

# PARASITIC GRANULOMA: A CONDITION ALLIED TO ORIENTAL SORE OCCURRING IN EGYPT

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## PLATES XII-XV

Outpatient practice among the poorer classes in Egypt includes a variety of conditions not described in the English textbooks. One of these has presented itself with sufficient frequency to induce us to try and investigate it. It consists essentially of a chronic elevated patch or warty growth in the skin, sharply localised, and unaccompanied by other symptoms. Most of the cases we have so far seen have been structurally papillomata, others have consisted of flat skin-covered granulomata. We have described them as warty and flat forms respectively, and in both we have occasionally found 'bodies' of the same class as those described in Oriental sore. Clinically, however, these cases differ widely from the usual description of that condition, and we do not think they can be classed under that name as it is used at present.

Taking these two forms of the disease together, we have, so far, investigated clinically and pathologically ten cases of the nature of which we feel tolerably certain. Besides these, we have observed a number of similar ones in which some doubt existed, or of which full notes have not been kept. In addition to these, Professor Bitter and Dr. Dreyer, Bacteriologist and Assistant Bacteriologist respectively to the Egyptian Government, have each met with a case of a similar nature, in which the parasite was found. They have kindly permitted us to append their notes of



these cases to the present paper. We desire further to acknowledge our indebtedness to Professor Bitter for allowing us to reproduce his excellent micro-photographs of the parasites seen in Pl. XIV, figs. 11, 12, 13.

There is no doubt that this condition was equally common in the past, and the diagnoses show that there was less difficulty in distinguishing it from other diseases than in finding a suitable name for it. Among the names previously employed by various English and Egyptian members of the staff, we find 'papilliferous degeneration of skin'; 'chronic benign papilloma'; 'pseudo-epithelioma'; 'false elephantiasis'; 'hypertrophic dermatitis'; 'lupus erythematosus exanthematosus'; 'granuloma of foot'; 'partial ichthyosis'; 'parasitic growth'; 'fungous growth'; 'fungating granuloma.'

Cases bearing these very varied titles seem, as far as we can gather from reports, and in some cases observation, to have belonged to the class described above. These names are interesting as showing the clinical features which struck a number of different observers in individual cases.

*Incidence.* In the ten cases we have selected, the age of the patients varied from eighteen to sixty, with an average of thirty; they were all males, and with the exception of two students, all fellaheen. Five of them were affected on the forearm or hand, four on the legs or feet, one on the face. Half of them had single lesions, half multiple. The duration of the disease varied from six weeks to ten years; excluding the last figure they averaged six months.

Consequently, as far as we can conclude from so few cases, the disease, as we meet with it, is one affecting male fellaheen at any time in their adult working life, it may be single or multiple, and it affects the arms and legs about equally: the patients usually apply for relief about six months after the disease has begun.

We have never obtained any history of similar cases in the same village from which infection might have been acquired. Where infection is multiple, the lesions are usually near one another. This may be due to simultaneous infection, but more probably, especially where there is an interval of time between them, to auto-inoculation from scratching.



The chronicity of the condition is sufficiently well shown by the histories. The rate of progress varies a good deal in different cases, but is slow in all; the channel of infection is probably through the skin, for it appears almost exclusively on uncovered parts, i.e., the limbs and face rather than the trunk.

As regards the constitutional condition of the patients, they none of them gave any constant or important medical history, and their general health was clearly unaffected. In those cases in which we examined for enlargement of liver or spleen, it was absent.

### I. WARTY FORM

These masses begin as small painless tubercles and may gradually attain a diameter of three or four inches. The skin round their edge is usually healthy, but it may be reddened from sepsis, or show a definite areola marked by loss or increase of pigment. They have a very definite, raised, even overhanging edge, and may rise nearly an inch abruptly from the level of the surrounding skin. The surface of the growth, by the time it is seen, is often ulcerated in whole or part, but typically is covered by hard whitish epithelium, and presents a warty cauliflower-like appearance. It is intersected by clefts lined with foul decomposing epidermis; indeed, where bacterial infection has occurred, it is possible to express masses of dead epithelium with pus from numerous apertures under the overhanging edge. In places where movement naturally takes place, as on the front of the ankle, some of these clefts deepen and appear as transverse fissures which extend through the skin and give rise to pain on movement. With this exception, the disease appears to be painless. There is occasionally some local oedema and enlargement of lymphatic glands, but these depend on secondary sepsis and are not an essential part of the disease.

Most of these growths become septic in course of time, and full of mixed infection. Most of their offensive smell and foul appearance is due, however, to decomposition of epithelial masses on the surface and in the clefts, outside the substance of the growths altogether. If they could be kept clean, which of course



they never are, they would probably show a firm white mammillated surface, like the head of a raw cauliflower, to sight and touch.

A very striking feature, and one that marks them off at once from malignant growths, is the way in which they are confined to the skin, and hardly ever affect even the most superficial tendons. An extensive growth on the dorsum of the foot scarcely affected the movement of the extensors of the toes. And it is quite easy, after running an incision round them, to strip them like a scalp off the deep fascia, leaving a smooth surface on which grafts take readily.

An exception to this was Case VIII, in which the growth situated on the inner side of the elbow, had enveloped the ulnar nerve and invaded the internal condyle for a short distance. But this growth had been present for ten years, and the ulnar nerve, which ran through it much as the spinal accessory runs through tubercular glands, was easily freed, and covered with a skin graft. It retained its motor and sensory functions unimpaired. The fact that the growth could completely surround a nerve for a distance of some two inches for a period of several years, and leave it functionally active and sufficiently well nourished to take a skin graft on its surface, is very good evidence of its sharp limitation and innocent character.

## II. FLAT FORM

So far we have only seen two instances of this variety as against eight of the preceding. They both occurred in students of the higher schools, one on the face and one on the forearm, and had been present for four and twelve months respectively. In appearance they were flat pink patches, raised one or two millimetres above the surrounding healthy skin, covered with thin epidermis, sharply limited, painless, soft, and freely moveable on the deeper structures.

Their essential identity with the preceding form is suggested by the fact that they contained similar intracellular parasites. It is possible that the apparent differences are due to external causes. Both these cases were in men of the educated class, who kept the growths clean and protected from irritation. It is possible that, if

they had been situated on the bare and dirty limbs of fellaheen, exposed to constant friction and bacterial invasion, they might have shown the same proliferative changes which are so marked in the papillomatous form.

The two cases recently described by Balfour\* fall into this class, in which, in our experience, the parasites are present in much larger numbers.

*Treatment.* A very large variety of lotions and ointments have been used for these growths. They seem to have no effect, beyond slightly diminishing the sepsis.

In one case a determined attempt was made to treat a large patch by ionization with iodine. Under this treatment there was distinct improvement up to a certain point, and the size of the growth was measurably lessened; but after six weeks there was not enough change to make it worth while continuing.

For fellaheen especially—who cannot afford to spend a long time in hospital—the only treatment worth considering is that of excision of the whole mass, followed by immediate skin grafting. The growths can be readily stripped off the underlying fascia, and in spite of the sepsis usually present, grafts take fairly well. A good example of this is shown in Pl. XIII, fig. 8 (Case VIII).

### CASES

*Case I.* Pl. XII, figs. 1, 2. Man aged eighteen, admitted January 21, 1907, under Mr. Richards. Six weeks ago he had swelling of both legs; a few days later small red patches appeared, which increased in size and turned brown.

On admission there is a brown circular raised patch, three inches across, divided by irregular furrows containing a yellowish-brown secretion, situated in front of the ankle and extending back past the external malleolus. A similar one on the internal malleolus of the right leg, and a smaller one above it. Two more on the dorsum of the left foot. The patches have a foul smell, and are surrounded by an inflamed area. There is a little oedema of both feet.

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\* 'Trans. Soc. Trop. Med. and Hyg.,' Vol. III, No. 3, p. 107, January, 1910.



The feet were cleaned, and various patches were treated with salicylic, boric, and yellow oxide of mercury ointment respectively. Potassium iodide was given internally.

After twelve days in hospital there was no improvement, and he was discharged at his own request, unrelieved.

### *Pathological Report (A.R.F.)*

Great overgrowth of epithelium, with a cellular and vascular granulation tissue, pushing its way upwards through and between the greatly hypertrophied papillae. No purulent process or appearance suggestive of Madura foot. It may be a simple chronic wart, but the character of the infiltrating tissue beneath reminds one of a specific infiltration.

*Case II.* Pl. XIII, fig. 6. Man aged thirty, admitted August 4, 1908, under Mr. Richards. Four months ago a small painless papule, without discharge, appeared on the outer malleolus of the left leg, and increased in size.

The mass is the size of an egg, oval, raised above the surface, hard, papillomatous. The small papillae are of a purplish colour, and between them the surface is covered by yellowish crusts. It is sensitive to touch, but not painful, even on pressure.

Similar smaller growths occur on the chest and the right second toe, dating two and four months respectively.

It was treated for 18 days with liniment and tincture of iodine, and showed great improvement, but did not disappear. The patient then left hospital at his own request.

*Case III.* Pl. XII, figs. 3, 4. A man aged twenty-five, admitted April 23, 1908, under Dr. Phillips, transferred to Mr. Richards April 29.

Ten months ago he noticed rough, red, warty, painless masses appearing in front of right ankle and on dorsum of left foot. As they grew older they became white and encrusted. Four months later they began to be painful. No similar case in the district.

*Right foot.* A square papillomatous mass  $12 \times 11$  cm. raised 2 cm. from the surface, over the front of the ankle joint. It is divided by three deep transverse clefts extending right through it, and filled with foul-smelling epithelium. The surface is covered with

epidermis, and has a low-set warty cauliflower appearance. There is no ulceration. It is surrounded by a margin 1-3 cm. broad, in which the skin is raised, smooth and glistening with some loss of pigmentation.

A similar oval patch  $7 \times 3$  cm. is found over and behind the external malleolus. Movement of tendons unaffected.

*Left foot.* A similar patch,  $12 \times 7\frac{1}{2}$  cm., covering base of four inner toes and adjacent dorsum. Another over tendo Achillis,  $6 \times 4\frac{1}{2}$  cm., its lower margin level with malleoli. This has no cracks. Enlarged glands in groin on both sides.

### *Pathological Note (A.R.F.)*

A case, in my opinion, of the same parasitic nature as the two others (I, II). The parasite may be:—*a*, a pathogenic yeast; *b*, a mycelial fungus, Botryomycosis.

*Treatment.* All the growth was stripped off the right foot, leaving a smooth grey surface, which was painted with iodine, and afterwards skin-grafted. It healed well, but in July small warty indurations began to form in the scar, suggesting recurrence.

The left foot was treated by ionization with iodine. It decreased in circumference from 27 to  $25\frac{1}{2}$  cm., became painless and the movements of the toes quite free. It then remained stationary.

He was discharged at his own request, July 11.

*Case IV.* Pl. XIII, fig. 5. A man of 38, admitted April 24, 1909, under Dr. Day for cirrhosis and ascites.

On the right hand is a growth extending over the metacarpals of the first three fingers, with a raised border. The lesion was of a year's duration. It presented itself as a circular area with a firm, raised edge, which was rounded, covered with skin, and painless. Manipulation of the lesion was freely permitted, although the man said that it sometimes pained him at nights. There was no ulceration to speak of. The centre consisted of a thin, wrinkled cicatrix, said to be due to cauterization. The lesion had commenced centrally, and extension had since been going on at the edges.

Naked-eye section of the margin showed it to be composed of a solid white mass of epithelium, the processes of which ran



downwards in parallel fashion towards a very definite lower boundary.

*Pathological Report.*

Repeated search in films failed to show Leishman-Wright parasites. Bacteria were not infrequently met with. They were diplococci, very like pneumococci, and some short bacilli. Histologically it was a sore of papillomatous type.

*Case V.* A man aged 21. Admitted on March 17, 1909, under Mr. Richards. No venereal history in self or family; no similar growths in the village; has inquired from everyone.

The present masses appeared six months ago, and have been painful enough to prevent his working for the last three months.

On the left foot is a patch, three inches by two, on the outer side of the front of the ankle, raised a quarter of an inch from the surface, partly skin-covered, partly granulomatous, surface like a cauliflower, definite sinuous raised edge surrounded by healthy skin.

A second similar patch, four inches by two, rising abruptly half an inch from healthy skin, starts at the front border of the tibia, and goes round past the tendo Achillis. The edge of the growth overlaps the surrounding skin. Both masses have yellow scabs adherent to their surface in places, and smell foul. Inguinal glands enlarged, foot and leg oedematous. The growths were stripped off by Dr. Aly Bey Ibrahim, and immediate skin-grafting done.

Patient discharged cured soon afterwards.

*Pathological Report (A.R.F.)*

The tissue is essentially of papillomatous structure, the penetrating epithelial columns passing into an almost continuous zone of small-celled infiltration. On careful examination, this proves to be mononuclear in character. In films treated by Giemsa's stain, large numbers of bodies having the closest resemblance to the parasite of Kala-Azar (*L. donovani*) but



doubtless of the species *L. tropica* are found, both free and in the interior of large mononuclear phagocytes.

*Case VI.* A man aged 60, admitted August 23, 1909. A year ago a swelling appeared on the forearm, near the wrist, and four months ago a smaller one came higher up.

Two rough raised patches with thick everted edges, covered with scabs, and containing maggots. They were excised, and he was discharged cured.

#### *Pathological Report.*

No Leishman-Wright parasites found in scrapings. A good deal of mixed bacterial invasion, which may account for their absence. I have no doubt the growth is a parasitic papilloma.

*Case VII.* A man aged 26, admitted March 31, 1909, under Mr. Richards. Nine months ago a number of small red lumps appeared near one another on the inside of the middle of the left forearm.

The growth is superficial, does not affect movements. Its edge and part of its surface are covered with skin. Treated by excision and grafting, and discharged cured April 24.

#### *Pathological Report.*

Search for parasites, so far, negative. A rich secondary microbial infection, which adds to the difficulty of the search. The margins are diffusely infiltrated with pus.

*Second Report.* Prolonged examination revealed the presence, in the films, of the same parasite (*Leishmania tropica*) as was discovered in a preceding case (No. V), but in very scanty numbers. These were only found free amongst the bacteria of secondary invasion. Although their form was identical with that of those previously found, the staining of their cytoplasm, and in particular that of their larger chromatin masses was defective.

*Case VIII.* Pl. XIII, figs. 7, 8. A man aged 45, admitted October 27, 1909, under Mr. Richards. His trouble began as a small boil ten years ago, and has increased since. No treatment. No similar cases in the village.

The right arm is occupied from the elbow to half-way up the humerus, and over the inner and front half of its circumference by a swelling, rising with an abrupt and overhanging edge from the skin to a height of  $1\frac{1}{2}$  to 2 cm. The skin immediately round the edge has a dark pigmentation about 2 cm. broad, but is otherwise healthy. The surface of the growth is mammillated, with ulcerated patches where the skin has worn off the tops of the projections, and divided by skin-lined cracks containing a foul fluid. The upper part moves freely on the deep tissues, the lower is anchored to the condyle. The arm is fixed at an angle of  $85^{\circ}$ , with scarcely any flexion or extension, but pronation and supination are free. No glands in the axilla. At the operation the upper part of the growth peeled easily from the deep fascia, lower down it surrounded, without invading the ulnar nerve, and involved the bone just above the internal condyle. This area—the only one where there was any deep invasion—was scraped out and packed with sulphur; the remaining surface was grafted; and in spite of the filthy condition of the arm, most of the grafts took well. The ulnar nerve, which lay bare and isolated beneath the grafts, preserved all its motor and sensory functions. He was discharged with a small sinus leading to the bone.

#### *Pathological Report (A.R.F.)*

Microscopical search in films, treated with Giemsa's stain, shewed no *Leishmania tropica*. Very numerous bacteria, diplococci, short streptococci, and an undetermined species of bacillus, were present. These, when present in large numbers, seem to determine the disappearance of the parasite.

*Case IX.* Pl. XV, fig. 9. A third year medical student, dressing for Mr. Richards, complained of two patches, one on his forearm, the other on his wrist, slightly elevated, flat, soft, pinkish, skin-covered, sharply limited, and freely movable. They had been present about a year. They were both excised under cocaine-adrenalin anaesthesia.



*Pathological Report (A.R.F.)*

The skin over the central portion of the lesion shows only slight thickening. There is beneath a dense, almost homogeneous mononuclear cell-infiltration; in two places, degenerated foci occur, in which numerous remains of cell nuclei are visible, but no bacteria. Films were not made from this case, but the characteristic parasite was found in sections, though not plentifully, in the larger mononuclear cells of the subcutaneous infiltration.

*Case X.* A student of the School of Law was admitted under Mr. Richards, with a patch on the cheek immediately below the left eyelid, measuring one inch by five-eighths. Flat, soft, pink, smooth surface, covered by thin unbroken skin. The skin around was quite healthy. It had been present for the last four months, and had gradually increased in size.

It was excised by Dr. Aly Bey Ibrahim.

*Pathological Report (A.R.F.)*

The specimen, as received, was incised by parallel sections, and placed in Formol-methyl-alcohol; microscopical sections being stained with Haem-alum and Eosin and also by Giemsa.

The skin over the lesion was much reduced in thickness, the majority of the Malpighian papillae having disappeared. The roots of hairs and sweat glands had also largely disappeared in an exceedingly dense cell-infiltration, which penetrated the corium for some distance. This, on examination with higher powers, was found almost exclusively mononuclear in character, the majority of the cells being of small size. Paler areas of larger mononucleated elements, however, were present as rather definite nodules in the midst of the small-celled infiltration. These were found filled with enormous numbers of parasites, very few occurring outside the cells. They were not so plentiful immediately under the skin.

*Case XI. Note by Dr. Bitter, October, 1908.* The case was that of a native officer of the Egyptian Army in Cairo, who had never been out of Egypt. He had small disseminated tumours, elevated about two to three millimetres, which were not ulcerated and covered with dry, whitish-coloured scabs



of epithelium. The diameter of the individual tumours varied from two to ten millimetres. About twenty of these tumours were found on the right forearm from the elbow down (Pl. XV, fig. 9), three on his face, one on the forehead and two in the angle of the nose. He had consulted Dr. Scheuber, a dermatologist in Cairo, who first thought it might be a case of leprosy, and who sent the patient to me for bacteriological examination. The research for leprosy bacilli was, however, negative; but I found the Leishman-Wright bodies in smears as well as in sections of an excised tumour. The parasites were situated in big mononuclear cells (macrophages) which were abundant in the stratum just underneath the epithelium.

The same dermatologist brought, a few months later, some slides and an excised tumour to Dr. Dreyer, telling him that they had been taken from a Roumanian lady who had lived in Cairo for several years, and who was suffering from a similar affection on the face and neck. The size of the tumour was, however, bigger. Her sister was said to suffer from the same affection. Dr. Dreyer found a good many Leishman-Wright bodies in cells of the same type as in the case of Dr. Bitter.

*Case XII. Note of a case by Captain M. F. White, I.M.S.\** (Pl. XV, fig. 14). The papules were first noticed in February, 1909, in Bushire (Persian Gulf), where cases were scarce at the time, none of the Europeans being affected. Had been in Baghdad two months previously.

The 'flea-season' was on in February and not much notice was taken of the spots. They consisted of a group of five small spots on the dorsum of foot, and two others further up about an inch away were noticed later. They varied in diameter from 3 to 5 mm. They were slightly raised with a dull red periphery, with a small scab in the centre, raised in some, depressed in others. The whole area of the five spots was slightly raised and inflamed. They gave rise to no symptoms, pain, or trouble whatsoever, except that occasionally after a hot bath they gave rise to slight tingling and became slightly swollen and red. Otherwise they have shown no sign of increasing or decreasing, and at the present time, fourteen

\* We beg to express here our thanks to Captain White for his note and photograph, and to the Authors for permission to include it in this paper.—EDS.



months after they were first noticed, they are practically in the original condition.

For the last month, two of the spots which have been used for microscopic examination, have taken to remaining open for a few days, but always heal up again with the aid of a simple dressing.

Smears were taken in April, 1910, and typical parasites (*Leishmania tropica*) found. None were found in the peripheral blood, though many attempts were made to find them.

Cultures were tried twice on sodium citrate, acidified with citric acid, and incubated at 22° C. according to Rogers' method, but no result was obtained. Cultivation was then tried on blood agar, with positive result in each tube inoculated. The cultures showed *Herpetomonas* forms after two days' incubation, but it was found impossible to maintain them and to make subcultures owing to the contaminating micrococci of the skin.

#### PATHOLOGICAL HISTOLOGY OF THE LESIONS

It may at once be said that the pathological features of the two types above described present an underlying identity. The differences between them, although very great, both as regards their naked eye and histological characters, are, we believe, explicable on the ground of accidental influences depending on situation, exposure to friction, bacterial invasion, etc. The essential identity of the two forms is indicated not only by the presence in each of indistinguishable parasites, but by the essentially similar nature of the sub-epithelial infiltration which both present.

*Warty Form.* So far, we have only observed the warty forms in exposed situations where the skin is normally of considerable thickness, and where such growths are liable (in the absence of any protective covering) not only to bacterial invasion, but also to proliferative changes consequent upon the maintenance of a chronic inflammatory condition from irritative influences of a diverse nature.

In a thin paraffin section including the elevated margin of the lesion, one sees a number of vertical epithelial columns which penetrate the dermis sometimes to a depth of 7 to 8 mm. (Pl. XIV, fig. 10).

Small, apparently isolated down-growths of epithelium, the



cells of which have a normal arrangement, also occur in the deeper lying tissue. Structures resembling 'cell-nests' have been frequently observed both in the epithelial columns and in the deeper epithelial collections just mentioned. The 'prickle-cell' nature of the epithelial down-growths is, as a rule, very clearly seen, the intervals between the cells being rather greater than usual by reason of inter-cellular oedema. The stratum granulosum and the keratinous layer are usually considerably increased in thickness. These features of the epithelium are simply those which might be expected to result from any chronic lesion. The 'cell-nests,' for instance, have no greater significance than they possess in other chronic lesions such as simple warts, scrofuloderma, etc.

The dermis itself is the seat of an exceedingly dense and uniform cellular infiltration which is continuous beneath the entire extent of the lesion. This infiltration is composed of cells of various kinds. The superficial strata of the dermis in the central parts of the lesion frequently contain considerable numbers of polymorphonuclear leucocytes, as well as free nuclei and other cellular detritus, the result of inroads by pyogenic bacteria. More deeply, however, the cellular infiltration is composed almost exclusively of mononuclear elements of various kinds. A certain proportion of these are indistinguishable from lymphocytes. In the midst of this cellular zone, small ill-defined areas are observed composed of mononuclear cells of much larger size than the preceding class. Such areas, seen under a low power, appear rather paler than the dense small mononuclear infiltration surrounding them. The parasites are found in the largest numbers in the interior of the cells composing such areas, though by no means exclusively confined to them. The infiltrated areas just described are fairly vascular, considerable numbers of small vessels of capillary character being present.

Hair-follicles and sweat-glands, which are often of course encountered, share to some extent in the surrounding infiltration, but have not been observed to suffer any degenerative or destructive change.

Deeply, the infiltrated zone gradually merges into the normal areolar tissue proper to the site.



*Flat Form.* The skin here, in contrast to the preceding form, is thinned and atrophied, the glands of the skin sharing markedly in the atrophic process. The papillae of the Malpighian layer are represented by very short processes, or are at the centre of the patch, entirely absent.

A sharply defined zone of cellular infiltration, practically identical in all respects with that described as pertaining to the warty form, is present under the thinned epidermis. Such a growth, examined in section with a pocket-lens, closely resembles the subcutaneous nodules sometimes seen in cases of leucocythaemia. The parasites, which occur in the large mononuclear cells described above, were present in such large numbers in both cases of this kind which we have examined, that the sections appeared to be crowded with them.

The parasites agree in every respect with the descriptions of *Leishmania tropica*. They are identical in both the warty and flat forms of the lesion (Pl. XIV, figs. 11, 12, 13).

Our two examples of the flat form were entirely free from micro-organisms. In the warty forms, on the contrary, these were constantly present. These micro-organisms were of many different kinds, and as they clearly represented a secondary accidental infection, we have taken no pains to determine their nature. They were most frequent in the superficial layers, and were never found deeply in the centre of the growth.

The examination of a large number of specimens has shown that in those cases in which bacteria were most plentiful, parasites occurred in very scanty numbers or not at all. Our opinion is that, so far from there being anything of the nature of a symbiosis between the two, the appearance of bacteria involves the extinction of the parasite. The reason why we have failed to find the parasites in so many of the cases reported, is probably that this process of extinction had reached a point where exceedingly few, if any, parasites had survived. The specimen which contained the parasite in largest numbers was one which contained no bacteria. Whether the bacteria ever destroy the parasites sufficiently to bring about a natural cessation of the process we have no means of judging, but it seems quite possible.

The condition is therefore essentially one in which the

subdermic tissues are invaded by *Leishmania tropica*. Almost certainly, the parasite, after its entrance has been effected, multiplies in enormous numbers. The large non-granular mononuclear cells are those which are primarily attracted to the site of infection, and they harbour the parasite in large numbers in their interior. Whether intracellular multiplication of the parasite occurs or not, we have no means of stating with certainty, but it would appear probable.

The skin over the site of infection may or may not show hypertrophic changes; in other words, the resulting lesion may be either a prominent centrally ulcerated papilloma, or a slightly elevated non-ulcerated patch. In either case, the essential nature of the underlying infiltration is the same. We have, unfortunately, not been able to make any inoculation or cultural experiments with the parasite.

The facts to which we have called attention may be thus summarised:—

- (1) Certain forms of skin affection caused by *Leishmania tropica* occur not infrequently in Egypt.
- (2) They may be solitary or multiple, and in the latter case are almost certainly the result of auto-inoculation.
- (3) They consist essentially of a mononuclear infiltration of the subcutaneous tissues which harbour, sometimes, large numbers of the parasites.
- (4) The lesions manifest themselves clinically under two forms: the one, a slightly raised, smooth, flat patch; the other, a prominent warty growth. They run a chronic course, and are unaccompanied by constitutional disturbance.
- (5) They are best treated by excision and immediate skin-grafting.





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Ferguson, A. R. and Richards, Owen. 1910. "Parasitic Granuloma: A Condition Allied to Oriental Sore Occurring in Egypt." *Annals of tropical medicine and parasitology* 4(2), 151–166. <https://doi.org/10.1080/00034983.1910.11685708>.

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