SYCOSIS:

PRIZE ESSAY FOR 1877 OF THE BELLEVUE HOSPITAL MEDICAL COLLEGE ALUMNI ASSOCIATION.

BY

A. R. ROBINSON, M. B., L. R. C. P. AND S., EDIN.,

SPECIAL PATHOLOGIST TO THE NEW YORK CITY ASYLUM FOR THE INSANE; ATTENDING PHYSICIAN TO THE BELLEVUE BUREAU OF OUT-DOOR POOR, CHILDREN'S DEPARTMENT; MEMBER OF THE NEW YORK COUNTY MEDICAL SOCIETY, OF THE NEW YORK DERMATOLOGICAL SOCIETY, AND OF THE AMERICAN DERMATOLOGICAL ASSOCIATION, ETC.

[*REPRINTED FROM THE NEW YORK MEDICAL JOURNAL, AUGUST AND SEPTEMBER*, 1877.]

NEW YORK:
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1877.

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SYCOSIS.[1]

Syn.: Sycosis barbæ (Celsus): mentagra (Plenck): dartre pustuleuse mentagre, herpes pustulosus mentagra (Alibert): folliculitis barbæ (Köbner): acne mentagra: lichen menti.

Definition.—Sycosis is a non-contagious inflammatory disease of the skin, characterized by its chronic course; its limitation to the hairy parts of the body, appearing chiefly on the bearded part of the face; its appearing in the form of papules, tubercles, or pustules, and the invariable perforation of those by a hair.

History.—The name sycosis appears frequently in the works of writers during the ancient and middle periods; but though they had certainly seen cases of our sycosis, yet their description of the disease designated by them with that term bears so little analogy to the symptoms of our sycosis, that they undoubtedly included different diseases under this term. The name sycosis first appears in the works of Celsus, Paul of Ægina, and Aëtius.

[1] Prize essay of the Alumni Association, Bellevue Hospital Medical College, New York, 1877.

Celsus (lib. vi., cap. iii.) describes it as an "ulcus quod a fici similitudine σύκωσις Græcis nominatur, quia caro in eo excrescit." The later Greeks, however (Aëtius, Paul), applied the terms συκα and ογκοι σύκωδεις to eruptions seated on the eyelids, as well as to the sycosis of Celsus. Celsus said it appears principally on those parts of the skin covered with hairs, and especially on the bearded part of the face ("maxime in barba"); but his description corresponds so little with the characters of our sycosis, that it is unlikely he was acquainted with the latter as a distinct disease. He distinguished two varieties of the disease: the one consisting of hard or round, and the other of moist and unequal ulcers with fœtid secretion: "Sub es vero duæ sunt species. Altera ulcus durum et rotundum est; altera humidum et inequale. Ex duro exiguum quiddam et glutinosum exit: ex humido pus, et mali odoris. Fit utrumque in iis partibus quæ pilis contegunter; sed id quod callosum et rotundum est maxime in barba: id vero, quod humidum, præcipue in capillo."

Paul of Ægina (lib. iii., cap. iii.) described it as an eruption of "round, red, somewhat hard, painful, and ulcerating tubercles of the face; and Aëtius (Tetrab. ii., serm. iv., cap. 14) mentioned it as a skin-affection, differing from acne in its greater tendency to ulceration, and in the nature of the secretion.

Plinius ("Nat. Hist.," lib. xxvi., cap. i.) described under the term "mentagra," instead of lichen, as previously used by the Greeks, a contagious disease which was brought from Asia to Italy in the reign of Tiberius Claudius by a Perusian knight, Quæstoribus Scriba, and which spread especially in Rome and its surroundings, and also, though in a less degree, in other parts of Italy, Illyria, Gaul, and Spain. According to Plinius (lib. xii., Epigr. 59; lib. xi., Epigr. 98 ad Basium, de importunis basiatoribus), it appeared especially among the rich, and owed its spread to certain social customs then prevalent. "Causing little pain, and without danger to life, it produced such hideous deformities, that death would have been preferable. With many of the subjects it did not remain confined to the chin, but occupied the entire face except the eyes, spread to the neck, breast, and hands, which it covered with

hideous scales. Females were not attacked by the disease. The treatment employed was so severe, that it produced cicatrices of even greater deformity than those naturally resulting from the disease."

From this description of the nature and the results of the disease, it is clear that the mentagra of Plinius was a very different disease from our sycosis, and that it was probably of a venereal nature. It is further evident that some forms of syphilis were frequently included in the description of sycosis by those ancient writers, since they speak of the latter as appearing on the anus ("nascitur in ano"); and from the considerable resemblance of some condylomata to the pulp of a fig, it is probable that the disease referred to by them as occurring in that locality was syphilis, and probably a broad condyloma.

Galen ("De Comp. Med.," lib. v.), in speaking of acne, described fig-like tumors ("de ficosis tumoribus") and other eruptions located on the skin ("de lichenosis in mento tumoribus" and "de menti tumoribus"); his description, however, is so incomplete, that, with the exception of the localization on the chin, it could be applied to almost any disease of the skin (Hebra).

From the physicians of the Arabian school, and from those of the middle ages, we have no clear description of sycosis, it being confounded with other diseases, and especially with syphilis. Even such physicians of the seventeenth and eighteenth centuries as Mercurialis ("De Morb. Curand.," Venetiis, 1601), Lorry ("Tract. de Morbis Cutaneis," Parisiis, 1777), and Sauvages ("Nosol. Meth."), contributed nothing to the subject.

Plenck ("Doctrina de Morbis Cutaneis," Viennæ, 1783) put mentagra in the class crustæ, and said: "Est pecularis scabies circa mentum in crustas abit." He recognized four varieties: M. venerea, leprosa, infantum, and Plinii, but, from his description of the different varieties, none of them corresponded to our sycosis.

Bateman was the first writer to give us certain correct ideas of our sycosis; and the majority of authors since his time have followed him, and have applied the term to designate that disease for which Bateman, and also the writers of the

present day, use the term, and whose characteristic nature I have already given you in the definition of the disease. The views of those different authors, including those of Bateman, will be given in that part of my essay devoted to a discussion of the etiology and nature of the disease. That disease, which since the time of Gruby has been called sycosis parasitaria, will be discussed in the part devoted to the differential diagnosis of the disease.

Symptoms.—Sycosis appears only on those parts of the body which are supplied with hair, and is almost always confined to the bearded part of the face; hence the name sycosis menti. Sometimes the eruption is confined to the upper lip, at other times to the side of the chin, or a part only of the submaxillary region. It has been observed on other parts of the body as well as on the face, though its appearance elsewhere is rare. The parts most frequently attacked after the bearded part of the face are the eyebrows, then the scalp, and, lastly, the other hairy parts of the body, especially the axillæ and pubis. I have seen but two cases of sycosis of the scalp, in both of which the affection was also present on the face. In one of the cases eczema of the scalp preceded and accompanied the sycosis; in the other, the sycosis invaded the scalp by extension *ex contiguo* from the beard. This latter patient had an exceedingly severe attack of the disease, producing destruction of tissue, and leaving cicatrices as extensive as in many cases of lupus. Except in such cases as this latter, in which the disease spreads *ex contiguo* from the bearded part of the face, sycosis of the scalp will be found almost always preceded by a greater or less degree of some form of inflammation of this region, and generally by an eczema. Even when seated on the face, in the majority of cases, it has been preceded by a chronic moist or dry eczema. An eczema, however, does not precede or accompany the eruption in every case; sometimes only a chronic hyperæmia is present, and in a third class of cases there is nothing abnormal to be noticed in the skin previous to the outbreak of the eruption, although an irritable condition of the tissues, insufficient to produce inflammatory changes in the part, is present. This last statement will be defended when I discuss, later on,

the cause of the disease. When it appears primarily on the upper lip, it is usually preceded by a nasal catarrh, the discharge from the nose irritating the skin, and producing a congestion or an eczema, which, in its turn, is followed or accompanied by sycosis. Sycosis, situated in this region, mostly remains limited in area, and rarely extends to the cheeks. Nasal catarrh—a disease which differs from eczema only in having its seat on a mucous membrane instead of a cutaneous surface—has naturally the same effect on the tissues under the inflamed mucous membrane; consequently, sycosis is frequently combined with the nasal catarrh in those parts of the nasal mucous membrane provided with hair. Sycosis of this region differs from that of the beard only in the duration of the disease, sycosis in the nose disappearing upon cessation of the catarrh; or, in other words, the disease in that region is generally acute, disappearing upon subsidence of the catarrh, as, afterwards, there is not sufficient irritation to produce the disease; while sycosis of the beard is a chronic affection, continuing generally, unless properly treated, months, or even years.

Sycosis of the beard is generally ushered in with severe local symptoms. It is preceded or accompanied by a feeling of heat, smarting, and a painful, pricking sensation, with swelling or intumescence of the part. Sometimes the attack is so severe, and the local inflammation so great, as to produce swelling of the lymphatic glands in the neck. The eruption makes its appearance in the form of papules and tubercles of greater or less size, ranging from that of a millet-seed to that of a pea, which are isolated or collected in groups. In acute cases, and with the first outbreak of the eruption, the tubercles are generally seated near each other; but in chronic cases the local symptoms are not so severe, and the papules and tubercles are oftener isolated and fewer in number. In subsequent outbreaks new papules and tubercles appear, and, if seated in the same locality, may unite with the former ones and form connected infiltrations. This occurs only where the eruption is seated on parts thickly studded with hairs, and a considerable number of the follicles are affected by the inflammation. The eruption from a single

outbreak rarely appears over a large surface, but generally in patches of limited extent; the patches in subsequent attacks often occupying a different portion of the face from that during the preceding outbreak. The papules and tubercules are of a red color, somewhat conical in shape when isolated, and generally, though not always, raised above the level of the skin. These papules and tubercles increase in size, pus collects on the summit, and afterward the greater part of the papule is gradually converted into a pustule. The length of time occupied in the transformation from papule or tubercle to pustule differs in different individuals, in the different outbreaks of the eruption on the same individual, and in the different papules and tubercles which make up a single patch. For instance, in scrofulous individuals the pus formation proceeds slower than in robust individuals, though it is more abundant; in chronic cases the papules change slower than in acute attacks; and lastly, pus collects usually more rapidly in the perifollicular region of stiff hairs than in that of fine ones. Thus it happens that, when a patient presents himself for consultation, papules, tubercles, and pustules are found present in varying proportions on the affected part; and if the eruption has already lasted several days, the majority will consist of pustules. Each papule, tubercle, and pustule, whether raised above the level of the skin or not, is perforated through its centre by a hair. The perforation of the tubercles, papules, and pustules, through the centre by a hair is characteristic of the disease, and it is upon the presence or absence of this perforation that the greatest reliance is to be made in forming a diagnosis between sycosis and the other diseases liable to be confounded with it. If perforation is not present, then the disease is not sycosis. This affords a ready explanation why sycosis is confined to the hairy parts of the body, as perforation of the papules by hairs is necessary to constitute the disease. When the tubercles and papules have become pustules, which usually occurs in from two to ten days, a scab forms on their summit, if not prevented by shaving or some emollient application, both of which would remove or prevent the formation of any scab that might otherwise form. The scabs in uncomplicated cases are generally thin, slight,

and isolated, differing in this respect from those of impetiginous eczema, which are thick and form a large mass. Upon removal of the scab with the forceps, a circular funnel-shaped excavation is observed, having a hair exactly in the centre, and the base filled with pus. On account of the inflamed and irritable condition of the tissues surrounding it, great pain is caused in the extraction of the hair during the papular stage of the disease; but in that period of the pustular stage when the pus or serum which surrounds the follicle has penetrated the follicle-sheaths and separated the hair from its normal surroundings, or has destroyed those latter, as is generally the case in the pustular stage, no pain arises from extraction of the hairs, as they lie loosely in the follicle. In fact, if not extracted, the ever-increasing accumulation of pus around and within the follicle, and its subsequent movement to the surface through the space previously occupied by the hair-sheaths or the tissue immediately surrounding them, finally expels the hairs, and the part heals, with or without cicatricial tissue. The resulting cicatrices are sometimes flat, and sometimes raised above the level of the skin. If the pus has escaped through the opening of the follicle, the part will probably heal without a cicatrix forming. If, however, we do not extract the hair as soon as this can be done without causing much pain, and thus allow exit to the accumulating pus, there is danger of destruction of the follicle, and consequent permanent alopecia. If the hair remains until it lies loosely within the follicle, there is danger of the inflammatory products destroying the base of the follicle and the seat of origin of the hair. This condition of the hairs is met with only in an advanced period of the pustular stage; for during the papular stage the hairs are unchanged, and sit firmly within the follicle.

The amount of suppuration differs greatly in different subjects. In those of a strumous constitution it is much greater than in robust individuals. Sometimes the amount of suppuration and cell-infiltration in the skin is so great that complete destruction of the cutis, hair-follicles, sebaceous and sweat glands occurs, followed by cicatrices as extensive as in many cases of lupus. Such a destruction of tissue, however,

rarely occurs, and the only evil result generally of even a long-continued chronic sycosis is destruction of the hair-follicle and sebaceous glands, with consequent permanent alopecia. Even this, to any considerable extent, is not a frequent occurrence; yet a limited number of follicles are usually destroyed if the suppuration has been at all extensive and epilation not performed at the proper time. When the papules are isolated, and no eczema is present, the inflammation is limited to the immediate neighborhood of the follicles. The tissue between the pustules is therefore sometimes natural; but, as a rule, there is hyperæmia or a slight dermatitis, with desquamation, especially if the pustules are not too widely separated from each other. In cases of long standing this condition of chronic dermatitis is nearly always present, and increases the irritability of the skin. The area of surface occupied by the eruption at a single outbreak varies greatly. Sometimes it is very limited; at other times, and more especially in acute cases, it can occupy the entire cheek. In chronic cases often only a few isolated pustules make their appearance here and there, unaccompanied by the heat, pain, and swelling which usher in acute attacks. When seated on the upper lip, the eruption is generally limited to a small patch, not larger than a ten-cent piece, situated near the middle line, and nearer the nasal orifices than the mouth. If the patient does not shave, such a patch appears red, somewhat swollen, and covered with a crust. Upon removal of the latter, a few papules or pustules are found, each perforated by a hair, and a slight discharge is usually present. Such a patch is generally a combination of eczema and sycosis, shows but little tendency to spread, and is exceedingly rebellious to treatment, unless the nasal catarrh, from which it usually has its origin, is previously cured.

As I have already said, the papules, tubercles, and pustules are generally isolated; but sometimes they are collected, and accompanied by infiltration in the intervening skin and subcutaneous tissue. This occurs only when the affected part is provided with numerous hairs, or in acute attacks accompanied with considerable local inflammation. When they are thus united by infiltrations, papules or tubercles no longer arise in that region as long as the infiltration exists to any

considerable extent; but new pustules arise in the infiltrated tissue, and the pus, passing to the surface, becomes dried up, forming brownish or yellowish scabs, perforated with hairs. On removal of these scabs, we find underneath, as in the case of the scabs formed on isolated pustules, circular, funnel-shaped excavations, corresponding in number to that of the follicles, and each excavation is perforated by a hair. This circular, conical excavation, containing pus at its base, and perforated in its centre by a hair, is found in nearly all pustules present in this disease, whether isolated or collected, upon removal of the pus or scab from the surface. If the hair has been extracted in removing the crust—a not unfrequent occurrence, as the hair sits lightly in the follicle in this stage of the disease—then naturally it will not be seen penetrating the excavation. With this exception, however, this perforation by a hair is always present, and should be sought for in every case upon removal of the crusts or scabs, if there is any doubt about the correct diagnosis. Where the beard is allowed to grow, and the natural course of the disease is not interfered with, scales or scabs are always present during the pustular stage; but if the part is frequently shaven, their formation is prevented, though in other respects the symptoms of the disease remain unchanged. Papules, tubercles, and pustules, will be present as usual, and the perforation by a hair will be much more easily recognized than when scabs are present. When the hairs are finer, isolated papules are present, instead of tubercles and infiltrations. "Sometimes productions resembling placques muqueuses arise from the surface of the ulceration in the course of the disease, or the confluence of several deep-seated pustules may produce an abscess resembling an anthrax, having several openings on the surface. In other cases granulations appear on the surface, in the form of the caro luxurians" (Hebra, *l. c.*, p. 610). This statement of Hebra is more appropriate for cases of parasitic disease of the beard than for sycosis, since it is exceedingly rare to see such abscesses, or any granulations bearing any resemblance to the pulp of a fig, in the latter disease, while in the former they are not uncommon. Sometimes the pustular formation, especially in strumous or ill-fed persons, is so

great as to produce scabs similar to those in impetiginous eczema. In chronic sycosis, or, better said, in sycosis of long standing, there is more or less induration and thickening of the affected part, from the products of the constantly-recurring inflammation. We have thus seen that the eruption in sycosis differs in appearance in different subjects, according to the general condition of the patient, whether the hairs are strong or fine, long or closely shaven, and whether the papules, tubercles, and pustules, are isolated or collected.

Sycosis is a chronic disease lasting weeks, months, or even years, and is prolonged by successive outbreaks of the eruption arising before the previous one has disappeared. These successive outbreaks occur generally at intervals of from seven to fourteen days, and the eruption follows the same course as the first outbreak; therefore the description I have already given of the primary outbreak will answer for that of the subsequent attacks. A successive attack does not always appear on the same place as its predecessor, especially in chronic cases, different parts of the face being often the seat of different outbreaks of the eruption. A notable exception to this is the case of sycosis of the upper lip, where, as I have already mentioned, the disease shows no tendency to spread, but remains confined to its original seat for months, and even years. The disease in this region, however, is a combination of eczema and sycosis, the latter having its origin in the inflammation constituting the eczema. The eczema, in its turn, is produced and continued by the irritation arising from the nasal secretion in coryza passing over the affected surface. This nasal secretion irritates only a small portion of the upper lip, and unless some portion of the remainder of the tissue of the bearded part of the face is made irritable by other means, as shaving, cosmetics, heat-rays, etc., the tissue will not be disposed to the production of sycosis, and the eruption will remain limited to the only spot irritated. This affords an explanation why sycosis of the upper lip usually remains confined to the limited area I have already described.

Generally the disease is milder in summer than in winter. If cured, it is very liable to return in a few weeks or months, and especially in autumn. If recovery takes place spontane-

ously, it does so by the cessation of the successive outbreaks by which it was prolonged, and by the gradual healing of the pustules, and growth of new hair from those follicles not destroyed by the suppurative inflammation. There is always complete replacement of the lost hairs by new ones, except where the follicles have been destroyed.

I have given, in the foregoing pages, the natural history of sycosis with its usually long chronic course, sometimes lasting for thirty years, and its spontaneous termination in either complete restitution of the part to its normal condition, or in general or partial alopecia; and sometimes, though rarely, in destruction of the epidermis, cutis, hair-follicles, sebaceous and sweat glands, and substitution of those structures by cicatricial tissue. Divested of its unusual characters, sycosis may therefore be briefly described as follows: It is a chronic disease, confined generally to the bearded part of the face; it makes its appearance in the form of papules or tubercles, which after a few days become pustules, and each papule, tubercle, and pustule is perforated through its centre by a hair. This eruption, after having completed the pustular stage, disappears, and is succeeded by a new eruption similar in all respects to the primary outbreak, and is in its turn succeeded by a similar eruption, and so on, so long as the disease continues to exist. Upon cessation of the disease the part regains its normal character and appearance, except a slight partial alopecia from destruction of a few hair-follicles.

Etiology and Nature.—In giving the history of the disease, I quoted not only the names of the writers previous to the time of Bateman who made use of the term sycosis, but also gave their descriptions and views of the nature of the disease referred to by them under that term. From their descriptions it follows that, if they included our sycosis under that term, they confounded it with other diseases, and especially with syphilis, since their descriptions correspond with no one special disease known to dermatologists of the present day. Since the time of Bateman, however, the majority of authors agree in the use of the term sycosis, as applied to the disease whose symptoms I have already described. I have, therefore, reserved for this part of my essay a statement of

the views of those writers on the nature and cause of the disease, at the expense of leaving the part devoted to the history of sycosis incomplete, since I wished to discuss the correctness of some of them, after giving the results of my own observations, and the views I have formed from them. I will first give the views of those authors, and return to a discussion of them, when stating the conclusions I have formed from my own studies.

Bateman ("A Practical Synopsis of Cutaneous Diseases," 7th ed., London, 1829, p. 403) classed it with acne, among the tuberculæ, and accepted the two species of Celsus (Sycosis menti et capilitii). He believed it is an inflammation of the hair-follicles and sebaceous glands, and that it differs from acne indurata in its seat being exclusively on the bearded part of the face; by the softer, more numerous, and clustered tubercles, and by the ulceration which they tend to produce; also from the porrigo of Willan, by the nature of the tumors, age of the patient, and absence of contagion.

Alibert ("Précis Théorique et Pratique des Maladies de la Peau," tome i., Paris, 1818, p. 263) was the first who said that sycosis approaches acne in its nature, and treats of it under the title, Dartre pustuleuse mentagre; also Herpis pustulosus mentagra. He classed it with his species varus, which included the diseases of the sebaceous glands. He believed that the situation, the apparent similarity of cause, the course of the disease, and the age of the patient, show their close relation. He believed that it is an inflammation of the sebaceous glands and hair-follicles, caused by the use of bad razors, or from suppressed hæmorrhoidal flow. He mentioned, also, that it sometimes spreads to the mucous membrane of the mouth, where no hair-follicles exist!

Cazenave ("Abrégé Pratique des Maladies de la Peau," 4th ed., Paris, 1847, p. 312) put it in the order "pustulæ," and denied its contagious nature. Before 1841 he said it follows general inflammation of the skin, but since that time that it is an inflammation of the hair-follicles, and arises from the use of bad razors. He believed it is a pustular disease, and that any papules or tubercles present are secondary to the pustules.

Rayer ("Traité Théorique et Pratique des Maladies de la Peau," tome i., 2d ed., Paris, 1835, p. 661) classed it with the acne eruptions, and said it arises from exposure to high temperature, and from the use of bad razors.

Plumbe ("A Practical Treatise on the Diseases of the Skin," 4th ed., London, 1837, p. 91) said it is nothing more than acne, or follicular obstruction and its consequences, occurring on parts covered with hair, and differs from acne only in the existence of hair on the part, and its consequence in aggravating the disease. He gave a very good description of the disease, and was the first to recommend epilation in the treatment. He believed it to be an inflammation of the hair-follicles and sebaceous glands, and drew attention to the invariable perforation of the papules by a hair.

Bazin ("Affections Cutanées de Nature Arthrique et Dartreuse," 12th ed., Paris, 1868, p. 226) thinks there are five kinds of sycosis, viz.: Artificial, parasitic, syphilitic, arthritic, and scrofulous. He denies the existence of the microsporon mentagrophyta, and says the fungus found in the so-called parasitic sycosis is that of tinea tonsurans. The syphilitic and scrofulous varieties he regards as cases of pseudo-sycosis, because the inflammation is not limited to the hair-follicles. In true sycosis, he says, the inflammation is limited to the hair-follicle, and does not extend to the subcutaneous tissue. He believes the predisposing cause of cases of true non-parasitic sycosis is either an arthritic or scrofulous condition of system, and the exciting causes anything that irritates the skin, as cosmetics, heat, shaving with dull razors, etc.

Küchenmeister ("Die in und an dem Körper des lebenden Menschen vorkommenden Parasiten," Leipzig, 1855) said all cases of sycosis are parasitic.

Hebra ("Lehrbuch der Haut-krankheiten," Bd. i., zweite Lieferung, zweite Auflage, Erlangen, 1874, p. 605) places sycosis among the acne eruptions, of which he gives three varieties: Acne disseminata, acne mentagra seu sycosis, and acne rosacea. He says it is a local disease of the hair-follicles, the cause of which is unknown. He gives an excellent description of the disease, and always denied the existence of a parasitic sycosis. Last year, however, he saw a "typical case" of

the *sycosis parasitaria* of authors, and it is probable he no longer denies its existence.

Tilbury Fox ("Skin-Diseases," 2d American edition, New York, 1873, p. 502) calls it a parenchymatous inflammation of the hair-follicles, with the ordinary results of long-continued congestion. He says it is an independent morbid state of the actual hair-follicle itself, the cause of which is doubtful, though external irritants, as shaving and long-continued exposure to heat-rays, can produce it in persons "out of health."

Nelligan ("Diseases of the Skin," 4th American edition, Philadelphia, 1864, p. 275) considered all cases of sycosis as parasitic.

Wilson ("Lectures on Dermatology," London, 1871, p. 136) says it is an inflammation of the hair-follicles. There are several varieties of the disease, and among them is observed the phytiform degeneration of the epithelium consequent on deranged development and nutrition of the tissue.

Hutchinson ("London Hospital Reports," vol. iii., 1866, p. 389) denies the existence of a parasitic sycosis.

McCall Anderson ("Eczema," 3d ed., London, 1814, cap. xii.) describes under the term eczema pilare faciei appearances which correspond exactly with those of sycosis; yet he says it differs from the latter in being simply an extension of the eczema to the perifollicular region, while sycosis consists in small abscesses and tubercles.

Baudet ("Traité des Affections de la Peau," Paris, 1869, p. 94) says it is an inflammation of the hair-follicles depending on an arthritic constitution. He believes that a sycotic eruption, whether arthritic or parasitic, can be converted into a syphilitic or a scrofulous eruption if the patient, while affected with sycosis, becomes syphilitic or scrofulous.

The other French writers, as Chausit, Rayer, Duchenne, Dupare, Gibert, Rochard, Divergie, Giubout, etc., have contributed nothing worthy of special mention.

Wertheim (*Zeitschrift der k. k. Gesellschaft der Aerzte*, 1861) made use of the microscope in studying this disease, but only with the object of confirming previously-conceived ideas of its nature and cause. He argued thus: Since a

hair is always in the centre of every pustule, and pus always follows the extraction of such a hair, therefore the hair-follicle must be the seat of the inflammation. Every such follicle will therefore inclose an abscess with its sheaths, and every pustule is a metamorphosed hair-follicle. As sycosis appears but very rarely on other parts of the body than that of the bearded parts of the face, therefore the cause of the disease must be in the anatomical character of the hair-follicles of this region. Believing in those conjectures, he examined the structure of healthy hair-follicles taken from different parts of the body. From these studies he found that in the beard the hair has a greater diameter, in comparison with the diameter of its sheaths, than in any other part of the body. As the pus reaches the surface by destroying or pushing aside the external and internal root-sheaths, therefore, when the hair-follicle is inflamed, the pus has much more difficulty in reaching the surface when the hair is thick and the sheaths thin, than when the hair is thin and its compressible sheaths thick. On account of the resistance which a thick hair offers to the immediate evacuation of pus, the latter collects, and an abscess is formed.

Köbner ("Klinische und experimentelle Mittheilungen aus der Dermatologie und Syphilidologie," Erlangen, 1864, p. 13) was the first to give any description of the changes which take place in the hair in sycosis. He names the disease folliculitis barbæ, and says it has no connection with acne, but is an idiopathic inflammation of the follicle, which inflammation is the cause of the nutrition changes which take place in the hair. This inflammation may be produced by changes of temperature as well as from chemical and mechanical irritants. He examined hairs extracted in different stages of the eruption, but did not make any microscopical examination of the diseased follicles *in situ* or otherwise. The changes outside the follicle he regards as consecutive to those taking place within it. He says that first the external and then the internal root-sheaths swell, their cells become enlarged, increase in number, divide, and finally are partly transformed into pus and detritus. The hair itself is not changed at first, but later it loses its connection with the follicle, the bulbi swell two or three times their normal size, and

become infiltrated with a sero-purulent fluid. According to Köbner, the primary changes therefore take place in the external and internal root-sheaths. The cause of the perifollicular inflammation, he finds, lies in the anatomical construction of the part, in its richness in blood-vessels and nerves, and the deep situation of the follicles.

Since the time of Bateman, therefore, the disease has been regarded by almost all writers as an inflammation of the hair-follicles, produced by irritating agents. Wertheim and Köbner were the only writers who studied the disease with the aid of the microscope, but they examined only hairs extracted from the part affected, and not the whole tissue affected; i. e., they did not examine the affected part itself.

In my own studies upon this subject I examined portions of skin taken from the living subject and affected with the eruption in its different stages, and have followed the process from its commencement to its termination, either in complete restitution of the parts, or in greater or less destruction of the skin of the affected region.

I will now describe the various pathological changes which take place in this disease, and show the incorrectness of the views of the authors I have quoted. I will first describe the changes which take place in a case of sycosis, uncomplicated by an eczema or dermatitis.

The first changes which take place occur around the follicle, in the peri-follicular region. The usual changes which occur in vascular connective-tissue inflammations are here met with. An increased amount of blood is sent to the peri-follicular region, and the blood-vessels of the part become dilated and filled with accumulated blood-corpuscles. Some of those escape (pass outward), and directly pus-corpuscles (previously white blood-corpuscles) are found outside the vessels, especially around the base of the follicle; but scattered corpuscles are found lying as high as its neck. Sometimes a rupture of a blood-vessel occurs very early in the disease, and a greater or less quantity of red blood-corpuscles appear in the neighborhood of the ruptured vessel. In one case the blood-vessel of the hair-papilla was ruptured, and the papilla partly filled with extravasated red blood-corpuscles (*see* Fig. 1). As occurs

in any similar inflammation, the pus-corpuscles rapidly increase in number, either by the outwandering of more white blood-

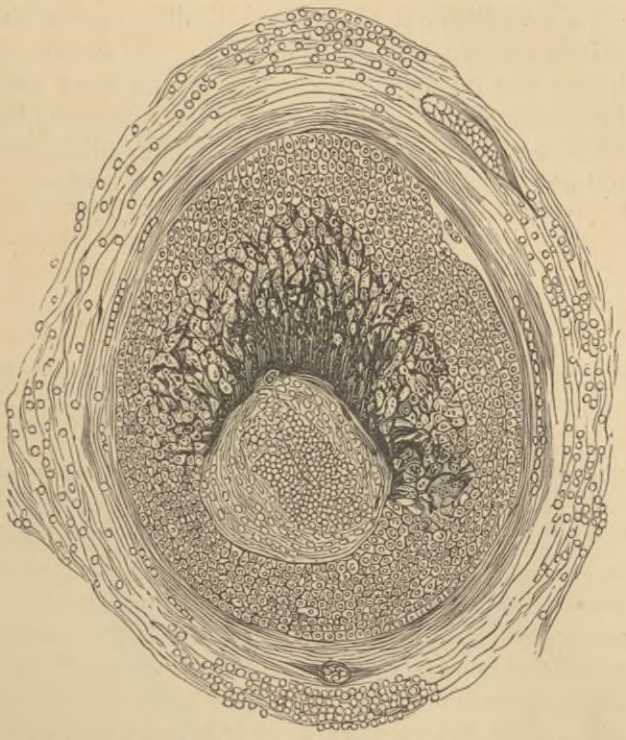

Fig. 1 is a section through the hair-bulb, on a level with the papilla, and represents the earliest stage in the disease. The blood-vessel of the papilla is ruptured, and blood-corpuscles have been extravasated. The cells forming the hair-root are still perfectly normal, but pus-corpuscles are present in the peri-follicular region. From a case of uncomplicated sycosis.

corpuscles from the vessels, or from division of those already outside, or by both processes combined, and soon surround the base of the follicle; while along its sides, between the fundus and the neck, the blood-vessels are much dilated, though only few pus-corpuscles are found in the tissue surrounding them (*see* Fig. 4). With this outwandering of formed elements there is the usual transudation of serum, which penetrates the tissue and the hair-follicle; but, beyond the action of this transuded fluid upon the follicle, there is not any change to be observed in the latter structure in the earli-

est stage of the disease. The changes, therefore, which occur during the early papular stage, take place primarily in the tissue surrounding the follicle, and show that the disease in the first stage is not a folliculitis, but a peri-folliculitis, *pure et simple.* As the inflammation proceeds and more pus and serum collects, the follicle and its sheaths become more and more affected. The latter become softened and more or less destroyed, and a portion of the surrounding pus may enter the follicle through the ruptured sheaths (*see* Fig. 2). The changes which occur

FIG. 2 represents a little later stage than Fig. 1. A large number of pus-corpuscles were present around the follicle, and the follicle-sheaths are ruptured. The cells of the hair-bulb are commencing to break down. This section is also made through the hair-root on a level with the papilla, and from a case of uncomplicated sycosis. The central part is the papilla, the next is the hair-root, and the external connective-tissue structure the follicle-sheaths.

within the follicle, prior to the rupture of its sheaths, are principally attributable to the increased amount of serum present. The cells of the external root-sheath become swollen, and some of the cells begin to break down. Similar changes occur simultaneously in the cells of the hair-root. Here the cells forming this part of the hair are soft, contain much protoplasm, and are therefore easily affected by external agents. They swell, the protoplasm becomes granular, their margins become indistinct, and there is evidence of commencing destruc-

tion. If the serum is rapidly effused, the cell bodies and their connecting substance may become indistinct, and only round

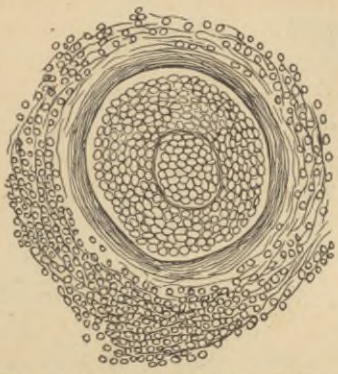

Fig. 3 is also a section from the same situation as the preceding ones, but is from a case complicated with eczema. Both the papilla and the root of the hair seem to be composed of round cells. In the papilla such is the case, but the appearance in the root of the hair is from the action of the serum on the cells of the part.

bodies appear where the epithelial-like cells of the hair-root previously existed. This change occurs especially in cases complicated with acute eczema or dermatitis. After the rupture of the follicle-sheaths, or even before, the cells of the hair-root and of the external and internal root-sheaths become rapidly broken up and changed by the serum which has entered the follicle, accompanied occasionally by the pus from the blood-vessels. If pus has entered them, the hair-root is infiltrated with a sero-purulent fluid. Very frequently, however, no pus enters the follicle, and then all the changes which occur in the follicle are caused by the serum alone. The cells of the external and internal root-sheaths undergo destructive changes, the cell-bodies and connecting substance are gradually destroyed, and a granular-looking mass containing roundish bodies (the nuclei of the former cells) is formed. This change is shown in Fig. 5, which represents the changes always found in the whole length of the external root-sheath in ordinary cases of sycosis. The cells of the hair-root undergo exactly similar changes to that of the external root-sheath, and at an earlier period than that portion of the sheath seated near the surface of the skin.

There is usually no purulent infiltration of the root; the

FIG. 4 shows a later stage than Fig. 2. Pus is present in great quantity outside the fundus of the follicle, and the follicle-sheaths and external root-sheath are partly broken down. Toward the neck of the follicle the changes are less and less. The cells of the root of the hair were more granular than normal, showing the commencement of the retrograde metamorphosis. This drawing shows exceedingly well the primary changes in the disease to be a peri-folliculitis.

appearance of pus-cells is deceptive; the round cells seen in the broken-down granular mass are the nuclei of the normal cells of the part. This can only be decided by sections through the hair-root, as examining the root of a hair extracted entire leads to the view that pus-cells are present in great number within the follicle. In this the pustular stage of the disease, the principal changes take place within the follicle; and, if a hair is extracted in this stage, it is found that the hair-root and the external and internal root-sheaths are broken down, and no longer possess their normal characters. The external root-sheath and the root of the hair exhibit the changes shown in Fig. 5, only that the root is more changed than the sheath.

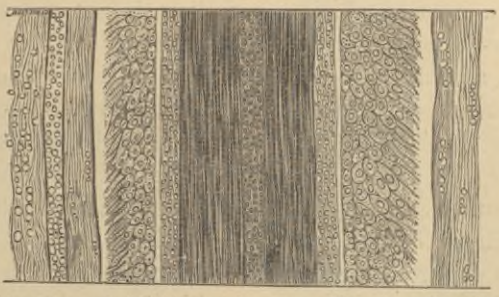

Fig. 5 represents a later period in the pustular stage. The cells of the external root-sheath and the soft parts of the hair are changed in the manner described in the text. I have here drawn only the portion of the shaft of a hair, but similar changes extend the entire length of the hair. It is in this stage, when all connection is severed between the external root-sheath and the follicle-sheaths, that the hair lies loosely within the follicle, and can be extracted easily and without producing pain.

The shaft of the hair being hard, and the serum consequently unable to act upon it, retains its normal character. As the disease progresses, the connective tissue around the follicle becomes infiltrated with pus-cells as far as the surface of the skin, and softened. If the hair is allowed to remain within the follicle until expelled by the accumulating pus, the external and internal root-sheaths and soft parts of the hair become completely destroyed, and only the hard part of the hair remains.

The follicle-sheath and the connective tissue in the perifollicular region are more or less destroyed, and the Malpighian layer becomes ruptured on a level with the upper part of the neck of the follicle. The pus reaches the surface by breaking

through the Malpighian layer, and does not pass between the hair-shaft and the follicle-sheath, as mentioned by Wertheim. When the follicle-sheaths are destroyed, and there is free connection between the peri-follicular pus and the follicle, a portion of the pus does pass to the surface through the space previously occupied by the external and internal root-sheaths. In extracting a hair during the pustular stage, sometimes the follicle-sheaths accompany the hair, but generally they do not. The cells surrounding the hair-papilla, and from which the hair is formed, seem to resist the inflammatory process longer than the other cells of the bulb, a circumstance which explains why permanent alopecia is not a more frequent consequence of sycosis. The cavity left after the extraction of a hair in sycosis, in a case in which the follicle is not completely destroyed, contains pus along the entire length of its walls and at its base, and the follicle sheaths are more or less destroyed. The structures, however, forming the base of the follicle are not completely destroyed, the papilla remaining, from which a new hair will grow. In those cases in which permanent alopecia results, pus is present in the cavity as in the former case, but the follicle sheaths and the base of the follicle are completely destroyed, making it impossible for a new hair to grow, as there is no longer a papilla from which it can be formed. Such a cavity is represented in Fig. 6. Here all the follicle structures have been completely destroyed. Such a cavity becomes obliterated by new-formed connective tissue forming a cicatrix. The whole process, therefore, in simple, uncomplicated sycosis is, first, a peri-folliculitis, then the follicle elements are acted upon by the inflammatory products, and notably by the serum, which causes destructive changes in the soft parts of the hair, and in the external and internal root-sheaths, by which their cells are so acted upon that the cell-body and connecting substance are first destroyed, and a granular mass containing round bodies, the nuclei of the fixed cells of the part, results. If the process continues a length of time, the round bodies also become destroyed, and a detritus only remains. In this latter stage, only the hard, corneous part of the hair remains of the structures which previously made up the hair and its sheaths. In those cases of sycosis in which

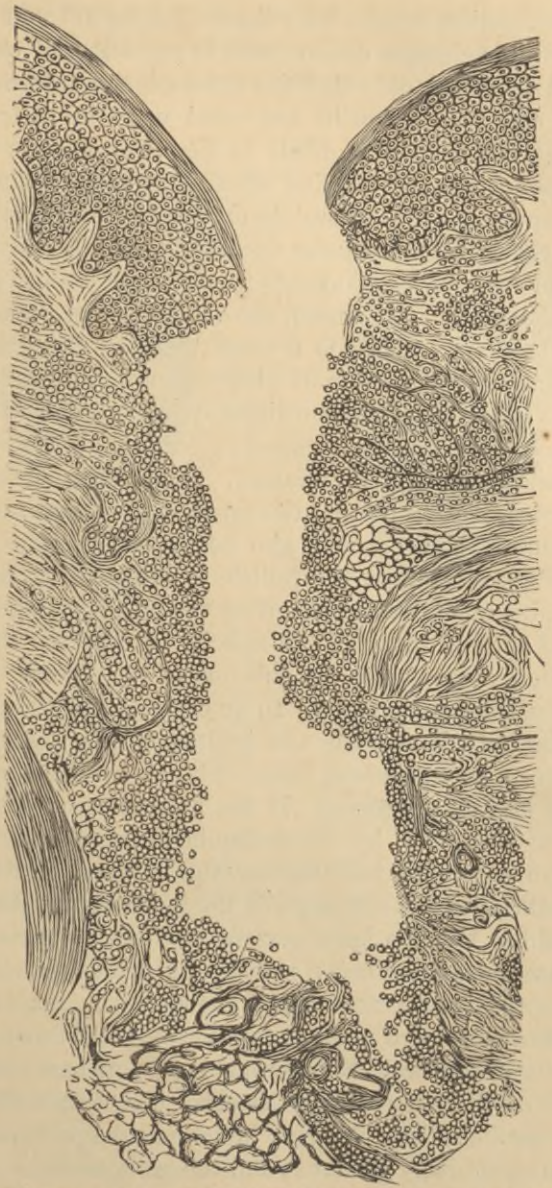

FIG. 6 shows the nature of the cavity left in the skin after expulsion of a hair in the latest stage of the disease, and where the destructive process had proceeded so far that the follicle is completely destroyed. There is no trace to be seen of any of the structures belonging to the follicle. Such destruction always produces permanent alopecia.

the inflammation extends from the surface, as when an eczema is present, the changes do not differ in any essential way from that just described, only that the external and internal root-sheaths and follicle-sheaths are acted upon in their entire length at the same time, while in simple sycosis the sheaths at the root of the hair are first affected, and the inflammation travels upward. If a general dermatitis is present, as in erysipelas, the follicle-structures become frequently changed in the same manner as in sycosis; but, as the limited peri-follicular inflammation is absent, the same clinical appearances are not presented. This is a proof that the changes within the follicle are produced from without, but it requires the peri-follicular inflammation to constitute sycosis. A hair will therefore present different appearances, according to the stage of the disease at which it is extracted. If a healthy, normal hair is extracted, it is found that the external root-sheath does not accompany it. This would also be the case in the earliest stage of sycosis, before the follicle is affected. If, however, we examine a hair extracted during the pustular stage, it will be found covered with the root-sheaths in different stages of destruction, according to the duration of the disease and the activity of the inflammation. In an early part of the pustular stage the bulb is swollen, and infiltrated with a serous, and sometimes a sero-purulent fluid. The root-sheaths will also be more or less destroyed. If the hair remains within the follicle until expelled by the accumulated pus, the destruction will have proceeded still further, the external and internal root-sheaths, and the soft parts of the hair, become destroyed, and nothing but the hard part of the hair remains intact. The sebaceous glands, being seated so near the hair, and being richly supplied with nerves and blood-vessels, may also become affected, though not at so early a stage of the disease as the fundus of the hair. Similar changes occur here to those in the cells of the external root-sheath. The endothelial cells become swollen, their margins indistinct, the protoplasm becomes more coarsely granular, and the cells become more or less destroyed. An early stage of these changes is seen in Figs. 7 and 8. The manner in which the connective tissue and its cells and the different gland elements are destroyed,

differs in no respect from the process of molecular retrograde metamorphosis of the different tissues, as given in works on pathological histology, consequently is not peculiar to sycosis,

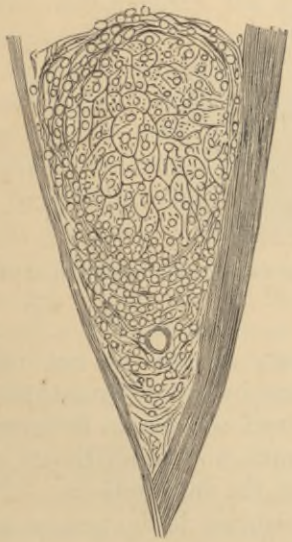

FIG. 7 represents an early stage of the changes which sometimes occur in the sebaceous glands. They become surrounded with pus, and the endothelial cells undergo the hanges I have described.

FIG. 8 shows the changes which occur in the sebaceous glands when they become entirely destroyed, as occurs in those severe cases of the disease which resemble a lupus in their results. The gland is surrounded with pus-cells, and the endothelial cells become changed to a granular mass containing fat-drops.

and need not be here further described. The sweat-glands, when affected, show similar changes, though these structures possess considerable immunity against external agents. In Fig. 9 the cells show commencing degeneration from the transuded serum. If, however, but little serum is present, as in some cases of chronic sycosis, the cells of the sweat-glands can remain normal even when surrounded with pus.

The changes which I have thus far described take place in cases of ordinary sycosis, and the results of the inflammation, even when of long standing, are nothing more than a temporary or permanent partial alopecia. In those severe cases, however, which resemble in their effects mild cases of lupus, the retrograde changes proceed further, and there is more or

less destruction of the hair-follicles, sebaceous and sweat glands, and of the other tissues of the affected part, and healing by

Fig. 9 gives the changes which are met with when the sweat-glands are surrounded with a considerable amount of serum.

cicatricial tissue. The inflammatory changes do not differ much from those which take place in simple sycosis; but the inflammation is more diffuse and chronic in its course. Pus collects in the epidermis and cutis, and those tissues are destroyed in the same manner as the follicle-tissue. The sweat-glands offer considerable resistance to the process, and consequently remain longer normal than the sebaceous glands (*see* Fig. 10). In Fig. 9 is shown a sebaceous gland almost

Fig. 10 shows the resistance the sweat-glands offer to pathological processes. Pus-corpuscles may be present in great number, as in this case, but, unless the quantity of serum is also abundant, the cells of the sweat-glands retain a long time their normal character.

completely destroyed by the retrograde metamorphosis. The connective tissue shows all the changes of a retrograde process,

as destruction of the connective-tissue bundles and the cells and nuclei of the part.

We thus learn that, in sycosis, the first changes take place in the peri-follicular region, and that the subsequent changes which occur within the follicle are due to the inflammatory process which has its origin in the surrounding tissue. There is never any change whatever to be observed in the cell-elements proper of the follicles previous to the changes taking place in the tissue surrounding them, i. e., the disease is primarily a peri-folliculitis.

To constitute an idiopathic inflammation of the hair-follicles, the primary morbid changes must take place in the elements of the hair or its follicle. In acne the first abnormal changes are supposed to take place in the cells of the sebaceous gland, or in their secretion, and any peri-glandular inflammation that may arise is secondary, and caused by the process which has taken place within the gland. If this view of the process in acne is correct, then the disease is, properly speaking, an affection of the sebaceous glands. In sycosis, however, the peri-follicular inflammation is not caused by any process occurring within the follicle, since the elements of the latter are perfectly normal until invaded by the inflammation from without. Even then those elements do not take an active part in the inflammation, and increase, and divide, as stated by Köbner, but are simply more or less broken up and destroyed, in the manner I have already described, by the inflammatory products from the blood-vessels passing into the follicle. A study of the whole process shows, therefore, that the disease is not primarily an inflammation of the hair-follicles, as has been generally believed, but a peri-follicular dermatitis.

Etiology.—Having completed the study of the nature of the disease, I will now proceed to discuss its cause. In the majority of cases, an eczema or superficial dermatitis precedes, and is to be regarded as a predisposing cause of, the disease. Sometimes, though there is no active inflammation present, the skin is harsh, red, and irritable. A temporary superficial irritation of the skin rarely, if ever, produces sycosis of the beard, provided the skin is otherwise in a normal condition

and the health of the patient good. When the hairs are not deeply seated, as, for instance, on the scalp, a superficial inflammation frequently extends to the follicular region, and produces all the changes peculiar to sycosis. In many cases of the disease, however, there has been no previous dermatitis, either of a catarrhal or other form, and even those parts of the skin situated between the pustules appear to be normal. In acute cases the eruption generally appears on limited areas, and is ushered in with pain and swelling of the part where the eruption will appear. Even when thus appearing, with acute symptoms, and on limited areas, a peri-folliculitis does not occur around every follicle situated within the affected area, but only surrounds a limited number.

In chronic sycosis the pustules are more isolated, and appear on different parts of the beard, with the same outbreak. However, whether the pustules are isolated or collected, and whether ushered in with acute symptoms or not, they do not appear continuously, but periodically, that is, the eruption appears in successive "outbreaks," with an interval of generally from seven to fourteen days between the successive attacks. I recall those clinical characters of the disease, as they will assist us greatly in studying the cause of the disease. In those cases where an eczema is present, the disease has been regarded by some writers as simply an extension of this disease to the peri-follicular region, without being influenced by anything which has occurred in the latter location. This is true of the majority of cases of blepharo-adenitis and sycosis, seated within the nose or on a part of the body such as the scalp, where the follicles lie near the surface of the skin, but such is rarely the cause of the disease when located in the bearded part of the face, where the follicles are so deeply seated. In the acute cases, when the eruption is on a limited area, the peri-folliculitis does not surround all the follicles, but only a few, and those often the deeply-seated ones, which would scarcely occur if the peri-folliculitis were simply an extension of the superficial eczematous inflammation to the deeper-lying tissue. In a case of sycosis of the scalp, once under my care, and which was preceded and accompanied by an eczema of this region, nearly every follicle of the affected part was sur-

rounded by the inflammation, and the follicles changed. In this case, and in similar ones, the sycosis was caused by the simple extension of the eczematous inflammation, first to the peri-follicular region and then to the follicles, and it ceased to exist as soon as the eczema disappeared. The superficial situation of the hair-follicles in this region favors an extension to them of the inflammation. By the use of croton oil, a sycosis can be produced on the scalp, in which all the changes I have described as taking place around and within the follicles occur. In chronic sycosis, where eczema is frequently present, the pustules are generally isolated, and few in number. If the disease were simply an independent extension of the eczema, it is probable that a greater number of pustules would be present, that they would be more collected, that there would be more general infiltration of the skin between the pustules, and, finally, that pus would be always found surrounding the neck of the follicle as early in the disease as it appears around the base. None of those conditions, however, are present, and the absence of the last-named one is proof absolute that the peri-folliculitis is not an independent extension downward of the eczema. Such a view could not be maintained one moment for those cases of sycosis where no eczema is present.

There must, therefore, be some exciting cause why this inflammation is limited to the peri-follicular region, and attacks only a limited number of follicles, and I will now endeavor to show that the direct cause is to be found in the irritation produced by the stiff hairs of the beard on the irritable skin-tissue. In cases of chronic sycosis, the skin is in an irritable condition, and especially the peri-follicular region, on account of its rich supply of blood-vessels and nerves. Such a part, when in this condition, easily inflames when irritated, and in the hairs of the beard we have a body so stiff that they can act like so many spears on the morbidly-sensitive skin. That movement of hairs causes great pain, when the skin is inflamed or tender, is common experience, and when they are stiff, like those of the beard, they can certainly produce a peri-folliculitis when this region is already irritable, especially when we bear in mind that traction upon a hair seated in a papule which is beginning to subside is sometimes sufficient to cause active in-

flammation in the latter again, and to become a pustule. The hairs, however, must be stiff or they cannot sufficiently irritate hence the rarity of a peri-folliculitis around fine hairs of the beard, at any period of life, and the still greater rarity of sycosis on those parts of the body supplied with fine hairs only. An eczema may, and often does, continue on those parts of the body, and the skin is in an irritable condition, but no peri-folliculitis occurs, as the hairs are not stiff enough to inflame the tissue. The reason, also, we have isolated pustules in sycosis of the beard is, that only a limited number of hairs irritate sufficiently to produce a peri-folliculitis. It is only the older and stiffer hairs of an affected part that are surrounded with inflammation, a proof, I think, that the exciting cause of the disease is the irritation produced on the irritable tissue by those bodies increasing the condition present sufficiently to cause actual inflammation. This irritation from movement of the hairs is not sufficient to produce inflammation in a healthy individual with normal skin, or sycosis would be a more frequent disease than it is. The skin, however, does not require to be actually inflamed before the hairs can cause a peri-folliculitis around them, for, as I have already said, sycosis sometimes occurs when no dermatitis is present. It must, however, be in an irritable condition, and as it is more irritable at one period than at another, and generally at somewhat regular intervals, this explains the periodical outbreak of the tubercles and papules, as at those times less irritation from the hairs is required to produce a peri-folliculitis.

The fact of the rare occurrence of sycosis on those parts of the body covered with fine hairs, when the part is affected with eczema, or in an irritable condition, is sufficient proof that upon the nature of the hair depends the presence of the disease. Therefore, while the inflammation around the follicles may be regarded as an independent extension of the inflammation from the seat of the eczema, it can be regarded as purely such only in those cases where the hairs are so fine that they cannot produce much irritation. In this case almost all the follicles are affected, and especially those lying most superficially. Usually, however, only a limited number of follicles are affected, and those the deeper-lying ones, from which old and stiff hairs are

produced. Such hairs irritate the skin at the base of the follicle, and then the inflammation can extend to this region from the surface.

But, when no actual inflammation is present previous to the appearance of the eruption, and the skin is simply irritable, the first active inflammatory changes occur around the follicles, and are brought about by the irritation from the stiff hairs. Therefore, in cases of sycosis of the beard combined with eczema, the inflammation may extend from the surface to the follicular region; it, however, is not an independent extension, but is caused by the irritation produced at the follicles by the stiff hairs of the part. Remove the hairs and no peri-folliculitis will occur, as the part will no longer be irritated. I consider, therefore, that in no other manner can the occurrence of sycosis on a part free of eczema, and provided with normal hair, be satisfactorily explained than by supposing the skin to be in an irritable condition, and that the hair is capable of increasing this irritation sufficiently to produce a peri-folliculitis, though not a general dermatitis. When eczema is not present, we must seek for other causes to produce this irritability, and they are found among the various mechanical and chemical irritants which predispose to the disease.

Nearly all writers agree that such things as constant exposure of the face to strong rays of heat, or occupations with dusty and irritating substances, can, and frequently do, produce the disease. In fact, as Tilbury says, "any local irritant can produce it, if the person is out of health, by rendering the skin irritable." Shaving, especially with a dull razor, acts in this way, as it produces great irritation of the skin, though Hebra is inclined to regard shaving rather as a prophylaxis against the disease than a cause of its production. Hebra, however, stands almost alone in this opinion, and the statement that he has met with sycosis more frequently among persons who never shave, such as the Polish Jews, than among those who shave daily, admits of easy explanation. It is easier to keep the skin clean when the face is shaven, than if the beard be allowed to grow long. Such being the case, it is easy to perceive that, with such a dirty class as the orthodox

Polish Jews, shaving is really a prophylaxis, for, as they neither shave nor keep themselves clean, their skin is exposed to all the irritating substances which collect in their beard, and the continued irritation therefrom is quite sufficient to render the skin irritable, or produce an eczema, and finally sycosis. That daily shaving is necessary in the treatment is for the majority of cases not correct, though, if it is necessary, that is no proof that it is also a prophylaxis. It is only a prophylaxis, as I have said, in the case of uncleanly persons.

We thus see that, among the different things which lead to sycosis, as eczema, exposure to strong rays of heat, dusty substances, shaving, irritating powders, cosmetics, etc., all act in the same way, producing an irritable condition of the skin, and the stiff hairs acting upon this irritable skin produce an inflammation in their immediate neighborhood, i. e., there arises a peri-folliculitis pilorum. Therefore, sycosis barbæ is not a folliculitis or an independent extension of an eczema to the peri-follicular region, but a peri-folliculitis; neither is its cause to be found in the large size of the hair, as compared with its follicle, but simply in the size and stiffness of the hairs, enabling them to act like spears on the tender skin. Sycosis, therefore, should not be classed among the diseases of the hair-follicles, but as a form of dermatitis, among the exudative affections.

Diagnosis.—There are but few diseases of the skin whose characters are more sharply defined, or that are easier to be diagnosed, than sycosis; yet it happens very frequently that other eruptions are regarded as sycosis or barbers' itch, merely because they are located on the bearded part of the face. Such an error, of course, will not be committed by those who have studied the disease carefully, and are familiar with the characteristic signs of the eruption. It is to be borne in mind that sycosis is not a frequent disease, and always presents decidedly characteristic appearances, the presence of which are necessary in any given eruption before the diagnosis sycosis can be made. On account of the rarity of the disease the chances are that an eruption, when seated on the face, is not sycosis, but some other disease of frequent occurrence in this region, as eczema or acne. Frequently sycosis is accom-

panied by a chronic eczema; but, if so, the two diseases can be easily separated and diagnosed by the special characters of each. In sycosis, papules, tubercles, or pustules are present, and generally all three at the same time. They are confined to the hairy parts of the body, and appear almost exclusively on the bearded part of the face; are frequently isolated, especially when the disease has become chronic, and each papule, tubercle, and pustule is perforated in the centre by a hair. When papules or pustules, wherever seated, and of whatever form, are not, or have not been, perforated in the centre by a hair, they belong to some other disease, since this perforation is an essential condition in sycosis, and is relied upon chiefly, when making the diagnosis. The diseases with which it is generally confounded are tinea barbæ (sycosis parasitaria of some authors), acne, eczema, impetigo, lupus, and syphilis. The use of the term tinea sycosis, or parasitic sycosis, for an entirely different disease from true sycosis, and the statement of some authors that all cases of the disease are parasitic in their nature, have been productive of the greatest amount of confusion among physicians and of suffering to the patients. Acting under the belief that a given eruption, because seated on the face, must be sycosis, and all cases of this disease, according to the latest views, parasitic in origin, physicians have had recourse to antiparasiticides, a class of remedies which usually aggravate and prolong the disease, and subject the patient to much unnecessary suffering.

In view of the importance of the subject, I will therefore enter into full details as regards the nature of this so-called parasitic sycosis, and endeavor to show its entire dissimilarity with sycosis in every respect, and consequently the impropriety of the term sycosis for this disease, in the hope that future authors in writing upon it will treat of it under its proper designation, namely, that of tinea barbæ.

Gruby ("Comptes rendus des séances de l'Académie des Sciences," 1842, p. 512) first described the disease, which has been called parasitic sycosis. To the fungus found by him in this affection he gave the name mentagraphyta, and named the disease itself phytomentagra. "The fungus," he said, "is formed within the hair, and between its root and the root-

sheaths, and has its origin in the matrix of the hair and in the cells composing the follicle, but is never found to rise above the surface of the epidermis. The disease is limited to the hairy part of the face, and is most frequently met with upon the chin, upper lip, and cheeks. It covers those parts with white, grayish, or yellowish scales, which are slightly raised in the middle; their borders are angular, and pierced at all points by hairs. The scales are so firmly united with the hairs that, in removing them, some of the latter are pulled out at the same time." From his whole description, and from the fact that subsequent observers have shown the identity of the fungus present in such cases with the fungus of ordinary ringworm, namely, the *tricophyton tonsurans*, it is plain that the disease described by him was not sycosis, but simply tinea tonsurans of the beard, a disease which is not at all rare in Paris, occurring, according to Köbner ("Über Sycosis und ihre Beziehungen zur Mycosis tonsurans," Virchow's *Archiv*, 1861, xxii. Bd., p. 46), more frequently than sycosis. Although Gruby and several other writers since his time (Nelligan, *l. c.*, Küchenmeister, *l. c.*) believed every case of sycosis to be of parasitic origin, the majority of observers hold to the non-parasitic nature of the disease, and separate it from the sycosis of Gruby, retaining, however, the name of sycosis for both diseases. In reality, the two diseases are entirely different in every essential point. The sycosis of Gruby is always parasitic in nature, and the fungus which produces the disease corresponds to that which produces ordinary ringworm—the tricophyton tonsurans. I consider the disease simply a tinea tonsurans, modified by the anatomical characters of its seat, and will in future, in speaking of this disease, make use of the term tinea barbæ, as being the correct designation for it, representing, as it does, the true nature of the disease. The fungus in this disease passes down into the hair-follicle, then into the shaft of the hair, and is found in the matrix and between the hair and its sheaths. It is easily detected with the microscope in recently-altered hairs, but is frequently absent in hairs much changed or bathed in pus, as this latter is an anti-parasiticide. The disease is generally preceded by a red, itching, or scaly spot of tinea circinata, of circumscribed or

zigzag shape, upon which vesicles, tubercles, and pustules arise, accompanied with desquamation of skin and change in the character of the affected hairs. The tubercles of tinea barbæ arise without that pricking, burning sensation which occurs in sycosis, and are produced continuously, and not periodically, as in the latter disease. The fungus not only interferes with the normal growth of the hair, but, acting as a foreign body, produces irritation, and, secondarily, peri-follicular inflammation around the affected follicles. The hairs are affected early in the disease, becoming opaque, brittle, loose, and are easily extracted. The affected part is much indurated, and the tubercles are more voluminous than in sycosis, sometimes reaching the size of a cherry. In the majority of the cases I have seen, the tubercles were large, prominent, and studded with numerous hairs, which lay loosely in the indurated mass. The disease begins imperceptibly, proceeds slowly and steadily, always increasing in extent; while sycosis begins with severe local symptoms, pain and swelling of the part, which soon subside, but reappear in a few days, accompanied by a new outbreak of the eruption. In sycosis, the periodically recurring attacks keep up the disease, but in tinea barbæ the fungus, being always present, and the irritation therefore constant, the progress of the disease is gradual and continuous. In sycosis, during the papular stage, the hairs are not affected, and at that period of the pustular stage when the hair is surrounded with pus and its connection with the follicle-sheaths destroyed by the inflammation, they lie loosely in the follicle, so that epilation is easy and painless. In tinea barbæ the tubercles are frequently isolated, and situated on different parts of the face or neck. When several tubercles are situated closely together, they form a circular mass, or are arranged in the form of a circle, or part of a circle; they are more voluminous; their margins are sharply limited; the surface is uneven, fissured, and studded with loose hairs; the base is broad, firm, lies deep in the subcutaneous tissue, and generally cannot be raised without the corium. There is often a foul-smelling, sero-purulent secretion collected on its surface, which dries into a thick scab, which, when removed, takes the hairs along with it. In chronic sycosis the pustules are generally isolated, but in acute attacks

they are seated more closely together. In nearly every case of tinea barbæ, patches of ringworm are present on other parts of the body, and even, if not present, there is often a history of ringworm among the patient's companions; or the disease has been conveyed from some animal, as a horse or mule, with which he came in contact. The number of cases in which there is no history of ringworm is only about 5 per cent. of all cases of this disease, and it is reasonable to suppose that this percentage would be still further reduced if the previous history could be accurately ascertained. It is somewhat singular that in the only typical case of this affection which has come under Hebra's observation ("Lehrbuch der Hautkrankheiten," ii. Bd., 3. Lieferung, Stuttgart, 1876, p. 654) no history of ringworm could be obtained. Tinea barbæ does not disappear spontaneously, but, when cured, there is no return of the disease, unless the patient is exposed again to contagion. If all those characteristic signs are insufficient to enable the physician to make the diagnosis, though it is improbable, then a microscopical examination of the hairs will, in competent hands, decide the question. It requires, however, more experience in the use of the microscope than is generally supposed to be necessary, in order to enable the physician to decide correctly as to the presence or absence of fungi in hair or scales. Therefore, unless the physician is accustomed to the use of the microscope, it is better not to rely too much upon his interpretation of what he sees through that instrument, for he will very probably imagine to see fungi even if none are present.

Thus, the situation, form of the patch, character of the tubercles, mode of origin, cause, difference of anatomical parts primarily affected, nature of the disease, condition of the hair, and derivation of the disease from some person or animal affected with the fungus tricophyton tonsurans, render the diagnosis easy, and show the complete dissimilarity of this disease in every respect to sycosis.

Now, since the term sycosis was used to denote a special disease long before Gruby made his observations, no other disease, therefore, should be called a sycosis, unless it can be shown that there is a close relationship with the disease origi-

nally named sycosis, or that the disease thus primarily designated was misnamed. As regards sycosis, it is true that the term was ill-chosen, as it is exceedingly rare to find the eruption presenting any fig-like appearance. This appearance is more common in tinea barbæ, yet it was not on this account that this disease received its name, but from its supposed identity of seat and nature of the inflammatory changes with those of sycosis, that it received the name sycosis with the addition of the adjective "parasitic" to designate the kind of sycosis. The reason for calling tinea barbæ parasitic sycosis was, that it was looked upon as a folliculitis produced by a fungus, and, as the general view of the nature of sycosis was, that it is an inflammation of the hair-follicles, therefore the two diseases were considered to be similar in character and to differ only in their causation. If the view that both diseases are similar in nature and differ only in the agent producing them was correct, then there would be some reason for the use of the term parasitic sycosis. For instance, eczema is sometimes a local disease produced by some known irritant—as, for example, in eczema of the upper lip, arising from the irritation produced by a nasal discharge; at other times the cause may be entirely different, yet, from the similarity of the pathological process in both cases, the disease receives but one name, which is intended to designate the eruption and not its cause. But, even assuming the view held by most authors of the present day to be correct, namely, that in both diseases an inflammation of the follicles always exists, that fact alone would not be sufficient ground for giving the two diseases a similar name, unless this inflammation is the essential feature of the disease and of constant occurrence. In sycosis the follicular inflammation is supposed by some authors (Fox, Hebra) to be idiopathic or primary, and by others (Wertheim) as produced by the hair-sheaths, hence secondary. In tinea barbæ the inflammation is always secondary to the nutrition changes in the hair and its sheaths, and arises from the irritation produced by the fungus present. We therefore see that only in secondary phenomena was this disease supposed to agree with sycosis, but we can never on such correspondence alone classify diseases so different in nature under one

name. There is no more propriety in calling tinea barbæ parasitic sycosis, even if a follicular inflammation is generally present in it as well as in sycosis, and this inflammation the principal clinical symptom, than in calling scabies an eczema because an eczematous eruption is almost always present in the former disease, from the irritation arising through the presence of the acarus scabiei.[1] The only justification for the term would be, if, as Gruby and Küchenmeister believed, all cases of sycosis are parasitic in nature. This incorrect view, however, is not held by any living authority, since all writers accept the existence of a non-parasitic sycosis.

I have thus endeavored to make clear that, even if the view prevalent at present that sycosis is essentially an inflammation of the hair-follicles was correct, the term parasitic sycosis should not be used to designate a parasitic affection in which the changes in the hair and the peri-follicular inflammation were secondary results, and not the essential feature of the disease. But, as my observations have shown that sycosis itself is not a folliculitis, and that all changes which take place in the hair and its follicle are secondary to the inflammation around the follicle, every particle of supposed similarity between the two diseases disappears, and we must conclude that the two affections are absolutely different.

Therefore, the nature, mode of origin, course, termination, parts of skin affected, and, what necessarily follows from such great difference, the modes of treatment are all different; and, since the use of the term parasitic sycosis has also been the cause of great confusion and of erroneous ideas concerning the appropriate treatment, I ask, not only from a scientific but also from a practical standpoint, that the two diseases be no longer designated by the same name, and that, if the term sycosis be retained for the peri-folliculitis pilorum, that of parasitic sycosis be no longer employed, but that the parasitic disease of the beard be classed under its proper head as tinea barbæ.

[1] I am quite aware that Hebra places scabies in the same class as eczema, but outside of Germany he has no followers in this classification, and it is inconsistent with the classification he gives to the other animal parasites. Neumann also opposes this classification of Hebra.

Acne, which is a rare complication of sycosis, is a disease of the sebaceous glands, and consequently is not confined to the bearded part of the face, but appears on the forehead, nose, shoulders, and other parts of the body supplied with those structures. It is met with generally in young persons, does not often appear in periodical crops, and the papules or pustules are not perforated by a hair. This is sufficient for the diagnosis.

Syphilis is known by its concomitants, the arrangement of its papules in the form of a circle or part of a circle, their dark copper color, slow development, the absence of pain, history of the case, and the presence of syphilitic eruptions on other parts of the body. Syphilitic eruptions rarely occur exclusively on the hairy part of the face; the papules are flatter, have a shining look, and are not preceded by the burning, painful feeling which announces sycosis. In a pustular syphilide, the loss of substance, the destruction of the corium, the kidney or circular-shaped ulcers with dirty base, the history of the eruption, its presence on the other parts of the body, and the absence of pustules penetrated by a hair, will exclude sycosis.

Eczema is probably more frequently confounded with sycosis than any other disease. The localization of the eczema, and the statement of patients that they caught the disease by having been shaved with a barber's razor, are the deceptive motives for the incorrect diagnosis. In reality, eczema, as already stated, is a very frequent precursor and producer of sycosis, and the two diseases are often present at the same time and in the same region. In eczema there is either a moist red surface and absence of epidermis, with itching and "discharge" which forms thin scabs, or there is only hyperæmia, with a harsh dry skin and furfuraceous desquamation. The eruption is not limited to the hair-follicles, or to the parts provided with hair, but is also generally present on other parts of the face. If papules or pustules are present, they are not perforated by hairs. In impetiginous eczema, the duration of the disease, its localization, the great amount of crusting, the flat pustules, rapid march, the non-ulcerated surface under the

crusts, and the absence of tubercles or papules pierced by a hair, show that the disease is not sycosis.

Lupus vulgaris occurs in young persons of both sexes, runs a very chronic course, causes but little pain, the tubercles are soft, covered with slightly-adherent scales, and are not perforated by a hair. It occurs generally either upon the nose or in its immediate neighborhood, and produces more or less destruction of the skin, which is replaced by cicatricial tissue. Lupus erythematosus resembles very closely in its chronic course and results those severe cases of sycosis which produce destruction of the gland-structures and skin-tissue. The progress of the destruction in lupus is more gradual; the margins more sharply defined; it occurs in both sexes, and generally commences on the parts of the face free of hair. There are no papules or tubercles pierced by hairs in this disease.

Prognosis.—The duration of untreated cases of sycosis varies very much in different persons, and in the different attacks in the same person: sometimes a spontaneous cure takes place in a few weeks, while in other cases the disease may continue, with greater or less severity, months, or even years. There is often a diminution in the severity of the disease during summer, and a return to its former condition in winter. Permanent, general, or partial alopecia occasionally follows untreated chronic cases, as a consequence of destruction of hair-follicles from the inflammation. In the most severe cases there may be complete destruction of the cutaneous tissue, hair-follicles, sebaceous and sweat glands, followed by cicatrices as extensive as are met with in some cases of lupus erythematosus. The tubercular form is more obstinate than the papular (Wilson, *l. c.*). In syphilitic and strumous subjects it is very obstinate (Fox, *l. c.*). The greater the amount of pustulation, the greater is the liability of the follicles being permanently destroyed. Sycosis, however, can always be cured, and generally within a few weeks, when it is subjected to appropriate treatment; although, after complete removal, it is very liable to return within a few weeks or months, especially in autumn, and generally in the location previously affected. Therefore, while we are justified in as-

suring the patient that the eruption can with certainty be removed, and probably within a very short period, yet a permanent cure cannot be guaranteed, as the disease is so liable to relapse. Frequently, however, no relapse occurs, provided the patient avoids the exciting causes which favor its production. If the principal cause lies in the occupation of the affected individual, a relapse is certain to occur, unless he changes his employment. From the long-continued pus-production, or from too irritating applications to the affected surface, erysipelas may arise and prove a serious complication. This, however, is a rare occurrence, and usually the only detriment resulting from even a long-continued sycosis is the destruction of a greater or less number of hair-follicles and sebaceous glands, and consequent permanent general or partial alopecia.

Treatment.—Though sycosis can be regarded as a local disease, having its origin in purely local conditions of the part affected, yet certain conditions of the general system predispose to its development, aggravate the disease when present, and prolong its duration. Those conditions must be taken into account, and receive the necessary treatment if the disease is to be treated with reference to rapid cure and prevention of a relapse. Sycosis is in this respect similar to many other skin-diseases which, although local in origin and capable of being cured by local applications alone, yet yield much more readily to combined local and general treatment, and the relapses are less frequent than when local treatment only is employed. The general nutrition of the patient must not be neglected, and any morbid condition, as rheumatism, dyspepsia, syphilis, struma, demands its appropriate treatment. Some one of those conditions is generally present, and the condition of the general system, and of every organ of the body, should be known before commencing treatment. A strumous condition of the system especially aggravates the disease, and causes an unusual amount of pus to be produced. It is unnecessary to enter into full particulars as to the proper treatment of any of those constitutional diseases, as that belongs to the domain of general medicine, and every physician who undertakes to treat skin-diseases should have a proper

knowledge of internal diseases and their therapeutics. If there is a rheumatic condition of system present, alkalies are necessary; if the patient is anæmic, give iron, tonics, and a generous diet; for syphilis, mercury in some form, or iodide of potassium if gummata are present; and if strumous, cod-liver oil, and so on. Eczema, or superficial dermatitis, if present in the same locality, must be treated simultaneously with the sycosis, as the latter cannot be cured without the removal of the former. A knowledge of the proper treatment of eczema in its different phases is of much assistance to the physician in the treatment of sycosis, as there is a great similarity between the two diseases as regards the course of treatment to be followed. In sycosis of the upper lip it is especially to be borne in mind that the disease is generally kept up by a coryza, and that it is almost impossible to cure the former so long as the discharge from the latter continues to irritate the part. Much can be accomplished in the way of prophylaxis in warding off a relapse of the disease by a knowledge of the special predisposing cause at work in each case. If the patient's occupation plays an important part in producing the eruption, it should be changed, if possible. Exposure to excessive heat or cold should be avoided, also the use of cosmetics, snuff, and other irritating substances. Cleanliness is an excellent prophylaxis in this affection. When the disease is present, our chief reliance for its removal consists in local treatment, though constitutional treatment is of decided advantage as an adjuvant. The latter alone is never sufficient to effect a cure of the disease; but local treatment, used according to the special indications of each case, is adequate to effect a cure unaided by constitutional treatment, though relapses are more liable to occur. In the acute stage we should endeavor to allay irritation, and wait until the swelling and pain subside before using active measures. Lead and opium, warm applications, as a sponge dipped in hot water, or poultices, should be applied. The treatment in this acute stage is simply that which is applicable, and is everywhere employed, in inflammation, when we wish to allay irritation. Until the acute symptoms subside, this soothing treatment is to be continued. After they subside we must still continue

to allay irritation, for, as I have shown, an irritable condition of the skin is the principal predisposing cause of the eruption.

In the chronic stage the treatment varies, exactly as in the case of chronic dermatitis, according to the condition of the part affected. To reduce irritation, produce absorption of effused products, and remove the existing inflammation, should be the object in view. If scabs are present, they must be removed with poultices, ointments, or oily applications, before commencing other treatment. If the scabs are not removed it is useless to make local applications, as they do not reach the part you wish to influence with them. If the patient has a long beard, and will not permit its being removed, the sycosis will be much more difficult to cure than if the beard is short. Its presence, however, is not an insuperable object to successful treatment, though it retards the cure on account of the difficulty of applying remedies to the seat of the eruption. If there is any inflammatory thickening, absorbent remedies are required. Those, however, which irritate, as iodine, must not be used, as they aggravate the disease by increasing the irritation in the part. Some preparation of mercury, sufficiently diluted to prevent it from producing too much irritation, is the most suitable remedy. If the thickening is considerable, and of long standing, the oleate of mercury with morphine acts very efficiently. Care must be taken, however, not to use a very strong solution, or to apply it oftener than once every three or four days, as it sometimes irritates, and, from the facility with which it is absorbed, may produce ptyalism. Such accidents have occurred in my practice after very few applications of the oleate.

Epilation, first recommended by Plumbe (*l. c.*), is not only exceedingly useful in reducing the inflammation, but is absolutely necessary in the treatment, if permanent alopecia is to be avoided. Some authors say they derive but little benefit from it, but I believe, if it is performed at the proper time, the result is most beneficial. To remove the hairs during the papular stage, while they are still firmly seated in the follicle, increases temporarily the irritation, as their extraction causes great pain; but during the pustular stage they are easily extracted, and when the operation is performed not only has the

pus a free exit but the follicle is thereby frequently saved and permanent alopecia prevented. Though extraction during the papular stage causes pain and temporarily increases the irritation, yet I believe the evil resulting from the additional irritation thus produced is more than counterbalanced by the good resulting from the free exit allowed to the pent-up pus and the removal of the irritating hairs. Fomenting the part with hot water lessens the pain produced by the operation of extraction. In performing the operation, but a single hair should be seized with the forceps at one time, and traction should be made in the direction of the long axis of the hair. Every hair perforating a papule or pustule should be extracted. In cases of circumscribed sycosis—that is, where the disease remains confined to a small spot for a long period—it is better to remove all the hairs from such a spot, even if the operation causes considerable pain. This removal of the hairs, to save the follicle and allow exit to the pus, is, I believe, a much better procedure than opening the pustules, or rather small abscesses, with a knife.

In using ointments, the same rules are to be observed as in other skin-diseases. They should always be spread on cloth and bound on the part, as they then act more powerfully and efficiently than when simply rubbed in. The diachylon ointment of Hebra is most frequently employed, and is of great service in curing the disease. The ointment should be applied twice in every twenty-four hours, and kept constantly on the part.

Whether the part affected should be shaved or not is a disputed question. Good authorities are found to differ on this question, some recommending and others opposing the operation. Basing my views upon the nature of the disease, and knowing that shaving irritates the inflamed part, I believe it is injurious, and that it is much better to cut the hairs close to the skin with scissors. If they are thus closely cut, the part is not irritated by the operation ; ointments can be properly applied and the hairs easily extracted. Hebra (*l. c.*), who says he has tried the different methods of treatment, is decidedly in favor of daily shaving and washing the part; yet,

as equally good authority is found opposing it, future experience must decide which is the proper course to pursue.

The plan pursued at Cannstadt ("Ueber die Behandlung der Sycosis in der Heilanstalt zu Cannstadt," *Blätter f. Heilwissenschaft*, Jahr. 4, Nr. 11, 1873), of rubbing in a salve composed of two parts of ship-tar and one part of green soap until the hairs are easily extracted, then touching the cavity with acetic acid, is unnecessarily severe, and cannot be indicated in any, except perhaps chronic cases, with considerable induration and thickening of the cutis.

Ointments containing sublimed sulphur, or the iodide of sulphur, in varying proportions, according to the amount of induration and irritability of the skin, are of service, but must not be made so strong as to produce irritation.

In strumous subjects, the local application of cod-liver oil often acts more beneficially than ointments of either lead, sulphur, or mercury.

Hence epilation, and the application of astringent ointments, as the diachylon ointment of Hebra, with or without the addition of a mercurial preparation, according to the amount of induration present, and appropriate constitutional treatment, will enable the physician to cure all cases of sycosis, except the destructive form, within a few weeks, providing the patient does not continue to expose himself to the predisposing cause of the disease.

I will not enter further into the treatment appropriate for the disease in its different stages and conditions, as that would occupy too much space, and it can be learned in any good work on diseases of the skin. Epilation and the treatment appropriate for eczema can be considered the proper treatment for sycosis. We have learned that the skin is in an irritable or inflamed condition previous to appearance of the sycosis, and that the irritation from the hairs acting upon this changed tissue produces the peri-folliculitis. This irritability must be removed, as well as any actual inflammation or inflammatory products in the affected part. The same rules for treatment hold good here as in inflammation or irritability in any other part of the body, and the physician must know those rules and have a clear idea of the exact nature of the

process going on in the part in the different stages and conditions of the disease. Knowing those things, he cannot fail to cure quickly every case of ordinary sycosis.

All the drawings have been made by myself by means of a camera-lucida, and are exact reproductions of the appearances presented. Owing to severe illness and limited time, I have been unable to make as many drawings of the changes which take place in the pustular stage as I intended to do. I studied the sections, however, carefully, and have endeavored to describe the changes.

In conclusion, I have to express my thanks to Drs. M. H. Henry and L. D. Bulkley, of this city, for living material obtained from some of their patients, and also to the artist, Mr. C. F. Ruestow, for the manner in which he has executed the woodcuts.

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