general treatment alone is useless.

The treatment I prefer, for small or moderate-sized places, is to stimulate the part with iodine and cantharides. Iodine liniment should be painted on the place or places, and for half an inch round them into the long hairs, about every other night. This should always be done last, so that the lotion is not soaked in till the following morning. The lotion should be well dabbed into the places two or three times a day, both on the patches, and freely around them, especially if the disease be spreading. If the patches be at all extensive, only a portion can be painted now and then with the iodine liniment, but the lotion can be freely employed :—

℞ Tincturæ Cantharidis	.	.	.	ʒij. ad ʒiij.
Acidi Acetici	.	.	.	ʒj.
Glycerini	.	.	.	m. xxx.
Spiritûs Rosmarini	.	.	.	ʒj.
Aquam Rosæ	.	.	.	ad ʒviiij.
Misce. Fiat lotio.				

Some advise an application of blistering fluid first, but I prefer to use the strong cantharides lotion rather than a blister.

¹ *Diseases of the Skin*, p. 476, 1894.

When the new downy hair commences to grow, it may be shaved a few times, till it grows freely. If more patches appear, the iodine and lotion should be freely used to the fresh places.

In some cases, the hair rapidly falls, leaving very large places: then the application of oil of turpentine is often beneficial. This may be well rubbed in twice a day. Or fir-wood oil or petroleum (not near a light) can be employed. The following lotions are also useful:—

℞ Tincturæ Cantharidis	ʒj.
Tincturæ Capsici	ʒj.
Aquæ Rosæ	ʒj.
Misce. Fiat lotio.	

Or—

℞ Liquoris Ammonię Fortioris	ʒj.
Olei Amygdalę	ʒj.
Spiritûs Rosmarini	ʒiv.
Misce. Fiat lotio.	

Malcolm Morris advises:—

℞ Olei Sinapis	ʒj.
Olei Ricini	ʒij.
Spiritum Rosmarini	ad ʒiv.
Misce. Fiat lotio.	

This should be painted on the places two or three times a day, and should not be rubbed in.

Erasmus Wilson used:—

℞ Liquoris Ammonię Fortioris	}	. . . . .	āā ʒss.
Chloroformi			
Olei Sesami			
Olei Limonis			ʒss.
Spiritum Rosmarini			ad ʒiv.
Misce. Fiat lotio. ¹			

¹ *Lectures on Dermatology*, 1878.

Chrysarobin is recommended by Crocker and by Malcolm Morris, and may be used in the strength of from thirty to sixty grains to the ounce in lard, or in almond oil and lanoline. The staining, however, is very objectionable (see p. 167); and I prefer the other stimulating applications, for I believe chrysarobin acts only as a stimulant, and not as a parasiticide.

Payne has advised sulphur and perchloride of mercury. Sabouraud, acting on the microbial theory, also suggests the use of sulphur in some fatty ointment; but I have constantly seen this fail to benefit *Alopecia*.

Hydrochlorate of pilocarpin has been advised ($\frac{1}{30}$ of a grain, by subcutaneous injection).

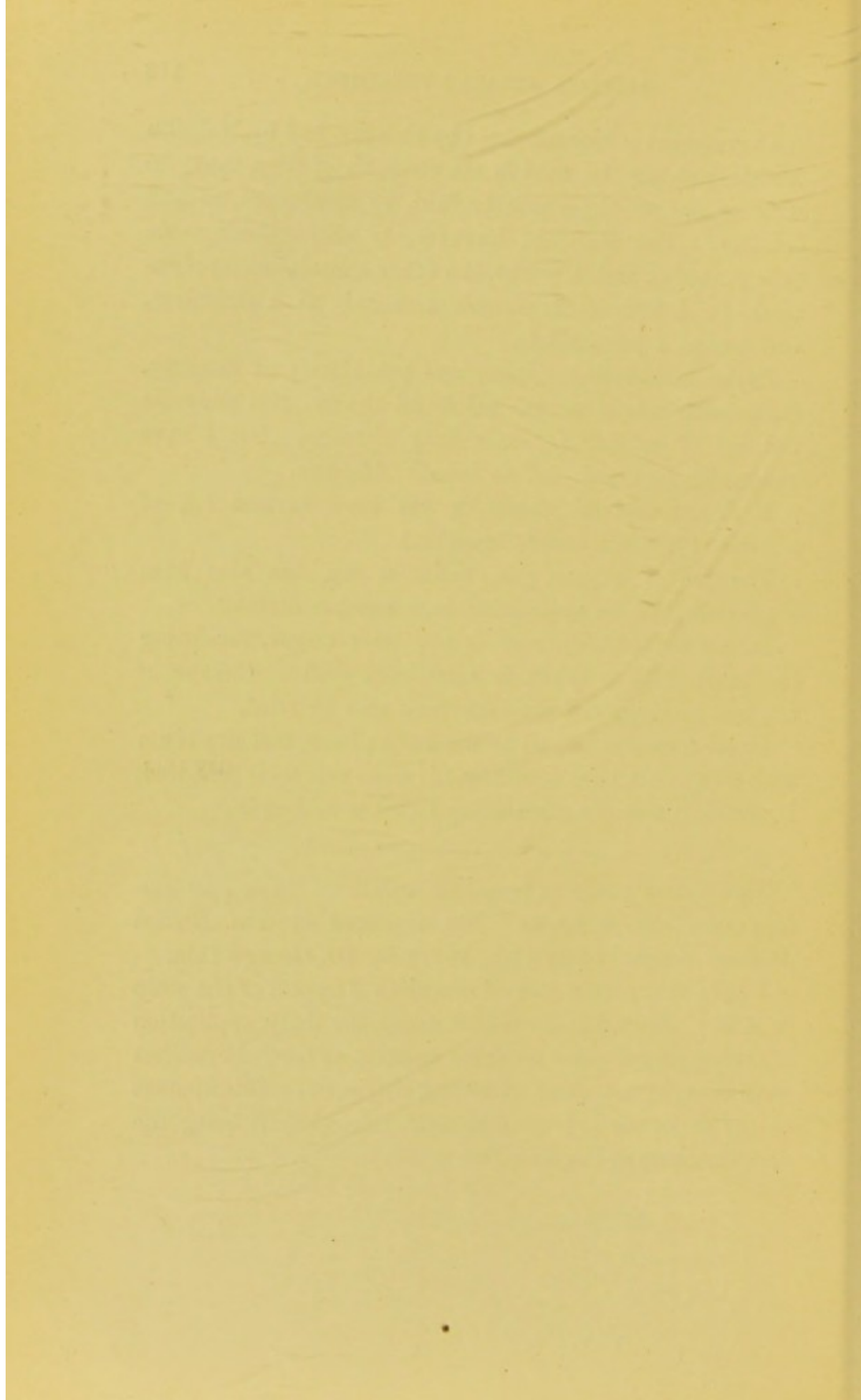
The use of oxygen gas, under a cap, has also been suggested, but its application is somewhat difficult.

In extensive cases, and in the later stages, faradising the scalp with a brush is sometimes useful. Change of air, sea-bathing, and massage may also be tried.

In all forms, it is well to wash the places, and dry them with friction; a good brushing, till some redness is produced, is useful, before the stimulating lotion is rubbed in.

Just before going to press, an article on "The Bacteriology of Alopecia areata" has appeared in *The British Medical Journal* (July 17th, 1897), by Dr. George Thin.

I have also seen a case of complete *Alopecia* of the scalp in a boy, which has developed under the daily application of strong parasitocides for some months, as the bald patches were thought to be, and treated as, ringworm. This appears to me to be an argument against micro-bacilli being the *exciting* cause of *Alopecia* (see p. 300).



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