NOTES
ON THE
BOUTON DE BISKRA
(MYCOSIS CUTIS CHRONICA, *AUCTORIS*).

BY
H. VANDYKE CARTER, M.D. LOND.,
INDIAN ARMY.

(COMMUNICATED BY J. BURDON SANDERSON, M.D., F.R.S.)

(Received November 9th, 1875—Read February 8th, 1876.)

THERE have long been known certain endemic skin-affections which in English are commonly termed "boils" or "sores," in French "boutons" or "clous," in German "Beulen," &c.; other more vague definitions abound, but it will be enough to remark here that the maladies in question are found in countries so wide apart as the west coast of Africa, the West Indies, certain oases of the Sahara, parts of Turkish Arabia, the shores of the Red Sea, Aden, Northern Sind, the Punjaub, around Delhi, and in the North-west Provinces of the Bengal Presidency, &c. Quite recently, also, I saw in the Island of Crete many examples of an endemic "boil" known as the "Caneotica," which is to be regarded as an imported form of the so-called "Aleppo evil."

Of all these peculiar skin-diseases good descriptions exist in medical works, but with very rare exceptions, so far as I am aware, nothing definite has been elicited as to their real nature and structural character; and it was with the hope of acquiring some much-needed information that in October last (1874) I visited the oasis of Biskra in Algeria, which is situated on the border of the great desert of Sahara.

The object of my search—well enough known as the “Bouton de Biskra”—has been compared with the Delhi boil and the Aleppo evil (*vide* Nos. 822 and 823 at p. 173 of the ‘Nomenclature of Diseases,’ London, 1869), and since these two last-named affections are familiar to medical officers in India as very troublesome complaints, whose true character it would be useful to ascertain, I obtained the generous permission of H.M.’s Secretary of State for India in Council to visit Algeria (amongst other localities) on my return to duty in the Bombay Presidency. Notwithstanding previous intimation, the month of October proved to be too early in the season, and I saw only a few cases of the “clou;” but this deficiency has been largely supplemented by the persevering exertions of my friend Dr. E. Weber, Médecin-Major, 3me Batn. d’Afrique, who furnished me with new information on points I had arranged to inquire into, and who has most kindly supplied me with the “pièces anatomiques” forming the subject of these notes. Other details and drawings which I had collected have been already forwarded to the India Office, and I do not propose in this place to enter upon a complete account of the bouton de Biskra, as I hope for future opportunity of discussing the entire class of affections to which it may be said to belong.¹

¹ It may, however, be useful to add that the complaint in question commences as a superficial papule or pimple, which in the course of some days becomes a nodule or “bouton,” and then acquiring a scab, often ends as a very indolent ulcer. The ordinary duration of the eruption is five or six months, or from November to April, and the spots may be numerous, secondary ones appearing round the first or at a distance. Very little local

The specimens from Algeria reached Bombay in June last; they had been placed in a solution of potassic bichromate, and though rather compressed were in good state of preservation, being of normal consistence throughout and free from any sign of decomposition. Respecting them Dr. Weber writes as follows:

No. 1. "Les morceaux sont des clous de Biskra au début; ils ont débuté chez le nommé Eurquet, soldat au 3e Batn. d'Afrique, mort le 5 Janvier, 1875, de phthisie pulmonaire; ces clous avaient 15 jours d'existence lors de la mort du sujet: chaque portion du clou excisée est entourée d'un morceau de peau saine; ils ont été pris sur les bras."

No. 2.—"Les morceaux viennent du nommé Rebours, soldat au Bataillon d'Afrique, mort le 16 Janvier 1875. L'un de ces clous était ulcéré. Tous sont entourés d'une partie de peau saine: cet homme est mort d'une albuminurie (Maladie de Bright). Les clous ont été pris deux sur les bras, l'autre sur le front."

There were also specimens of a cicatrix of ten years' standing, and a bit of healthy skin sent for purposes of comparison.

I now proceed to describe the minute structure of these preparations, and will afterwards add a few remarks on the facts elicited.

No. 1. Early stage of the "clou." Three specimens. After their long immersion in the bichromate little change was to be seen by the unaided eye, and upon section only a bulging of the surface with a slight brownish infiltration of the cutis, which indicated the situation of the

pain or redness attends the "clou," and as a rule there is no constitutional disturbance whatever. Afterwards a scar is left having a punched-out character and little disposed to contract; it long retains a brownish tint and is almost indelible. The ulceration when extensive assumes a serpiginous character. The commoner sites of the clou are the face, arms, and legs.

Unless the Anglo-Saxon word "boil" means both "tuber" and "ulcus" its application to the present instance is unsuitable. There is, perhaps, nothing of a furuncular character in the clou de Biskra, and this complaint has no connection with syphilis, &c.

bouton. In different instances this measured $\frac{1}{8}$ to $\frac{1}{3}$ inch long and rather less in depth, and though without any definite form was yet tolerably defined at its boundaries. After hardening in alcohol vertical and transverse sections of the "bouton" were made, and the thin slices were then placed in glycerine, to which acetic acid, liquor potassæ, and carmine solution were separately added. No other reagents than these were employed. Both high and low microscopic powers were used, the light being good and the air warm and dry or moist. There appeared no reason whatever to attribute the incidence of the parasitic growth described below to accidental causes, and such moulds as are apt to spring up in glycerine preparations present a totally different aspect.

After close scrutiny with the microscope I conclude that the clou de Biskra is essentially a granulation tumour, *i. e.* a tumefaction caused in chief part by the advent of pale, round cells measuring $\frac{1}{4000}$ to $\frac{1}{2000}$ inch in diameter, and which, becoming densely crowded in the cutis, produce expansion of the connective-tissue meshes, effacement of the papillæ and the disappearance of the adjoining softer epidermis. Compression of the hair-sacs, with extrusion of the hairs and envelopment of the sweat-ducts, are noticed; and following the course of these ducts collections of similar cells are found, extending into the subcutaneous areolar tissue, and there accumulating around the sweat-glands themselves. Blood-vessels are numerous and enlarged, especially in the corium; nerves and fasciculi of smooth muscular fibre are to be seen, often also surrounded by the pale cells; but none of these structures of the skin, whether extrinsic or intrinsic, are essentially altered in appearance. For illustration of these remarks see Plate VII, figs. 1 and 2.

It would certainly seem that this cellular infiltration commences in the more superficial part of the cutis; and there, too, the parasitic growth I am about to mention first makes its appearance. The cell production is always well-defined in its limits, and would seem to be

superadded to the tissues rather than derived from them. So far nothing very peculiar was made out, since several skin tumours are mainly composed of these pale cells, which are variously termed lymph, granulation, migratory or embryonic, &c., corpuscles, but in searching further I at length detected the appearances depicted in Plates VIII and IX, fig. 1. Thus, permeating the cellular infiltration, and especially frequent at its outskirts, were seen numerous bulging and branching channels, which were usually filled with filamentous or mycelioid structures. On transverse section, round spaces appeared similarly occupied, and it became evident that the lymphatic vessels of the parts implicated were the seat of a foreign growth, which can only be compared with that which is characteristic of the lower vegetable organisms. Generally the walls of these channels are thin, but in the papillary portion of the cutis a condensation of tissue due to expansion of the local lymph canal may be seen around them; an endothelial lining may often be detected, and the general arrangement of the canals in question leaves little doubt of their being lymphatics in various degrees of distension. Generally their diameter attains the $\frac{1}{800}$ to $\frac{1}{300}$ inch, and sometimes they are so wide as to merit the name of lacunar spaces.

It is, however, in their contents that interest chiefly centres. Lymph-cells are not seen, and seldom anything like coagulated plasma, but there is instead a form of growth which must, I think, be regarded as strictly parasitic in its characters. The occurrence of granular micrococcus-like masses in these lymphatics would have been striking enough, but to find so clear proof of mycelium structure was wholly unanticipated. The conjunction with this of spheroid and zoogloea forms, in the same localities, removes all obscurity as to the character of the new organisms.

The mycelium structure is composed of bright filaments measuring $\frac{1}{20000}$ to $\frac{1}{15000}$ inch in breadth, and seldom more than $\frac{1}{800}$ inch in length; they are usually straight or

slightly wavy, branch and divide dichotomously, and commonly at open or even right angles, so that the collection has the crooked aspect of a bundle of thorns or an intercrossing of spider's webs. The interlacing of fibrils is therefore not very close, and this open aspect together with the "bent" look of the whole might be worthy of a *special* distinction.

Sometimes alone, but commonly intermixed, are found bright, refractile spherules, and it occasionally appears that the filaments may be constructed of rows of these particles; but more often it is evident that the terminal branchlets of the mycelium furnish, by a budding process, one or more of the bright granules which should hence be compared with spores or conidiæ. Probably these spores also undergo germination on the spot of their production, and, in fine, it has seemed to me as if the whole process of development were as follows:—Free micrococci grow into masses in which a mycelium appears, and from this arise spores which, by accumulation, produce an aspect again approaching the original zooglœa-form, only that the last-formed individual particles are larger than the first were. What next occurs will be afterwards surmised, and several details omitted in this brief narrative may be noticed in the Plates VIII and IX hereto appended.

Neither acetic acid nor solution of potass destroy the growths. The latter are almost colourless, and only in the mass do the micrococcus groups assume a brownish aspect. I am unable to say whether or not the mycelium filaments are jointed; sometimes they have a beaded contour, but even this is not always apparent, the edges seeming parallel; in general, the differences noticed in either filament or granule, or in the relative proportion of the two, are inconsiderable and readily explicable by reference to varying stages of growth.

Nowhere else than in the one situation named have these appearances been detected; and I would add that when they become familiar to the observer, he may afterwards find them in parts of the tumour where at first they

were passed over. A good light, high powers, and careful focusing have enabled me to see this remarkable parasitic growth in almost every part of the "clou," but where the cellular infiltration is unusually copious there it may be impossible to find it. The growing part is evidently the margin of the tumour, and principally that edge close to the surface of the skin. At the superficies, too, the clou seems to commence, and I have traced a distended lymph-tract so close to the free surface that it seemed as if by an irregular channel through the epidermis itself, its contents might be extruded or foreign matters enter inwards.

Respecting the source of the pale, round, infiltrating cells, I would only remark that although they were most abundant around the distended blood-vessels, yet they were numerous elsewhere; and such of the like as may have been contained in the lymph channels were very effectually driven away, since none could be seen in the midst of the advancing parasitic growth. Possibly this expulsion would partly account for the cellular infiltration which attends the progress of the implanted organisms, and certainly the whole formation of the "bouton" is a slow and gradual process.

Specimen No. 2.—Late stages of the bouton de Biskra. Under this head are included an ulcerated "clou" from the forehead, and two others from the arm; actual duration of disease not mentioned, but known to be advanced. Sections were made and treated as in No. 1.

The pieces taken from the arm presented a general aspect like that above described, only the reddish-brown infiltration was more evident to the eye and of softer consistence. The surface was also more irregular, and the still persistent cuticle had here and there been pushed outwards by force from within, with the result of leaving depressions which had the aspect of follicular involutions of the epidermis, but no morbid element was noticed in connection with these alterations of the cuticle,

even when they were considerable. On minute examination the bulk of the tumour was found to be still granulation-tissue; no marks of fatty degeneration in the cells were present; blood-vessels abounded. Groups of pale cells were seen deep down in the subjacent connective tissue, but the more striking feature here, and to a rather less extent superficially, was the abundance of bright, orange-coloured particles, almost everywhere scattered throughout the tissues, and specially numerous around the sweat-glands, ducts, and larger vessels (see Plate VII, figs. 3 and 4). Commonly grouped in small clusters, their individual size varies from $\frac{1}{10000}$ to $\frac{1}{2500}$ inch; their form is rounded or rarely ovoid, or dumb-bell shaped as if dividing. They resist the action of acetic acid and solution of potash.

Several varieties in their aggregation were visible, but as many groups were in form regular, being ovoid or elongated, and as much as the $\frac{1}{2500}$ inch long, with a clear contour and evident organic connection, it must be allowed that some uniform influence determines their form and position, and I infer that these remarkable bodies are properly located in the interspaces of the larger bundles of connective tissue. Certainly some of the orange-tinted masses may be contained in lymph-spaces lined by endothelium, for in addition to an evident linear arrangement, I have noticed that the endothelial cells partake of their hue, becoming studded with tinted granules; and since the finer lymph or serous channels are everywhere widely distributed, the complete dispersion of these coloured bodies becomes easily explicable. That the coloured particles originate within the granulation-cells is not likely; and even the more plausible idea that they are derived from disintegrating red blood-globules is, notwithstanding the rare occurrence of free hæmatoidin-like masses, by no means well founded. Appearances have at times suggested that the ovoid and more capsulated groups of particles (which might be compared to *thecæ*) are borne at the end of mycelium filaments of large size,

which exist in the tissues themselves ; yet on re-examination of the specimens it has always been doubtful whether the abounding elastic fibres had not simulated such mycelioid growth ; and, in short, I am unable to account for the presence and dispersion of these characteristic bodies, except on the supposition that they represent a further—perhaps terminal or fructificational—stage in the growth of the undoubted parasite which has been shown to be present in the early period of the “clou.” If this view be correct, the occurrence of such remarkable products is a fact both novel and interesting.

In these later specimens of the “clou” the true mycelium growth was not seen, but occasionally micrococcoid masses were found, which were sometimes shrunk or withered in aspect, and at other places were in seeming connection with the tinted groups as indicated in Plate IX, fig. 2. From this observation there is derived confirmation of the opinion that a final stage of the entire parasitic growth is represented by these coloured bodies.

The specimen of ulcerated “clou” from the forehead is noteworthy from its greater vascularity, and the abundance of round and stellate granulation-cells; and the large papillary eminences seen on its surface would imply that a sort of “fungating” sore had existed. The ulcer was well-defined and its dessicated secretion was abundant ; but no peculiar element in this discharge could be detected in this specimen. In no part were vegetable organisms to be seen, and the orange-tinted particles were few in number ; hence one might suppose that the parasitic growth, with its products, had become mostly expelled, and such is a probable consequence in all cases of active or prolonged ulceration of the clou.

Dr. Weber has remarked that the open-ulcer form heals more quickly than the non-discharging squamous or scabbed variety of this affection.

I found fat-cells and striated muscular fibre at the base of the ulcer in question, but in localities of the body where the subcutaneous connective tissue is more abun-

dant than on the forehead, so deep a penetration of the sore as is here implied is rarely seen. The sweat-glands were noted as particularly large, their contents were unchanged in aspect.

The decided reddish hue of the substance of these 'boutons' is doubtless partly due to the presence of the small orange-tinted masses above described.

Specimen No. 3.—An old cicatrix taken from the forearm of an Arab, who died in consequence of fracture of the skull. The scar was said to be of ten years' duration. Repair was almost complete; the cuticle was smooth and thin, pigment abundant, papillæ few and irregular; loose connective tissue was found in place of the corium, and a few hairs and sweat-glands had survived. In several places close to the skin I noticed a scanty collection of the red masses, mostly disposed in thin streaks; nothing else abnormal was detected. Hence one would infer that on the formation of a scar hardly anything remains of the original "clou."

The portion of healthy skin which I examined presented no trace whatever of change; it had been treated in precisely the same manner as the pathological specimens.

Remarks.—The most obvious fact which has been elicited in the preceding observations is the close and constant association of a parasitic growth with the bouton de Biskra; and the question now arises whether or not the former be the essential cause of the latter.

In the absence of synthetic experiment (which was clearly impossible in the present instance) this question cannot strictly be answered, yet analogy and several collateral circumstances would point to affirmative reply.

Undoubtedly the presence in the tissues of a foreign growth would be a sufficient reason for all the signs of irritation which are seen in this tumour of the skin; and the following features of the complaint are adequately explained on the affirmative decision.

The "bouton de Biskra" is, like the "Delhi boil" and "Aleppo evil," (*a*) an endemic affection; it is (*b*) seasonal

in its occurrence, has an incubation period, and is limited in duration; (c) the site of the clou, or the first clou, is usually on parts exposed to contamination; (d) the spots are commonly multiple and seldom recur. Here, I would remark, is evidence of a constitutional nature singularly analogous to the phenomena of "variola;" and it would not be unreasonable to infer that it is through the lymphatic vessels that the system becomes affected.¹ Something may be added by the vegetable organisms I have described, which exerts a protective influence; and the successive cropping of the local manifestations may be regarded as other evidence of local and systemic infection.

(e) Although the clou de Biskra is not to all appearance a contagious malady, yet there is evidence that it may be propagated by inoculation. Most, if not all, residents at the station some time or other acquire the disease, and persons are affected even after leaving the locality.²

¹ Having before considered this point I begged Dr. Weber to inquire into it, and he writes as follows:—"Biskra, 23rd April, 1875.—Cette année-ci les clous ont été très nombreux, et guidé par vos avis et vos conseils, j'ai trouvé dans la plupart des cas un retentissement vers les ganglions lymphatiques, se propageant à ces ganglions par un chapelet de petits ganglions engorgés le long des vaisseaux lymphatiques: je vous ai même envoyé le clou d'un homme mort à la suite d'un érysipèle de la jambe qu'un clou au pied avait déterminé (this specimen did not reach me.—H. V. C.); depuis, j'ai vu plusieurs cas du même genre, qui n'ont pas eu une terminaison aussi funeste, mais qui ont donné lieu à des abcès le long des lymphatiques. En ce moment même j'ai encore en traitement à l'hôpital un homme qui a un clou au pied avec un érysipèle de toute la jambe jusqu'au genou, et du genou part un chapelet de ganglions qui va répandre aux ganglions de l'aîne: vous voyez par cela qu'en général les glandes lymphatiques ne sont pas épargnées, quoique d'habitude les complications de ce côté sont peu graves."

² It was, of course, important to determine the question of inoculation, and Dr. Weber writes of his proceedings thus:—"Des personnes arrivées à Biskra en automne ont eu des clous 7 jours après leur arrivée, et dernièrement un Vétérinaire qui est parti pour la France a eu des clous 30 jours après son départ de Biskra. Les inoculations que j'ai faites à Biskra et que j'ai faites faire à Philippeville avec le liquide du clou n'ont pas donné de résultat concluant, mais m'étant conformé à votre conseil d'inoculer les croûtes, je suis arrivé à un beau résultat. Voici le fait. Le 7 Avril 1875 tous les clous étant presque guéris, j'ai pris un homme, soldat au Batn. d'Afrique, âgé de 25

I may here remark that the Delhi boil and Aleppo evil are known to be inoculable, and in Crete I was informed that the Caneotica is certainly even contagious. The same property attaches to the frambœsia of Africa and the W. Indies, and if the observations recorded in the text of these "notes" are applicable to the maladies just named, no inconsiderable light in this respect is, as it seems to me, hereby thrown upon the whole series of them.

I do not propose pursuing this topic, and will only add that until now no efficient cause of the malady in question has been made known. I have carefully perused most of the original essays of French authors, and cannot but conclude that none of the assigned meteorologic, telluric, or dietetic influences usually invoked can be regarded as the *vera causa* of the bouton de Biskra.¹ An inkling of the probable truth was, however, long since

ans, ayant un clou de trois mois à l'avant-bras; n'ayant aucun antécédent syphilitique et d'un bon tempérament. J'ai pris un morceau de la croûte, je l'ai réduit en poussière et j'ai inoculé sous l'épiderme quelques grains de cette poussière à 3 soldats et à M. Maty, mon médecin aide-major; les trois soldats ayant un peu de crainte l'inoculation n'a pu être faite dans de bonnes conditions, mais chez le docteur Maty, âgé de 27 ans, à Biskra depuis 8 mois, n'ayant aucun antécédent syphilitique, j'ai bien introduit la poussière de la croûte sous l'épiderme de la cuisse droite. Trois jours après, la piqure prenait le caractère du clou de Biskra au début, et aujourd'hui 23 Avril, ce clou à forme ulcéreuse, ayant le fond de la plaie fongueux, est grand comme une pièce de 2 sous, c'est-à-dire qu'il a trois centimètres de diamètre, et n'ayant aucune tendance à la guérison; il n'est pas enflammé ni douloureux; cependant dans les premiers jours les glandes lymphatiques de l'aîne ont été un peu engorgées, sans douleur mais aujourd'hui cet engorgement a disparu. Voilà donc un clou inoculé ayant maintenant 15 jours, avec tous les caractères du clou de Biskra, que j'ai fait constater par tous les médecins présents ici et par d'autres personnes qui ont l'habitude de voir de ces clous: et de plus, depuis quelque jours trois autres petits clous sont en train de se développer sur la même cuisse à environ 15 centimètres audessous du premier qui est assez grand." Dr. Weber continues, "toutes ces raisons me font croire que le clou de Biskra est une affection spécifique dont la cause m'est inconnue."

¹ It need not be denied that the system may be infected by a parasite otherwise than through the channel of the skin; and in such case, as doubtless holds good for some outbreaks of the clou subsequent to the first, the cutaneous eruptions would be of a "secondary" character.

felt by Virchow, who sagaciously remarks ('Pathol. of Tumors,' Fr. trans., vol. 2, p. 526) of the bouton d'Alep, de Biskara, Sind and Delhi—"The course of these affections is so peculiar that one would be almost tempted to attribute the disease to the presence of some parasite; but there are no data on this point." Subsequently, indeed, medical officers in India have made valuable observations on the Delhi boil, but no undoubted parasitic growth, as I think, has been established to account for the complaint; and it was mainly by way of preparation for further research in this country that I undertook the visit which has, after some interval, proved to be thus not unproductive, and which may by the results now recorded stimulate other observers to inquiries not less promising than was that touching the bouton de Biskra.

Addendum.—Constitutional treatment has not been found to influence the course of this affection; and, locally, caustic applications are alone of any use. Change of residence is beneficial.

Depending on the accuracy of the view that the bouton de Biskra is caused by a lowly organised parasitic growth of plant-nature, I have ventured on the name *mycosis cutis*, adding the word *chronica* to indicate a distinction from the similar acute specific diseases. Perhaps, by-and-bye, this proposed designation will prove suitable for the whole class of these endemic skin-affections, including the Aleppo evil, Delhi boil, framboesia, and the like.

As regards the place of the specific-invading organism above described I would not yet attempt its identification, for this would be premature.

DESCRIPTION OF PLATES VII, VIII, IX.

PLATE VII.

Mycosis cutis chronica : vertical sections of the Bouton de Biskra.

Fig. 1.—Vertical section of a clou de Biskra at the early stage (duration fifteen days) : $\times 60$ diameters. The shaded tint indicates the general disposition of the cellular infiltration which forms the mass of the tumour and surrounds the blood-vessels, ducts, &c., being prolonged with these into the connective tissue subjacent to the skin. Its chief seat is in the corium, and by its accumulation there the papillæ are effaced and a bulging, yet unbroken contour is produced.

Fig. 2.—A portion of the above magnified 300 diameters. It is taken from near the free surface, and shows the so-called "granulation-tissue" of which the bulk of the "bouton" is formed. On the right, the orifice of a distended blood-vessel is depicted.

Fig. 3.—Vertical section of an ulcerated "clou" made near to one edge : $\times 40$ diameters. To the left are seen a few unchanged or little enlarged papillæ : the granulation-tissue is abundant and forms the basis of the ulcer, being also prolonged downwards. At * is the jagged surface of the ulcer and irregular masses of epithelium, &c., are seen projecting from it. The sweat-glands (one is indicated at †) ; their ducts and some blood-vessels are seen to be surrounded by dark granular streaks, which represent the orange-tinted bodies described below and in the text.

Fig. 4.—A portion of the above magnified 300 diameters : acetic acid has been added. It shows the form and arrangement of the orange-coloured granules and masses found at this late stage of the "bouton" : their bright appearance is represented in black tint. To the left is part of a sweat-gland ; to the right a bit of granulation tissue.

PLATE VIII.

Mycosis cutis chronica.—The parasitic growth in the lymphatic canals, vertical section.

Fig. 1.—Vertical section of the deeper part of a "bouton" at the early stage : $\times 500$ diameters : with acetic acid and glycerine. A sweat-duct passes down the centre ; and on its right, below, is a dilated lymphatic canal containing the parasitic growth, whose interlacing filaments are represented in its interior. To the left, above, is another lymphatic trunk filled with the growth, and the two canals unite at the top, where a large-grained micrococcus-mass is seen projecting in the lumen of their common trunk : around here are numerous pale cells, but elsewhere the connective tissue is yet

free of infiltration. Both mycelium-filaments and spherules (conidia ?) are to be seen within the lymph-lacunæ: and in other specimens more minute spheroids were as well observed.

Fig. 2.—Shows a few of the filaments and spheroids in a part of the above: $\times 700$ diameters. A beaded or jointed aspect of the former is perceptible, and the origin of the latter by pullulation at their tips seems to be indicated.

Fig. 3.—Mycelium-filaments from another collection: $\times 700$ diameters: treated with acetic acid. As a variety, they are smoother and less angular than is commonly seen.

PLATE IX.

Mycosis cutis chronica.

Fig. 1.—Transverse section of the edge of a "bouton" in the early stage: in glycerine and acetic acid. $\times 500$ diameters. It shows on the right a divided papilla and the free surface; above are a few granulation-cells; elsewhere are seen the branching lymphatic channels which are occupied by an invading fungus growth. One of these canals is seen issuing from the interior of the papilla, and in this situation dilated cavities are not uncommon; they lodge the parasitic mass, but in thin sections, the latter falling out, they may appear to be empty.

Fig. 2.—Transverse section of a "clou" in the later stage; made at the deeper surface. Treated with acetic acid. $\times 500$ diameters. It shows a dilated channel here making a bend, in which (embolus-like) is contained a granular mass having all the aspect of micrococcoid composition, except that the individual spheroids are of larger size than usual: a detached fragment is seen to the left. Above, the lymph-channel appears to be in communication with some collections of the orange-tinted particles. Other coloured groups are visible to the right, where they are lodged between fasciculi of fibrous tissue: a few larger ones are free. Numerous granulation-cells are also present, so that excepting the mycelium structure (which probably preceded the micrococcoid masses) all the characteristic elements of a bouton de Biskra are here visible.

FIG. 1.

FIG. 3.

FIG. 2.

FIG. 4.

FIG. 1.

FIG. 3.

FIG. 2.