

appears as a knob-like bright swelling, at times they contain isolated lustrous granules, in other places we see in them rows of oblong-oval nuclei looking like vacuolæ and containing dark nuclear corpuscles; some segments are short and sausage-shaped, others taper to a point at one end, on others we see at various places indentations nearly uniform on both sides. Some threads are rather narrow and filled with dark, larger or smaller granules, while others appear altogether pale and vacant.

Diagnosis.—The brownish color, as well as the slight desquamation and ready removability of the uppermost layers with the finger nail, will easily obviate confounding with similar efflorescences on the trunk, such as macular syphilide, pigment remnants after other eruptions, brownish warts, and other more deeply seated pigment anomalies. More difficult, often quite impossible without microscopical examination, is its differentiation in the inguinal and upper femoral region from intertrigo, particularly in male persons who perspire very freely. From extensive patches of lichen acnéique pityriasis versicolor is differentiated by the more brownish than yellowish color, the absence of small nodules and crusts in the periphery of a large patch. Pityriasis rosea rarely reaches in its centre so great a discoloration as to be confounded with pityriasis versicolor; besides, the former is distinguished by the red circular border and the acute course.

TREATMENT.—In the treatment of pityriasis versicolor, it is essential to cause the more rapid casting off of the uppermost layers in which the microsporon has its seat. In doing so, however, it is not always possible to remove at the same time those fungi seated around the point of exit of the lanugo; this probably is the reason why pityriasis versicolor again spreads even after very energetic therapeutic measures. Frictions with green soap followed by energetic ablutions in the bath, repeated several days in succession, are useful in treatment. Furthermore, frictions with ointments of chrysarobin ten to twenty per cent, pyrogallic acid five to ten per cent, salicylic acid five to ten per cent, thymol five per cent, sodium subsulphate ten to fifteen per cent, etc. Likewise with oil of cade, Wilkinson's ointment, and tincture of iodine.

ERYTHRASMA

Is the name given by v. Bärensprung¹ to a disease confined to the inguinal and axillary regions; it is contagious, presents the appearance of pityriasis rubra in the form of roundish or rosette shaped, sharply demarcated spots, and which he attributes to the fungus described by Burchardt,² the so-called *Microsporon minutissimum*. Oscar Simon³ has endeavored to show that the erythrasma is an intermediate step between pityriasis versicolor and herpes tonsurans.

While pityriasis versicolor in the inguinal region is an almost daily occurrence, erythrasma manifests itself more rarely in its pure forms. It represents a large, dry, reddish brown, often copper-colored surface covered with branny scales; its margin often surrounds the detached epidermis in a circle. Beside it are frequently several similar or more orange colored or pale reddish yellow spots with irregular outlines, barely the size of a five-cent nickel. The scales can be removed only in the shape of a fine flour. In them we find rather short, narrow (not half the width of those in pityriasis versicolor), very pale, slightly curved, or stiff and very long threads at times composed of two or three segments.

¹ Ann. d. Charit., 1862, Bd. x.

² Med. Zeit. d. Vereins f. Heilk. f. Preussen, 1859, No. 29.

³ "Localisation der Hautkrankheiten."

In other rare cases, some of the larger threads consist of rosary-like, closely adjoining, flattened small segments, the segmentation of which becomes visible only on very attentive inspection. The greatest transverse diameter is barely 0.6 micromill., in most cases they are narrower. Their length is exceedingly variable. We also find, by the side of long threads, others twisted in wave lines, of different lengths, but always very narrow and pale. Where the network is most dense and confused, the threads are the smallest. Lateral branching of the filaments is nowhere to be seen, any more than the formation of conidia. In their reproduction they seem to stand nearest to the schizomycetes. Some long threads are distinguished by a strong lustre at their end which is at times curved into a hook. The scales contain besides a number of small bacteria and heaps of zooglœa.

Burchardt has described the fungi in chloasma as follows: The threads are neither straight nor curved, their breadth is $\frac{1}{1200}$ mm., the length is very variable, the longest $\frac{1}{8}$ to $\frac{1}{12}$ mm.; but most of them are much shorter, $\frac{1}{200}$ mm. and less, so that they form the transition to the granules, the diameter of which equals the breadth of the threads. The threads are neither branching nor segmented. The granules are piled into irregular heaps and give a dusty appearance to the epidermis cells on which they lie; often the outlines of the granules are not distinct. Many granules and shorter threads move on the addition of potash lye or acetic acid. The threads become most distinct after having been long acted upon by potash lye. Burchardt found the same threads and granules in the urine of the patient in question.

From these reddish brown spots there are all possible transitions into the coffee-brown spots of pityriasis versicolor. In accordance therewith, we also see the elements of microsporon furfur become ever more plentiful and more easily distinguishable from those of erythrasma near them. Like pityriasis versicolor, the affection is very liable to relapses.

The *treatment* of the affection is the same as that of pityriasis versicolor.

THE PARASITIC DISEASES OF THE SKIN.

II. THE SKIN DISEASES DUE TO ANIMAL PARASITES.

BY
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THE animal parasites of the human skin inflict upon it different injuries according to the structure of their implement for boring, stinging, cutting, of the ovipositor, etc., as well as according to the force called into requisition for this purpose. Many of them also evacuate into the lesion the caustic contents of the glands (cimices, ixodæ, etc.). Others again, as for instance some species of leeches, inject with their bite poisonous fluids.

A further necessity in the acquisition of nourishment for our parasites consists in this, that they must come in contact with the skin. Many do so by remaining on the skin only during the attack; as soon as this is past, the animal retires, into the neighborhood if unable to fast long, but to any distance if it be able to exist without frequent repetition of ingestion of the nutriment (fleas, ixodæ), in which case it changes its host.

Another, not inconsiderable part of the parasites uses the skin as a domicile. They do this always in a manner appropriate to the perpetuation of the species. Animals which must seek each other sexually make their habitat in the upper layers of the skin; while others, in which propagation does not come directly into consideration, find room in the subcutaneous connective tissue. A very peculiar circumstance prevails with *pulex penetrans*, the female of which leaves its abdomen outside of the wound when boring its way in, so that it may scatter its eggs undisturbed over the ground. But there are parasites to which, when they accidentally get into the skin, this domicile is equivalent to destruction. The larva of *tænia solium* can subsist one or two or more years in the skin, but it always perishes before maturity.

We divide the animal parasites of the human skin into three classes:

I. *Stationary parasites* are such as prey almost exclusively on the human skin, but on that of animals only quite exceptionally and never permanently.

II. *Temporary parasites* or occasional parasites of the human skin. All the animals of this group are necessarily parasitical. But they differ from each other especially in this, that one part of them has a permanent host, while another is able to change their

host. In their relations to man they are all nearly equal, in that they prey upon him as they do on animals generally. Interesting here is the fact that the change of the host occurs with a certain regularity, and that this forms an essential condition to the future development of the animal (for instance, hirudines, some species of *cæstrus*).

III. *Accidental parasites* are such as do not seek the human skin of their own volition, but once there, injure it in the instinct of self-preservation.

Each of these classes may be further subdivided, according to whether the animal lives upon or in the skin, and whether it is a parasite of man during its entire life or only during a certain period.

If we tabulate all these factors, we obtain the following table for the principal parasites.

I. Stationary Parasites.

Sarcoptes scabiei hominis, itch mite.
Demodex (Acarus) folliculorum hom.
Pediculus: a. *Pediculus capitis*, head louse.
b. " *vestimenti*, clothes louse.
Phthirus pubis, crab louse.
Pulex irritans, flea.

II. Temporary Parasites.

1. In sexually mature condition:

Sarcoptes scabiei communis.
Dermanyssus avium, bird mite.
Ixodæ, ticks: a. *I. ricinus*, *reduvius*.
b. *Argas reflexus*, *persicus*, *americanus*.
Cimex lectularius, bedbug.
Pulex s. Sarcopsylla penetrans, sand flea.
Tabanidæ, Horse flies: *Tabanus*, *Chrysops cœcutiens*. *Pangonia*.
Culicidæ: *Culex pipiens*, *Simula colombacensis*, *S. pertinax*.
Hirudinæ: *H. medicinalis*, *officin.*, and others, *Hæmentaria mexicana*.

2. In larval condition.

Cestodes: *Cysticercus cellulosæ*.
Echinococcus, bladder worm.
Trematodes: *Distoma hepaticum*, liver fluke.
Nematodes: *Filaria medinensis*.
Filaria sanguinis hominis.
Oxyuris vermicularis.
Leptodera.
Muscidæ: a. *M. domestica*, *cadaverina*, *vomitaria*, and *L. Cæsar*.
b. *Sarcophila Wohlfarti* (Portschinsky), *Sarcophaga cadanaria*.
To these may be added: *Lucil. hominivorax* in America, *Stomoxys calcitrans*, *Glossina morsitans* known in Central Africa as *tsé-tsé*, etc.
Estridæ: *Hypoderma* (vers *macacaque* in Cayenne), species of *Cuterebra* and *Dermatobia* (*Cæstrus humanus*, Humboldt).

III. Accidental Parasites.

Species of *Dermatodectes* and *Symbiotes* (Gerlach).
Leptus autumnalis, harvest bug.
Kritoptes monunguiculosis.
Clothilia inquilis, bookworm.

I. STATIONARY PARASITES.

1. The disease caused by *Sarcoptes scabiei hominis* :*Scabies, Itch.*

DEFINITION.—Under the name scabies (itch) is understood a contagious cutaneous disease produced by the transmission of the human itch mite, connected with irritative conditions of the skin and intense itching; the disease is always conjoined with the presence of mites in the epidermis.

According to our present nosogenetic conceptions, it is altogether impossible to imagine scabies without the presence of acari. But it is otherwise in the opposite case. For in the numerous class of acarines there are several sarcoptides which, though parasitical, cannot become permanently domiciled on the human skin. Hence we must devote ourselves exclusively to the *Sarcoptes scabiei hominis*.

NATURAL HISTORY OF THE ITCH MITE.—*Sarcoptes scabiei*, the human itch mite, has an oblong round shape with an upper convex and a lower slightly concave surface. The female is on an average 0.35 mm. long and 0.23 mm. broad; the male, 0.25 mm. long and 0.15 mm. broad. The body is inclosed in a delicate, transparent, loosely adherent integument and has here and there epidermidal deposits, scales, chitinous inclosures, spines, bristles, and prickles. The cephalothorax has four indentations perceptible only on the sides and otherwise forms a compact whole. It is divided from the abdomen by a transverse undulating furrow.

The head represents a short, anteriorly rounded, posteriorly widening, flattened, resistant, strong cone, on which the following parts can be distinguished: The integument turns back like a fold at the limit of the head and as the epistome surrounds the lateral cephalic and upper parts of the mouth (Fig. 44). In the median line are the strong movable mandibles (*b*) which, seen from above, terminate like scissors and are besides slightly serrated. This first pair of mandibles is covered above by the upper labium slightly fissured in front. Laterally, and partly touching the mandibles, is a pair of three-jointed palpi developed into an organ of touch or taste, movable at the base, and provided with two or three bristles (first pair of maxillæ) (*c*). Under the pair of mandibles, resting on a kind of lower labium, we see two, anteriorly broad, posteriorly uniting small rods of chitin, which make the impression as if they represented a rudimentary second pair of maxillæ.

On the dorsum of the animal the skin is laid into several transverse folds between which are rows of concentric small roundish elevations. At the nucha are two short strong spines which are said to aid the animal in burrowing. Around the points of attachment of the limbs long bristles (Bergh's shoulder bristles) are fastened, and behind these Bergh has counted thirty three shoulder-cones. Farther backward come rows of numerous nails and scales which probably undergo no further change with the development. On the posterior half of the abdomen are four rows of spines, numbering ten in six-legged nymphæ, twelve in males, and fourteen in females.

On the ventral side the organs of locomotion deserve special mention. Medially the long narrow ridge of chitin—sternum—is conspicuous; this, giving off two forked branches (first pair of epimeres) in an anterior and external direction, has thereby a ball-and-socket joint connection with the first pair of feet. Behind a shallow incision follows the second pair of feet with the second pair of epimeres. The other pairs of feet—one in the larva before the first moult, two in others—are situated beyond the furrow between

thorax and abdomen on the posterior inguinal ridges. Each leg has five segments connected together by ball-and-socket joints. The tarsus at the anterior pairs of feet terminates in a double claw between the two arms of which are one or two bristles. From the lower surface projects the long stem with the sucking disk. In the female both pairs of hind legs end in long bristles, while in the male the posterior inner pair of feet again carries a sucking disk on a stem. In the centre of the posterior margin of the abdomen the anal opening appears as a vertical slit. To the right and left of this, the anal bristles may be seen.

The researches on a number of the internal organs are far from being concluded. As to the digestive organs, we know through Gudden's communications that the œsophagus

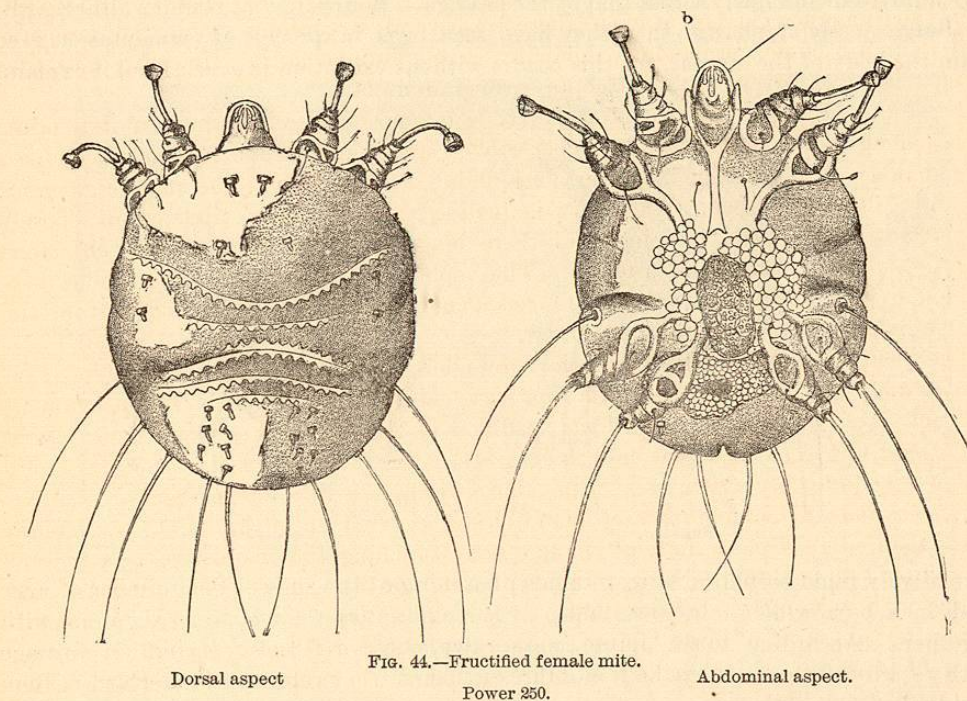


FIG. 44.—Fructified female mite.

Power 250.

dilates behind the second anterior pair of feet into the gastric cavity which consists of a body and two lateral lobes. Posteriorly the stomach continues into the long straight intestine which terminates in the above-mentioned anal opening. Gudden moreover gives detailed descriptions of a poison or salivary gland which becomes visible with the stomach and the efferent duct of which is directed toward the head of the mite. Respiratory organs are altogether absent in our mite which breathes by means of the skin. The *Sarcoptes scabiei hominis* also lacks circulatory organs and vessels, for even with the highest magnifying power nothing can be seen but a free flow of a kind of lymph in wall-less currents.

Better known and described are the sexual organs. In the male (Fig. 45), we find in the centre, between the posterior inner pair of feet, on the transverse ridge separating them, the bifurcated penis holder. The latter, which has a horse-shoe shape lying in the depression, is perforated at its convex part for the reception of the immission tip. As regards the internal sexual apparatus, it is probable that there are posteriorly testes

filled with zoosperms which merge into the seminal ducts and open into the common tube situated in front of the penis. In the female, at the limit between abdomen and cephalothorax, the curved vagina is placed in the form of a transverse fissure the margins of which are slightly bent with a posterior concavity. From there the ovipositor continues medially as far as the region of the posterior inner pair of feet. The ovipositor looks like a nail cleft at the head and is capable of dilatation during the passage of the eggs. Gudden (Taf. III., Fig. 6) also illustrates very clearly the vagina, seminal vessels, ovaries, etc., situated above the anal opening. The itch mites are oviparous. The ovum ripe for extrusion emerges through the transverse fissure of the ovipositor and in the shape of an oval grayish shining body, 0.16 mm. long and 0.10 mm. broad, lies with its longitudinal axis obliquely across that of the passage. Bourguignon, Gudden, Burchardt, and Bergh justly emphasize that they have seen eggs in process of segmentation even within the body of the animal, for this occurs without exception in acarini and it explains

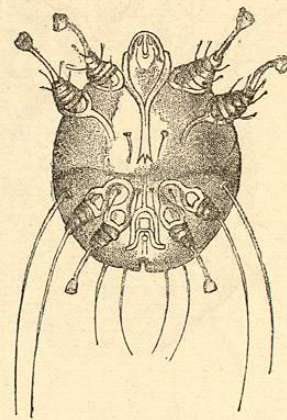


FIG. 45.

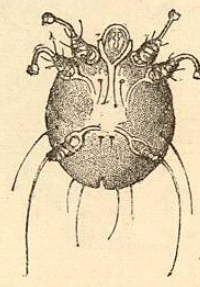


FIG. 46.

the relatively rapid (often in 64 to 76 hours) hatching of the eggs. The number of eggs found in a burrow of a mite is variable; hitherto not more than 21 to 26 were met with altogether. According to an approximate calculation, a female, during an average length of life of three and a half months, can point to a posterity of one-third million individuals.

Mode of Life of the Mite.—In a single burrow we never find more than one couple which have sought each other for cohabitation, *i. e.*, one male and one female. On the average in from three to six days, there escapes from the ovum a six-legged larva which is characterized by two bristles on the posterior edge (Bergh) and ten longer spines on the back. The young larva soon leaves its point of origin and digs either a lateral passage or a new burrow at some distance from it. Six days after, the first moult commences, and lasts three, four, or more days, when the animal possesses eight legs, four bristles, and twelve spines. After an equal lapse of time ensues the second moult, with the development of fourteen spines, so that the mite reaches the stage of puberty at the end of the third week. A week later, it appears sexually mature. The fully developed animal capable of reproduction now leaves its habitat, and both sexes having wandered about for some time, the female finally commences a special burrow where the male likewise arrives afterward, with a view to pairing. After fertilization, the male usually leaves the burrow altogether and digs into the neighborhood. But sometimes it

only constructs a lateral passage where it perishes in from six to eight days. Gerlach assumes that one male may fertilize several females. The female mite, having become pregnant, does not leave its burrow again, but, with a view to nutrition, advances in the succulent rete, where she continues burrowing, with the deposition of eggs. The ova are laid at variable intervals. The purpose of its life having been fulfilled, the animal remains inclosed at the head of its burrow (Hebra) and perishes. Most authors agree that the male on an average becomes eight weeks old, while the female, requiring for the laying of eggs (one to two daily) generally four to six weeks, reaches an age of three to three and one-half months, as a rule.

SYMPTOMS AND COURSE OF SCABIES.—If, for experimental purposes, we transfer to ourselves several pregnant mites, we observe that they bore into the epidermis after some running to and fro. In doing so, the animal rears on its hind legs, presses down

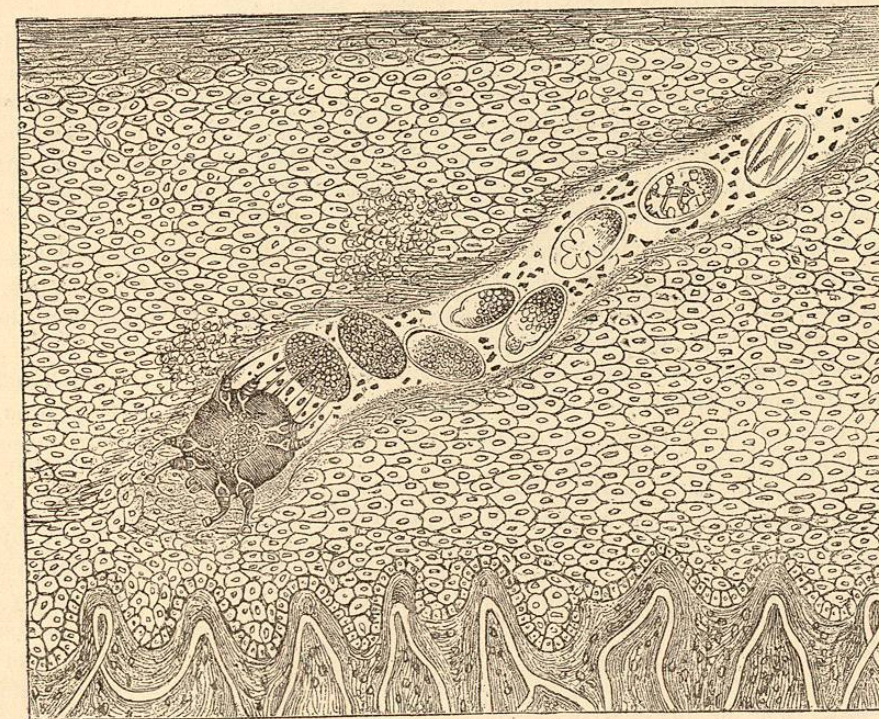


FIG. 47.—The burrow of a mite.—Schematic drawing after Kaposi.

its cone-shaped head, and the scissors-like mandibles being put into activity, the obstructions are gradually cleared away, so that it gets under the epidermis. Subjectively this is felt as a local burning or itching which is repeated at irregular intervals. Objectively we can observe here and there a small, inconspicuous, reddened elevation. In two or three days, these become more numerous, and develop into real nodules and vesicles the size of a pin's head. The itching becomes greater, so that it is difficult to abstain from scratching. Toward the end of one week, the mite advancing between the rete cells, we can see, extending from the points of attack, an undulating whitish streak, 1-2 mm. in length, which at first sight looks like a scratch of the epidermis, but in fact represents the beginning of the burrow. Gradually this becomes longer ($\frac{1}{2}$ -1 mm. daily, Burchardt), and, according to the quality of the skin, presents a different appear-

ance. Where the epidermis is greatly developed, the recent part of the burrow merely becomes more succulent; but on more delicate parts of the skin—in young persons and women—it bears vesicles or small pustules either at one point or over its whole extent. Usually during this process, the mite is lifted up immediately to the epidermis. Intermediate between these are those regions (penis, nipples, etc.) where the burrow is seated on a reddened, plainly developed tubercle. As a rule, the mite endeavors to escape from this position and burrows farther forward. But as soon as it leaves its place, the irritation there ceases, and the consequence is that the efflorescence atrophies, that part of the burrows sinks down, and nothing remains there but a small scale, a dried nodule, crust, or scab. This circumstance explains the fact that, excepting one case of Hebra's who found a burrow 16 cm. in length, they measure no more than 1-3 cm.; and that, although the pregnant female, for instance, can lay up to fifty eggs, more than twenty to twenty-five are never found in a burrow.

By the time such a long burrow is finished, the young ones first hatched have already reached the stage of maturity and propagation. While these are striving to fulfil their destiny, they will produce the same conditions of the skin as their ancestors; itching, nodules, vesicles, pustules, and burrows. If we bear in mind that the mites, besides multiplying, partly wander off, partly are transferred by the finger nails in scratching to some remote regions, we shall understand how scabies may spread over the whole body from a single point.

The subjective symptoms increase in consequence of the spreading of the process, and manifest themselves in the latter case not only at the places occupied by the parasites, but, owing to the many simultaneous points of attack, the reflex, and the irradiation, the patient is forced to scratch here and there and everywhere.

The following morbid picture is presented on the skin: While on the one hand the mites and their burrows increase, as well as the nodules, vesicles, and pustules produced by the presence of the animals; on the other hand, all sorts of eruptions are caused by the scratching with the finger nails.

The localization occurs in the following order of frequency: flexor side of the wrist-joint, lateral surfaces of the fingers, interdigital folds, anterior axillary folds, nipples and surroundings in women, penis, anal region, navel, etc. Or to express ourselves more concisely, we may say that the mites, their burrows, and the eruptions immediately produced by them are met with most frequently on those parts which are covered, protected, and kept in a condition of increased afflux of blood. Therefore we shall find them also where the skin is exposed to continual pressure by close-fitting articles of dress. But on this account, when the diagnosis of scabies is doubtful, we must never fail to examine such portions of the skin exposed to pressure, according to the occupation of the patient, for the presence of mites or at least of efflorescences. In infants and young children whose skin naturally is not subject to any certain continual pressure, there are generally no points of predilection for mites, and they may be found even in the face and on the soles of the feet.

The consequences of the scratching offer no peculiarities at all. They are the affections and efflorescences which we find in all chronic itching eruptions. On recently attacked places we see either a diffuse erythema or one corresponding to the scraping with the finger nails, and an urticaria which is eroded on the highest points, and with remission of the injury becomes lichen urticatus (Hebra). Where the irritations continue for a longer time and are repeated at one and the same place, artificial eczema, folliculitis,

furunculation, dermatitis, and cutaneous ulcers result. Biffon states that he has seen erysipelas in consequence of scabies.

But however variable the form of the eruption—erythema, urticaria, eczema papulosum, vesiculosum, pustulosum, erosions, ulcers, etc.—it is unchangeable in that it is largely grouped around those regions which are sought by the mites with special preference. But it happens occasionally that two or more such eruptive territories adjoin so closely that their peripheries blend with each other, thus resulting in larger patches of scabies. The region from the nipples to the knees is considered one of the largest, and termed by Hebra, with justice, particularly pathognomonic.

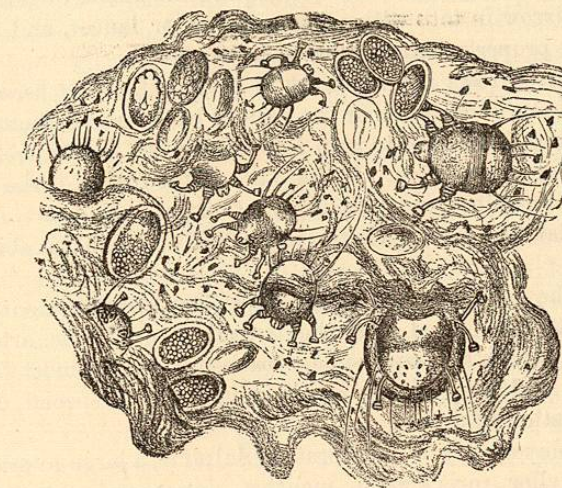


FIG. 48.

In exceptional cases, that is, when scabies patients remain for a long time—several years or decades—in a neglected condition, though the points of predilection are still most affected with all sorts of artefacts, the demarcation is no longer sharply limited, mites in variable quantities being met with everywhere, often on simple scraping of any crusted spot (Fig. 48).

DIAGNOSIS.—If we bear in mind all the symptoms enumerated, its recognition will generally not offer any special difficulties. What causes the patient to consult the physician is the continuous itching, literally spread over the whole body, and increased by warmth. In response to such a statement, we should for obvious reasons first inspect the hands to discover the burrows of the mite. In order to recognize these, we must remember that they represent undulating, punctated lines which become all the more distinct by painting with ink followed by drying (Hebra). If they are found sufficiently developed on the fingers or interdigital folds, the diagnosis is determined *ipso facto*.

If no burrows are present on the fingers or cannot be positively recognized there, they must be looked for on the points of predilection of the mites—penis, umbilical region, anterior axillary folds, nipples, or anal region. In a form of scabies, such as the one we have taken as the starting-point for our discussion, the development of burrows has occurred, as a rule, on one or another point. If it is probable that they are such, and a magnifying glass is at hand, we should not fail to fetch the mite out of its supposed burrow. If not skilful in catching the mite, it is advisable to compare the two ends of the burrow. At the point where the mite is located, we shall either at once see