

behave anhidrotically. Ebers states that in the case under his observation small lacerations of the epidermis could be seen. It is reported, too, that hæmathidrosis, in the slighter cases, lasts barely some seconds or minutes, and in the graver, one to two hours; that it may often recur at irregular intervals, even throughout many decades (Ebers). It spares neither age, state, nor sex; but it has been noticed to be relatively rare in men (thus far only three cases), and more frequent in women, especially about puberty or when affected with hysteria, dysmenorrhœa, etc. Parrot, one of the most ardent defenders of hæmathidrosis, even admits that it is traceable to central or peripheral local nervous affections, and hence chiefly met with in hysteric, dysmenorrhœic, chloro-anæmic women and paraplegic, paralytic, or hypochondriac men; but maintains in the main that it belongs to the same category as hæmaturia e nephritide. These statements are opposed by others showing that in cases affected with hæmathidrosis absolutely no morbid change could be observed. We willingly admit that the occurrence of this miscalled hæmathidrosis is certainly connected with nervous conditions. For every physician is familiar with the fact that in hysteria, for instance, vasculo-dilator hyperæmias result from the slightest causes, either directly or in a reflex manner. Should such a person have besides a predisposition to friability of the vessels, hemorrhages of various degrees and from different organs will result easily enough. But the sweat glands, being surrounded by a very plentiful vascular network, will not be able to escape this process which is traceable to a nervous origin. Therefore, an exudation of blood may occur in one or more organs and affect the sweat glands merely by accident; or else, what is still more likely, may simultaneously take place also in other tissues and organs. And, indeed, this fact has been clearly shown by Foot's collection of the cases of hæmathidrosis thus far reported; for in the majority of these, other hemorrhages or the tendency thereto were present. Accordingly, I look upon hæmathidrosis as an exudation of blood from the sweat pores which is incited by the sympathetic and brought about in consequence of neuro-paralytic hyperæmia of the vessels appertaining to the sweat glands (by diapedesis and sometimes by rhexis).

The hemorrhages from the sweat glands, being insignificant, are not deleterious to the organism.

3. *Osmidrosis, Bromhidrosis, Fœtid Perspiration.*—The perspiration, on account of the volatile organic acids it contains, possesses an odor which is perceptible in various degrees. But whether the Laplander really smells of whale oil, the Malayan of olive oil, etc., and what may be the cause of it, I am unable to determine in the absence of personal experience. However, sometimes the perspiration has quite a penetrating odor even in persons of the Caucasian race. It is customary to ascribe this to neglected care of the skin, which is said to cause on the perspiring parts a decomposition of the secretion and a corresponding formation of free volatile fatty acid. There can be no doubt that in most cases of bromhidrosis this is really the fact, but it is equally certain that there are also persons who are affected with offensive perspiration under all circumstances. Should the affection occur on the feet or the axillæ, we are very likely to refer the irremovable odor to the impregnated apparel, shoes, etc. However, this explanation will not suffice when the bromhidrosis occurs elsewhere. Thus I had under treatment a patient who otherwise did not show the least traces of bromhidrosis, but whenever he began to perspire more freely, as after eating and drinking heartily or by active exercise, so offensive an exhalation spread around him that he was forced to shun all social intercourse. Baths, cold ablutions, and hydrotherapeutics continued for weeks produced no improvement.

It appears to me more correct, therefore, in cases of this nature, to seek the cause of the bromhidrosis in the quality of the perspiration. Hence I cannot side with those who would allow the existence of bromhidrosis only in the sense of an artefact, a secondary product of decomposition. On the other hand I am far from admitting that, in general, the perspiration in red-haired persons has a peculiarly disagreeable odor; in parturients, a sour; in syphilitics, a sweet; in rheumatics, a musk-like odor; *i. e.*, differing according to the form of disease. Accordingly, we shall act correctly and in the interest of the patient if, in cases presenting penetrating exhalations, we endeavor to trace the sources, in order, at least, to counteract the annoyance by avoiding eventual injurious influences.

4. *Urhidrosis, Urinous Perspiration.*—The urinous odor of certain forms of perspiration had been noticed already by the ancient physicians and termed by them "sudor urinæ or urinosus." Unfortunately we have thus far no record of any examinations which would be apt to elucidate the quality of urinous perspiration. All we know is that, owing to the antagonism existing between the secretion of urine and the elaboration of sweat, during the impairment of the former the latter is likewise materially altered. While in the normal perspiration the quantity of urea varies from 0.0428 Gm. (Favre) to 1.55 (Funke) per thousand, it is so greatly increased in that of cholera, parenchymatous nephritis, uræmia, etc., that, after evaporation of the generally very profuse secretion, it remains on the surface of the skin in the form of a crystalline pulp which is easily seraped off. It is impossible to state for the present whether other nitrogenous substances, traces of which are met with, are likewise augmented. In regard to the inorganic constituents (phosphate and chlorides), we may conclude with the greatest probability that they are diminished in urhidrosis.

The strongly urinous perspiration is probably due in the first place to the generally increased elaboration of sweat on account of special conditions, and in the second place to the absolutely augmented excretion of urea, as well as to the inevitable presence of decomposition products, *i. e.*, particularly the carbonate of ammonium, aided possibly by the fatty volatile acids (formic, butyric, acetic, and other acids).



# THE PARASITIC DISEASES OF THE SKIN.

BY

A. WEYL, M.D., AND PROF. GEBER, M.D.,

## I. SKIN DISEASES DUE TO VEGETABLE PARASITES (DERMATOMYCOSES).

BY

A. WEYL, M.D.

It is only within the last forty years that the causal connection of the pathological processes in question with the existence of a fungus has been disclosed.

Thus in 1839 Schönlein<sup>1</sup> was the discoverer of the achorion of favus named after him. A few years before Schönlein, Remak had asserted that the favi are not composed of the same elements as other pustules; but Schönlein first demonstrated the fungus and called it oidium, which name Remak subsequently changed into achorion Schönleinii. It was not long before investigators endeavored to explore the disease in all directions by inoculating the fungus on themselves, on others, and on animals, as well as by its artificial propagation in suitable nutritive fluids.

The falling of the hair was accounted for by Gruby<sup>2</sup> by the fact that he had seen, though rarely, the threads of mycelium extend into the roots of the hair; thereby the hair was said to soften and split longitudinally. Subsequently Wedl,<sup>3</sup> after treating it with concentrated potash lye, found in the interior of the hair, a little way above and below its emergence through the skin, threads of mycelium which, however, did not penetrate as far the root. G. Simon,<sup>4</sup> in his sections of the skin affected with favus, saw the fungi only rarely penetrate downward between the hair and the interior root sheath; in most cases they extended merely as far as the opening of the hair-follicle. He never observed them to reach down to the root. To explain the cutaneous atrophy, G. Simon as-

<sup>1</sup> "Zur Pathologie der Impetigines." Müller's Arch., 1839.

<sup>2</sup> Müller's Arch., 1842.

<sup>3</sup> Ztschr. d. k.k. Gesellsch. d. Aerzte zu Wien, 1849, p. 643.

<sup>4</sup> "Hautkrankheiten," 1851, p. 330.

sumes partial wasting of the substance of the cutis by inflammatory-hyperæmic conditions of the skin, as well as by mechanical compression by the felted fungus growing downward.

M. Kaposi<sup>1</sup> states that he had seen, in hair extracted from favus patients, threads of mycelium in the hair bulb and the root sheaths, as well as in the hair itself above its emergence through the skin, although he admits that the cuticula of the hair may for a great length of time energetically resist the penetration of the fungi.

Götte<sup>2</sup> found "that in favus the growth of most of the hairs is not interrupted, but only their advance through the skin, so that the shaft, steadily increasing in length, winds in irregular bends within the inner sheath (the inner one is soon lost) without our being able to speak of adhesions at the several points of bending."

Remy states that in favus the fungus is seated only between the two epidermis layers and frays out the hair without penetrating into it. From the corneous layer the fungus extends into the papillary layer. The scutula of favus may give rise to lymphangitis. The conidia do not penetrate into the vessels.

According to Hoggan, the achorion penetrates between the epidermis and the connective tissue part of the hair-follicle, separating the two layers. In round plates it grows into the surface, and destroys the connective tissue portion of the hair-follicle and of the root sheaths. The fungus grows into the corium with sprouting forms of spores, the falling elements of which form the crusts.

Unna<sup>3</sup> found, on examining a piece of scalp with favus which had been preserved for several years in alcohol, that both the hair bulb and the entire external root sheath, as well as the whole prickle-cell layer of the rete, are altogether free from fungi, while already at the point of exit of the hair (funnel of the hair sac) the fungus, proliferating only in the corneous cell layer, penetrates both into the cuticula upward and downward with destruction of the medulla and cortex, and into the internal root sheath. The hair shaft has lost its smooth contour; it is as if frayed out, filled with fungi. Secondly, through the pressure of the scutulum, there ensue an early flattening of all the prickle cells and almost complete absence of the granular layer. In the sub-papillary cutis layer Unna found dilatation of the vessels, around which the rather firm connective tissue is densely infiltrated with cells. The cellular infiltration attains its highest degree around the funnel of the hair sac and the efferent ducts of the sweat glands; nowhere does it penetrate into the middle layer of the cutis. Besides, he found in several places a cystic degeneration of the hair-follicle containing a spirally twisted hair, and in the efferent ducts of the sweat glands a like degeneration which commences in the cutis, with finely granular as if coagulated contents, probably of inflammatory origin. Strange to say, the sebaceous glands were almost completely absent so that their atrophy appears very probable, while as many as six hairs here and there sprang from one and the same follicle.

Aubert<sup>4</sup> absolutely denies the penetration of fungi into the substance of the hair; on the other hand, owing to nutritive disturbances of the hair, a peculiar dissociation of the hair elements occurs, by which air enters, rendering the affected portions of the hair opaque and black under the microscope with refracted light, while they appear with glossy streaks with reflected light.

The alterations of the skin produced by trichophyton tonsurans are much more vari-

<sup>1</sup> Hebra and Kaposi, "Hautkrankheiten," ii., p. 608.

<sup>2</sup> Arch. f. mikroskop. Anat., iv., p. 300.

<sup>3</sup> Vierteljahrschr. f. Derm. u. Syph., lxxx., p. 170.

<sup>4</sup> Ann. d. Dermat., 1881, p. 43.



able than the favous affection characterized by the formation of scutula, and hence their etiological connection was not recognized until late.

In 1844, Gruby<sup>1</sup> communicated to the Paris Academy of Sciences the finding of fungi in herpes tonsurans. Two years before<sup>2</sup> he had found in mentagra (sycosis) another parasite which he had described under the name of mentagrophyte. At about the same time, Malmsten, of Stockholm, also demonstrated the fungus in herpes tonsurans. Gruby named the fungus which develops in the root of the hair and then penetrates into its interior, in other cases again surrounds the hair like a sheath, rhizophyte, and distinguished it from mentagrophyte. Malmsten termed the fungus of herpes tonsurans, trichophyton tonsurans.

In Germany, v. Bärensprung<sup>3</sup> furnished a very good description of the clinical picture as well as of the fungi of herpes circinatus and tonsurans; but he denies the existence of a parasitic sycosis. In the same way he reports cases of transmission of herpes tonsurans from animals to man, and the reverse. Before that, Fehr and especially Letenneur<sup>4</sup> had reported similar cases of transmission to man of a depilating eruption covered with white scales, occurring in spring on the neck of young cattle, particularly after the winter's stabling, and presenting the picture of herpes circinatus et tonsurans.

Sycosis parasitaria has received a thorough clinical and anatomical description by Köbner,<sup>5</sup> who also clearly demonstrated the trichophyton in pathologically altered nails; Köbner<sup>6</sup> furthermore was the first to furnish the stringent proof that the disease described by Hebra as eczema marginatum is an affection caused by the trichophyton.

One of the most disputed points in the dermatomycoses is the question of the origin of the fungi, some authors maintaining that both achorion and trichophyton and even microsporon furfur are but modifications of one and the same fungus; F. v. Hebra,<sup>7</sup> an adherent to the former view, states that after employing moist compresses and dressing, he had observed the occurrence sometimes of favus, sometimes of herpes tonsurans, sometimes again of both affections at the same time; furthermore, that besides favus, rings of herpes tonsurans appeared on one patient; pityriasis versicolor is to be looked upon as the earliest stage of development of the same fungus. Hallier has also endeavored to support this view by his culture experiments, asserting that from penicillium glaucum he had by cultivation secured sometimes the achorion, sometimes the trichophyton.

In most recent times the unitarian derivation of the three fungi of the skin has received a defender in Grawitz,<sup>8</sup> on the strength of culture experiments. All three showed an exact parallelism in their fructification which is like that of the oidium lactis; all three are morphologically identical both among themselves and with oidium lactis. After subepidermal inoculation with pure cultivated favus, herpes tonsurans, and pityriasis versicolor fungi, as well as with simple oidium lactis,<sup>9</sup> Grawitz witnessed the occur-

<sup>1</sup> Comptes rendus, 1844.

<sup>2</sup> Comptes rendus, 1842.

<sup>3</sup> Annalen d. Charité, vi., 1855.

<sup>4</sup> "Reflexions sur l'herp. tonsur." Nantes, 1852.

<sup>5</sup> Virchow's Arch., 1861, Bd. xxii.

<sup>6</sup> "Klin. u. experim. Mittheilungen," Erlangen, 1864.

<sup>7</sup> Ztschr. d. k. k. Ges. d. Aerzte, Vienna, 1854.

<sup>8</sup> Virchow's Arch., Bd. lxx.

<sup>9</sup> Experimental inoculations with oidium lactis produced in Prof. Köbner small painful pustules, and no results in myself.

rence of reddening, then small circles of vesicles subsequently showing largely confluent circles, together with itching; in two or three weeks healing ensued by desquamation. He did not succeed in producing favus and pityriasis versicolor.

The advocates of the specific difference of the fungi likewise base their assertions on experimental inoculations. Thus Köbner<sup>1</sup> proved that by inoculations with trichophyton he had never produced anything but trichophytinous affections, at no time favus or pityriasis versicolor. After inoculation with achorion he saw circles of vesicles resembling herpes circinatus which, after a brief existence, either desquamated and perished or else led to the formation of a central scutulum; never did true herpes tonsurans or parasitic sycosis, etc., develop from it. After inoculation with the fungus of pityriasis versicolor only pityriasis versicolor resulted.

Although the various dermatophytes, especially achorion and trichophyton, are not so constituted as regards size, shape, and arrangement as to be microscopically differentiated from each other, still frequently enough the microscopic differential diagnosis can be made by the general appearance of the preparation (predominance of one or other fungus constituent, epithelium, fat, quantity of bacteria, etc.). Even the most complete morphological resemblance of the dermatophytes does not suffice to identify them when they show themselves functionally dissimilar. The forms of the fungi living parasitically on the skin, which consist only of mycelia and conidia, appertain besides to many other fungi living parasitically which, when living as saprophytes or otherwise free in nature, show more highly differentiated forms of fructification and sexual organs. Up to the present time, these forms have not yet been found for the dermatophytes in question.

The source of the infection with fungous affections in many cases is to be sought in like or similar affections of animals. Thus favus is a very frequent disease in mice and rats; from the mice it is transmitted to cats, and from these to men, especially children. Aubert<sup>2</sup> calls attention to the fact that lesions must necessarily be present in order to permit the effectual lodgment of the favus fungus. The more frequent occurrence of minor injuries on the head, as well as the interchange of the head gear during play, are the causes of the greater frequency in boys than in girls. Rare as favus is in Germany, it is incomparably more common in certain districts of France; furthermore, in Scotland (Anderson), in Italy (Dubini), in Denmark (Bergh),<sup>3</sup> where about one-third of favus patients are adults; in the same way, Poland and Galicia are the chief nurseries of favus. In the United States, favus is not rare. Inasmuch as the occurrence of favus is always due to some infection, dirt, lack of cleanliness, defective care of the skin, cohabitation, and living in narrow quarters play only a secondary rôle. In the dust deposited from the air of hospital wards containing favus patients, the conidia of favus could frequently be demonstrated, and thus can be explained the cases in which favus arose after the application of moist compresses changed at long intervals (Hebra), as the moisture and warmth are apt to soften the epidermis deep enough to permit the further development therein of the conidia of achorion present in the wash or the air.

Dermatomycosis trichophytina is in general much more frequent and more uniformly

<sup>1</sup> "Klin. u. experim. Mittheilungen," Erlangen, 1864.

<sup>2</sup> Ann. d. Dermat., 1881, p. 293.

<sup>3</sup> Bergh, basing on the experience that, in case of the coinfection with the comb and other articles, there is frequently no infection with favus from one affected child to its healthy brothers and sisters, is inclined to assume a special disposition to the development of the mycosis in isolated individuals, which perhaps may be due to some peculiarity of the sudoral (Remak) or sebaceous secretion. ("Beretning fra Almindelig Hosp.," ii. A. el. for 1877, p. seq.)



distributed over the various countries. In France, especially in Paris, an exceedingly large number of children are affected with herpes tonsurans; London, too, has no lack of such individuals; and while in Germany trichophytosis corporis is not exactly rare, cases of herpes tonsurans of the head are extremely rare. Perhaps the continual wearing of hoods by little children in Paris allows the fungus, more plentiful there, to take root more easily; perhaps the system in vogue there of gathering somewhat older children into educational institutions as alumni gives occasion for more extensive simultaneous infection with favus. Cazenave (1840) reports a spread of the affection in one educational institution to sixteen children within a short time. Eng. Mahaux<sup>1</sup> reports a like trichophytin disease extending from year to year in its various forms among the young men levied for military exercises. Not rarely a minor epidemic may be traced to barber shops.

Correspondingly frequent is sycosis parasitaria; in Paris it is of daily occurrence. In Berlin, too, sycosis parasitaria is not very rare. An unexplained fact which has struck many observers, is that trichophytosis, even when quite extensive on the body and beard of adults, spares the hairy scalp.

Herpes tonsurans is a rather frequent disease in animals (horses, dogs, cats, and calves). According to Megnin,<sup>2</sup> teigne tondante in horses is characterized by the cutaneous surfaces being covered with overlapping crusts which consist of small epithelial scales; the hairs are broken off, projecting barely 1-2 mm. above the skin; the spores are light brownish. In calves the affected portions are quite smooth, the hairs not broken, but fallen out in toto; the fungus proliferates both in the follicle and in the adjoining layers of epidermis, not in the hairs. The falling of the hair, as well as the detachment of whole layers of epidermis, give to the herpetic surface an ulcerated appearance. The fungi have yellowish conidia of 5 to 6 micromill. diameter; the conidia of herpes tonsurans in horses are about 2 to 3 micromill. in size. Gerlier<sup>3</sup> makes a distinction between trichophytosis of horses and that of cattle; the former is often epidemic, very contagious, and stubbornly resists treatment; the latter is not so readily transmissible, more easily curable, has even considerable tendency to spontaneous recovery, it most readily extends to the herders, and the trichophytosis of man derived from it is endemic in cattle-raising districts.

The most frequent, particularly in Northern Germany, and most international of the dermatomycoses is pityriasis versicolor. The cause of this is obscure, especially because it is not easily transmissible; perhaps the small amount of inconvenience to which it gives rise, and the consequent slight interest taken by the patients as regards treatment, account for this, at least in part.

The examination for fungi is made by scraping away with a knife enough epidermal scales; sometimes only the deeper layers contain the fungus sought. The removed masses are placed on a slide and twenty to forty per cent potash or soda lye added. The covering glass having been placed over it, the preparation is brought under the microscope with a power of four hundred diameters or more. After the lye has been added, it is not desirable to wait too long with the examination, as when the thin scales are acted on for a great length of time, the clarification of the fungous elements becomes excessive, rendering their outlines indistinct. In the same way should be examined epilated hairs and their stumps which, after prolonged (one to twenty-four hours) maceration in lye and subsequent teasing into the finest fibrils, furnish the most beautiful preparations.

<sup>1</sup> "Recherches sur le trichophyton." Bruxelles-Paris, Delahaye. Thèse, 1869.

<sup>2</sup> Ann. de Dermat., 1880, p. 102

<sup>3</sup> Lyon médical, 1881, No. 18.

Glycerin clarifies the specimens too much, but strong acetic acid, used like the lye, can be employed to advantage. When the epithelial scales are very full of fat droplets, some ether and alcohol are added to them while dry, allowed to evaporate, and then either potash lye or, after treatment with acetate of potassium and rinsing in water, some anilin color (as for instance methyl violet, methyl anilin) to stain the fungi; but I rarely succeeded in obtaining very good and at the same time uniformly stained preparations.

#### FAVUS. DERMATOMYCOSIS ACHORINA.

Favus is characterized by various-sized (from a pin-head to a penny or larger), roundish, sulphur yellow, dry, friable plates. These scutula, so called, have a cup-like depression on their surface, and besides show in their centre a pointed excavation which usually corresponds to the emergence of a hair; their lower surface is irregularly uneven, convex, and corresponding to the irregular elevations and depressions of the rete in which they are imbedded. They are distinguished by a peculiar mouldy smell which is often compared with the odor of mouse dirt. The affection preferably attacks the hairy scalp, especially of younger persons, but other parts are not exempt. Its duration is usually very prolonged and relapses are frequent.

Favus begins with reddish spots of round form and various size. These have at their periphery a circle of vesicles<sup>1</sup> not always clearly defined (herpetic premonitory stage, Köbner); soon a moderate branny desquamation ensues in their centre. Usually after from two or three weeks we see around the hair an exceedingly small, yellow, cupped crust sunk into the skin—a typical miniature scutulum. The favus cup now grows uniformly in a peripheral direction so as to form a larger plate, becoming at the same time more superficial and projecting above the skin. This form, in which the single scutulum remains clearly apart and isolated, is called favus urceolaris s. isolatus, lupinosus. This is the usual manifestation of favus on the trunk or the extremities; when recent, it is not rare even on the hairy scalp.

By the simultaneous development of the same process on several points in the neighborhood, it finally comes to pass that the single scutula touch at their margins and eventually coalesce. This form is called favus squarrosus. Here, too, after a longer existence the scutula lose the sulphur yellow color and cup-like depression peculiar to the isolated plates. The crusts become paler, to a dirty grayish-white, very dry, wrinkled and friable, and accumulate in irregular, more or less elevated eminences. Through slight mechanical interference such as scratching, whole pieces of the dry crusts fall, together with the hairs inserted in them. The epidermis thus exposed, at first reddened and somewhat tumefied in appearance, at times also slightly moist, soon becomes smooth, here and there depressed, looking like an atrophic cicatrix, of a dull-gray color.

With the development of the scutula the hairs, around which the cups mostly form, are also drawn into the pale of the pathological process. The hair is nearly always perfectly preserved, apparently normal in shape, but it splits very easily and is readily pulled out; it is of a dull, gray, dry, coarse aspect, and sometimes of a reddish color.

T. Simon<sup>2</sup> reports a case of atrophy of the skull, particularly in the neighborhood of the tubera

<sup>1</sup> St. Cyr (Ann. d. Dermat., I., p. 282) thus describes an accidental transmission of favus to his own hand: On a spot the size of a silver five-franc piece the epidermis is discolored yellowish, thickened, wrinkled, fissured; at the edge of this spot is a circle of the prettiest vesicles filled with clear serum, barely the size of a lentil or pea; on close examination one sees around the lanugo hairs yellowish, pin-head sized scutula, cupped in the centre as if pricked with a needle.

<sup>2</sup> Arch. f. Dermat., 1870, p. 541.