ORIENTAL SORE: SOME OBSERVATIONS SUGGESTED BY ITS PREVALENCE IN QUETTA IN 1936.

by

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INTRODUCTION.

At 3 a.m. on the 31st May 1935, the native quarter of Quetta city was destroyed by an earthquake of terrific violence. Out of a reputed population of 50,000 it is estimated at least 30,000 perished in their houses.

The Military Garrison of 20,000 largely escaped with the exception of the Royal Air Force Units who suffered severely through being lodged close to the vortex of the disturbance. The Indian Police also suffered heavily losing 172 of their strength, a loss which must have disorganized completely a force whose services were to be so urgently required in restoring law and order.

It is not proposed further to describe the earthquake except in so far as it has some relation to the subject of this Thesis. The fact that epidemic diseases did not at once break out at the scene of the disaster has already been commented on in various published descriptions of conditions following the upheaval.

It is proposed to describe the outbreak of Oriental sore at Quetta which prevailed amongst Troops and Civilians during the early months of 1936, and to compare and contrast this epidemic with similar happenings in other places under varying circumstances.

HISTORICAL.

The first account of what is now termed Oriental sore appears to have been published in 1756 by Russell in a description of the Aleppo boil, a condition which he attributed to the drinking of the bad local water. This theory seems to have been accepted for 100 years. The disease was stated to have been so prevalent in Delhi in 1864 that from 40% to 70% of the resident Europeans were affected. Sanitary reforms reduced the incidence.

In the middle of the 19th Century Biskra was noted by French Medical Officers for the prevalence of sores amongst troops operating against the tribes of Southern Algeria. The whole of one Company was affected giving an incidence of 105 cases in a Garrison of 762.

Cunningham (1) in 1885 described mono-nucleated bodies found in sections of tissue excised from a non-ulcerated Delhi boil. It is however doubtful if the bodies he saw were the same as those subsequently described by Leishman.

Velichkin in 1885 described how in the Transcaspian Region 1800 Russian soldiers were found to have a 50% incidence while the interesting fact is recorded that local inhabitants were entirely free from/

from the disease.

Marzinowsky in the early years of this century described that in Russia several centres where the disease had prevailed in the past no longer produced cases. The disease might entirely disappear from a locality only to reappear in the course of several years. New arrivals were more apt to become infected than the natives of the country who apparently possessed some form of natural immunity, through superior economic conditions.

In May 1903 Leishman at NETLEY Military Hospital described small microscopic oval bodies recovered from the spleen of a soldier who had died of what was then termed DUM DUM Fever (Kala Azar). In July of the same year Donovan made an independent report on the same subject. The same month Wright in Boston discovered an organism afterwards known as Leishmania tropica in a smear taken from an Oriental sore which was excised, curetted and examined.

GEOGRAPHICAL DISTRIBUTION.

The disease, as may be learnt from some of its synonyms, Delhi boil, Sind sore, Frontier sore and further afield Baghdad sore, Aleppo button, Bouton de Biskra etc. etc., has a widespread geographical distribution in warm countries. It is found in North Africa, Crete, Cyprus, Sicily, Asia Minor, Syria, Palestine, Greece, Spain, Portugal, Malta, Iraq, Persia, Caucasus, Turkestan, India, China, Australia etc. etc.

The two diseases Kala Azar and Oriental sore seldom exist side by side although this is apparently claimed for the disease as found in Central Asia. Elsewhere however it is the rule to find Oriental sore only in localities where Kala Azar does not exist and vice versa, though the Sandfly is the considered carrier of the organism and prevails in both localities. There is often a sharply demarked boundary separating the two diseases. Thus in North Africa Kala Azar occurs South of Latitude 35 N. notably in Abyssinia and on the Blue Nile, where the writer saw many cases but no Oriental sore, which only is met North of Lat. 35 N. Again, in India Oriental sore is found in the West and Kala Azar in the East. A variety of Dermal Leishmaniasis - Post Kala Azar Dermal Leishmaniasis - is/

is really a delayed manifestation of the more serious condition and consequently is located in the Eastern parts of India, notably in Bengal. Here Napier and Gupta in 1934 reported on nearly 1000 cases 82% of whom showed a previous history of having had Kala Azar. The incidence of this disease appears to be increasing.

In South America there is another allied condition Espundia which has a wide distribution in that continent and particularly attacks the mucous membranes.

EPIDEMIOLOGY AND ETIOLOGY.

It is proposed to discuss the factors which may have caused an increase in case incidence of Oriental sore at Quetta this year in the light of experience of this disease by workers in the past.

The contagious nature of the disease has been recognized by Baghdad Jews since early times, and they practiced inoculation against the disease by implanting in an inconspicuous part of the body infective material from another case, and thus avoided the disfiguring scars on the face which was the too frequent sequel of the disease.

The conveyance of the disease by flies was suggested in 1875 by Seriziat and in 1876 by Tscherephin. It was noticed that the people of Tashkent called the disease Pasha churdj which means Fly Bite. In 1880 Laveran showed that the disease could be transmitted by flies. Press and Sergent in 1905 both suggested the possibility of Genus Phlebotomus being the possible vector of the disease.

Wenyon (3) in 1911 writing of Oriental sore in Baghdad pointed out that the disease, like measles in this country, was essentially one seen in childhood. The vast majority of Baghdad children acquired the disease/

disease on the face between the age of 1 and 3. The youngest child smitten and seen by him was aged 7 months. It is the custom in Baghdad completely to clothe the baby, including the face, up to the age of 1 year, and apparently this custom prevents infection at an earlier age except in the one case mentioned. In older children sores were common on the arm and leg though the face was still the more common site. Adults were infected equally on the face, arm and leg. Had the louse, flea or bed bug been the animal vector the sores would have been located on the parts of the body covered by clothing. Visitors to Baghdad invariably acquired the disease within a year or two. All classes were equally affected. He suspected the Sandfly, though he pointed out flies might be responsible as mechanical carriers of infectious material from case to case.

The disease made its appearance in the Autumn at the close of the long hot weather when the dates were ripening and local opinion blamed the combined diet of dates and Tigris water for the condition. Secondary inoculation and autoinoculation might occur at any time by scratching an already existing sore.

In 1921 Sergent, Parrot, Donatien and Bequet described the production of an Oriental sore on the arm of a man in Algiers, 2½ months after the scarified skin had been treated with a saline suspension of/

of crushed Phlebotomus papatasii collected some 3 - 4 days previously. The Sandflies had been brought from the oasis Biskra (a hyperendemic area) to Algiers, where the disease was unknown, a distance of 600 kilometres.

In 1922 Aragao produced a sore on the nose of a dog by inoculating it with the emulsion of Brazilian Sandflies fed 3 days before on human dermal sores.

Sinton working in India between 1922 and 1927 showed the close relation between the distribution of Oriental sore and Phlebotomus sergenti.

Adler and Theodor at Baghdad in 1926 inoculated 3 volunteers with emulsions of Phlebotomus papatasii caught naturally. These contained a flagellate presumably Leishmania tropica. Sores duly developed at the sites of the inoculation. In only a small proportion of cases was the Sandfly found to contain the organism. (7 in 3798).

In 1927 the same workers found that the inoculation was only successful if the parasite had been in the gut of the Sandfly for a minimum of 8 days.

In 1929 Adler and Theodor (4) working in Baghdad described in detail the habitat of Sandflies in endemic areas. In Baghdad the houses were built of brick walls and unplastered, and the interstices were ideal as a refuge for Sandflies when disturbed. After moving/

moving furniture in houses the Sandflies readily disappeared into these cracks. Upper stories and rooms occupied during the day harboured comparatively few Sandflies. The latter were prone to take refuge in cellars and bathrooms. In modern houses where walls were smooth the Sandflies took refuge in living rooms where no cellar was available. Here capture was easy.

As regards the particular species in Baghdad, the camp of the Royal Air Force at Hinaidi South of Baghdad was found to be heavily infected with P. papatasii while P. sergenti was rarely found. Cutaneous Leishmaniasis was not found but Sandfly Fever was common.

In the thickly populated districts in the city, where practically none escaped the disease, P. papatasii and P. sergenti were equally common. In the area round the Royal Hospital P. papatasii abounded but P. sergenti was scarce. Oriental sore was not uncommon. In Hinaidi Khan both the Jewish and Armenian quarters were very heavily infected with the disease. P. sergenti was common and P. papatassi rare. In the Senhae district both flies were found equally distributed and sores were prevalent. South East of this the disease was rare but P. papatassi was still prevalent though P. sergenti was not found. It appeared to these workers that the transmission must be by a biting animal with a limited field of flight, for areas/

areas where the disease was plentiful abutted on localities where the disease was not acquired. The demonstrated distribution of the two species showed that in the greater part of the city P. sergenti was probably the main carrier and in districts where it predominated practically the whole population was infected. Where P. papatasii predominated cases occurred but many escaped. It was concluded that P. sergenti was the more suitable carrier of strains of L. tropica prevailing in Baghdad.

Where houses were closer together and had no gardens P. sergenti predominated. Where the houses were surrounded by gardens and plantations with a soft soil, P. papatasii was found. It was suggested that the latter species preferred to lay eggs in soft soil in the neighbourhood of houses while P. sergenti preferred to lay inside houses probably in cellars.

Experiments by these workers showed that P. sergenti fed more readily from injured rather than from unbroken skin.

These workers noted that in Aleppo both species carried the disease equally. In Bar Elias, where the disease was hitherto unknown, an epidemic of the disease followed the return of infected villagers from Aleppo. During the next 5 years all the population of Bar Elias acquired the disease but P. sergenti

was not found. P. papatasii occurred in enormous quantities. The latter could be the only carrier in that district, and in Palestine where P. sergenti did not occur.

The same group of workers fed 42 P. sergenti on Oriental sores and 26 of these became infected. They further caused a sore to appear on the arm of a volunteer by inoculation of the gut contents from these flies but unfortunately the person was living in a district where natural infection was possible.

Canaan in 1929 (5) while working in Palestine showed that Oriental sore used to be restricted to Jericho but had spread from there to the surrounding country by the increased transport facilities of the inhabitants. He found that only 1 in 1000 Sandflies were infected in Jerico which explained why the disease never reached epidemic proportions and this may be contrasted with the findings of Adler and Theodor(4) who in Aleppo found the infectivity rate of Sandflies as high as 6%.

Canaan further noticed that in Winter infection with Oriental sore did not occur and visitors at that time escaped the scourge. Also those visiting Jerico by day only,were similarly not affected. As in Iraq only exposed parts of the body were attacked. 78.5% of infections occurred in the Summer, and 21.5% in Autumn and early Winter. Sandflies disappeared/

disappeared from December to April.

Mills, Machattie and Chadwick (6) in 1930 investigated the histopathology of Oriental sore with special reference to its natural occurrence in the dog. They noticed in Baghdad many dogs had sores at certain seasons of the year on the nose, ears and pads and the clinical course of the disease appeared identical with that seen in the human. Infection occurred on those parts uncovered with hairs and exposed to attacks by biting animals and started as a palpable nodule which in time became covered by a yellow crust beneath which was a shallow ulcer surrounded by areas of congestion. The ulcer spread and when it affected the nose very severe ulceration and destruction of mucous membranes occurred. Clinically there were 3 main types of disease: (1) An early nodule which could only be detected by palpation. (2) A non-ulcerated superficial nodule. (3) The ulcerated nodule. The histopathological appearances and general course of the canine lesions corresponded closely with those of sores observed in the human.

In 1930 Gupta showed that the guinea pig and white mice were susceptible laboratory animals to L. tropica when injected subcutaneously, intracutaneously and intraperitoneally. In some cases the infection was generalized.

Other/

Other animals capable of being inoculated were the monkey, cat and camel. This piece of work was carried out in Baghdad.

Sinton and Short (7) in 1934 made similar investigations in India and elsewhere. They found that it was not very uncommon for natural infections of dogs with dermal Leishmaniasis to occur in countries on the Mediterranean littoral and in some parts of Persia,Iraq, Transcaucasia and Transcaspia. In these countries both visceral and dermal canine Leishmaniasis had been recorded.

Some thousands of dogs examined by Donovan, Patton and Mackie in India in areas where Kala Azar was endemic proved free of infection. This was done in Bengal and Assam.

Only two cases of natural canine infection with Leishmaniasis had been recorded. Both these were cutaneous cases, one in Bombay and one which had recently been in Landi Kotal. They (Sinton and Short) recorded the case of a dog which in 1933 left Kasauli for Karnal in the Punjab and returned to Kasauli in 1934 and developed a nodule on the nose and upper lip. Some of these nodules were insignificant and might have been overlooked. At Karnal P. papatasii and P. sergenti occur and local cases of cutaneous Leishmaniasis are not uncommon.

Short/

Short, Sinton and Swaminath (8) in 1935 considered the vectors of Oriental sore were highly probably both species of Phlebotomus. They based their view on the fact that one or other species were found in endemic areas. They both readily became infected with L. tropica. Infected flies,caught naturally, produced Oriental sores harbouring L. tropica when inoculated into the skin. The weak link was that some flies caught as adults may have been infected before reaching the laboratory. To determine the position in India an investigation was made employing P. sergentis clean bred for the purpose. The result was that in the Punjab, (1) strains of L. tropica develop in P. sergenti in a manner indicating a definite host-parasite relationship. (2) The flagellate forms of L. tropica which develop in P. sergenti are infective when inoculated intradermally into a susceptible animal. (3) The Sand Fly is infective as early as the 5th day after the initial feed of the fly.

POSITION IN QUETTA.

Oriental sore has always been endemic in Scinde and Baluchistan. This is particularly so in Quetta and as Manson Bahr points out years of prevalence may be succeeded by years of rarity, possibly in harmony with altered sanitary conditions.

In Table 1 will be found records of the number of cases examined in the District Laboratory Quetta from 1932 onwards. The cases examined were British and Indian soldiers. It will be noticed that in 1936 only cases seen from January to March are included as further figures are not available at the time of writing. It will also be noted that 52 cases are returned as "Scraped but not examined". This means that these cases were so obviously suffering from Oriental sore that to avoid delay laboratory diagnosis was omitted. Thus 102 cases diagnosed positive by microscopical examination may be added to the above to give a total of 154 cases for the first three months of 1936. Compared with this the total number of positive cases for the preceding 4 years only amounted to 75, less than half. Further the Garrison during the early months of 1936 had been reduced/

reduced by one half. Doubtless additional cases have been noted amongst the Troops so removed.

One satisfactory aspect of the situation following the earthquake was the wholesale evacuation of Military families forthwith. Normally these categories live in Quetta all the year round as the climate of Quetta in Summer is reasonably cool and conditions healthy. Had these families remained during the Summer of 1935 the case incidence, particularly in children, would have been in all probability extremely high and the difficulties of treating these classes need only be mentioned. As it was, no cases of the disease in women and children came up for treatment.

TABLE 1./

TABLE 1.

Cases of Oriental sore for the period 1932-1935 and 3 months 1936.

Year	Total cases sent to Laboratory	Positive Cases	Negative Cases	Cases scraped but not examined.
1932 Whole year	80	15	65	
1933 Whole year	69	19	50	
1934 Whole year	110	32	78	
1935 Whole year	58	9	49	
1936 January to March	233	102	127	52

Positive cases 4 years 1932 to 1935		75
Positive cases 3 months 1936	102	
Presumed positive cases 3 month 1936	52	
Total for 1936 (3 months)		154

Strength of Military Garrison 1935	2687
Strength of Military Garrison 1936	1379

Prior to the earthquake in Quetta, as in many other Military Stations in India, the Troops lived in well constructed barracks separated by a distance varying from half to several miles from the native city. While the troops had access to the city the limited attractions there, as compared with the counter attractions in the way of cinemas, sport, games, and swimming facilities close to the Military Lines, kept the soldiers largely in the Military Cantonment. The shops in the city which were the chief attraction closed reasonably early and the city was out of bounds to the majority of the Garrison after certain hours.

After the earthquake, the situation profoundly altered. Troops were employed as police in and round the city boundaries both by day and night, in consequence of the disorganization of the civil police. The parts of the body, notably the face and arms, exposed owing to the warm weather were vulnerable to Sandflies.

The sanitary condition in the barracks remained much as before. As however many buildings and private residences had either been completely or partially destroyed or had been condemned as unsafe and were demolished, a considerable amount of debris tended to accumulate in the Military Cantonment. Gardens surrounding bungalows had been well tended. After the/

the earthquake, for various reasons, a great many families were evacuated forthwith and the gardens of bungalows were neglected. A wilderness rapidly grew up surrounding every deserted bungalow and, owing to the shortage of labour due to the enormous death rate among the civil population, breeding places for Phlebotomi developed everywhere.

As regards the city, the position was much worse. The clearing processes for various reasons could only proceed at a slow rate and this will of necessity take years to complete. The buildings were so thrown about and the ground itself so broken into cracks and holes of every size that ideal breeding grounds for Sandflies were everywhere to be found. "These insects" according to Townsend (9) "avoid wind, sun and full daylight. "They appear only after sunset and only then in the "absence of wind. They enter dwellings if not too "brightly lighted but are not natural frequenters of "human habitations. They breed in caves, rocky inter-"stices, stone embankments, walls, even in excavated "rock and earth materials. They hide by day in similar "places or in shelter of rank vegetation. Deep canyons "free from wind and dimly lighted are especially adap-"ted to them. Thick vegetation protects them from "what wind there is by day, or night. The flies suck "the blood of almost any warm blooded animal and even "that of lizards in at least one known case."

The/

The season June to September immediately following after the earthquake as it did, coincided with the normal Sandfly season in Quetta.

It followed that those troops which were called on to work more in the city became more readily victims to the sores. Thus it happened that:-

(a) Units (Infantry) who were called on to do police work in the city became heavily infected with Oriental sore.

(b) Units who remained at a safe distance largely escaped.

(c) Those who had barracks near the native city suffered more than those further away.

After the earthquake many dogs wandered in the city and Military Cantonment without owners. While no proved cases of canine Leishmaniasis have been reported it is more than possible that dogs played some part in disseminating the disease, more particularly in view of the insignificant lesions which have been found to be positive to L. torpica in the past.

Phlebotomus papatassi and Phlebotamus sergenti, both under strong suspicion for disseminating Oriental sore, were reported at Quetta in 1910 by Wimberley. Sinton (10) (11) who compiled a geographical distribution of Sandflies in India, mentioned that in his opinion P. minutus and P.sergenti are really members of a new species P. dentatus.

Recent surveys in Quetta report that in June 1936 both P. papatassi and P. sergenti were still present.

TABLE 2.

Showing the distribution of cases of Oriental sore in the different units in Quetta 1936.

Unit.	British or Indian.	Strength.	Cases (3 months)
Royal Artillery	British	97	9
1st Batt. Queens Royal Regt.	do.	798	18
2nd Indian Divisional Signals.	do.	159	1
Royal Tank Corps.	do.	118	nil.
Royal Army Medical Corps.	do.	22	2
Staff and Departments.	do.	151	3
Other Corps.	do.	34	nil.
16th Light Cavalry	Indian		9
2/11th. Sikhs.	Indian		24
4/19 Hyderabad Regt.	Indian		11
Royal Artillery	Indian		1
4th Indian Hospital Corps.	Indian		7
Indian Army Ordnance Corps.	Indian		6
21st Coy. Sappers and Miners.			11
Other Regiments.			1

SITUATION AMONGST CIVILIANS.

The civilian population of the city largely perished during the earthquake. Of the remainder many were injured and practically all were homeless. Most of the survivors therefore were evacuated. As trade revived and clearing operations preparatory to rebuilding were instituted many of the traders, officials in banks and Government employees returned. They occupied for the most part temporary houses or tents in close proximity to their work which of necessity was close to the city.

If the condition of the Military Garrison was serious from this scourge, the civilians fared worse. Walking along the streets or entering shops, banks or post offices it was the rule rather than the exception to find individuals marked with sores on the face or limbs.

In Table 3 will be found figures indicating the number of cases who presented themselves at one or more of the Civil Hospitals. Many cases did not present themselves through fear of the treatment which was painful and somewhat unsatisfactory. A slow form of treatment is never popular to the Oriental nor does he readily attend hospitals. Hence the figures given are minimum estimates based on the cases seen.

TABLE 3.

Oriental sore amongst Indian Civilians.

Category.	Approximate population.	Cases.	Percentage.
Cantonment workers. (Civilians working in Military area)	490	84	17
Civilians. (Includes Government clerks, employees, traders and others)	15,000	500	3
Hazara Population. (Includes local villagers who tend to work in or visit the city as labourers)	3,500	256 (includes 216 children)	7
Indian Police.	500	95	19

It is interesting to note that, in the opinion of prominent civilians who have lived for many years in Quetta, Oriental sore is much more prevalent this year than ever before.

As regards the police the Civil Surgeon found it more practicable to discharge from service any policeman who contracted Oriental sore and enlist a substitute rather than lose his service during long tedious treatment.

CLINICAL ASPECTS.

INCUBATION.

The incubation period of Oriental sore is very variable. Wenyon (3) quotes a case where the disease appeared after 15 days. He considered the average period as 2 months. Manson Bahr states that two cases have been observed where the sores did not appear for 5 and 15 months respectively.

Experimental infection varies also between 7 weeks and 6½ months. (Wenyon). He considered the disease developed according to the natural resistance of the body, state of health of the individual, and number of parasites injected.

In Quetta, the Sandfly season is in Summer from June to September. It can be taken that after mid October no Sandflies attack their hosts.

The first patient who was likely to have been infected in Summer 1935, was diagnosed on 26th December 1935. After that only two cases came to the Laboratory in January. Twenty-nine were returned positive in February and seventy-five in March, after which this record comes to an end. It will thus be seen that in Quetta the incubation period was long. It is, of course, always possible that the Sandflies remained in evidence later than the date indicated, or that ordinary flies or human contagion conveyed the/

the infectious material, but this appears unlikely. Ambulant cases who did not report did exist, but these were not noticed at the routine inspections of troops in the period between November 1935 and January 1936.

CONSTITUTIONAL SYMPTOMS.

All authorities lay stress on the lack of constitutional symptoms attending the disease in contrast to the severe generalized symptoms met with in Kala Azar. This was noticed in the Military Cases. Every opportunity of going sick is given to the soldier but it is noteworthy that many never reported at all but were diagnosed at the routine medical examinations in February and March 1936.

AGE INCIDENCE.

The disease was equally distributed among all ages and nationalities. Europeans, Anglo-Indians, and Indians all appeared equally susceptible which one would expect among communities coming from non-endemic areas.

Of the British Troops those who were fittest appeared equally, if not more susceptible, to the condition.

PATHOLOGY.

Thomson (12) describes the papule which is the earliest clinical manifestation of the disease as being palpable before it is visible. It is felt as a small hard nodule. In Quetta it was never felt in this condition.

Later (the description continues) it shows itself as a small red papule covered with dry scales. It may be surrounded by a zone of congestion. The skin exists for long unbroken. As a result of upward pressure coagulation necrosis occurs in the epidermis and a hard yellow crust appears. On this being removed the edges of the resulting ulcer are raised and the base covered with minute papillae. The sore next breaks down and ulceration occurs. A secondary invasion by bacteria and other organisms takes place. The final picture is a scar which may be pigmented.

Thomson describes the microscopical appearance of a small nodule. It was formed by the multiplication of cells of the reticulo-endothelial system and as growth proceeds many of these are found to be filled with L. tropica. Extension in a lateral and downward direction occurs towards the denser subcutaneous tissue and more especially upwards towards the surface. Along with the expansion of the lesion the L.D. bodies tend to be found in the macrophage cells/

cells in the periphery and to disappear from the central zone. Infiltration around the capillaries with round and plasma cells is marked and, in non-ulcerated sores, polymorphonuclear cells are usually absent.

The epidermis including the rete malpighii seems to be stimulated to form true cell nests (McAdam). A similar pathological picture was described by Thomson and Balfour in 1912 in a non-ulcerated nodule in the Sudan.

Fergusson and Richards found in Egypt Leishmania in granulomatous patches on the foot. The surface of these lesions was raised a quarter of an inch above the skin level and had the appearance of papillomatous warty excrescences.

Cure is brought about by fibrosis with scar formation.

Leishmania tropica.

Roberts (13) describes the parasite of Oriental sore as a protozoon found in flagellate and non-flagellate forms. In the ordinary lesion it is non-flagellated but under cultural methods it becomes flagellated.

The organisms in sores are round or ovoid, 2-4 microns in size, with an excentric nucleus and another smaller rod-shaped chromatin body. It reproduces by cell division. These organisms may be found in large numbers in large mononuclear cells up to 100 in one cell.

Morphologically/

Morphologically on smear examination these organisms are indistinguishable from L. donovani and L. americna. It is said that L. tropica has more tendency to flagellate formation in culture.

Naguchi showed by agglutination tests that there were definite immunological differences between the three strains.

CLINICAL DESCRIPTION.

Wenyon (3) describes the initial lesion as a minute papule dusky red in colour with slightly raised edges acquiring a brownish tint. It increases slowly in size without tenderness, pain or irritation.

Manson Bahr describes the papule as itching.

Most of the Quetta sores were more advanced than the type described above, but the following is a description of an early one.

Case 1. Major H., Pathologist in charge of District Laboratory, Quetta. The papule was on the flexor surface of the wrist and was minute, pink and raised, resembling a flea bite. He himself examined the sore and found L. tropica present. The sore had been present only a few days before scraping.

Wenyon describes two types of sores arising from the original papule. One called the female which breaks down to form a shallow ulcer, from which is extruded a yellow fluid, and extending to include large areas of skin. The fluid contains parasites and bacteria with which these ulcers were secondarily infected. They did not usually exceed 5/- in size. The surface of the ulcer granulated and bled readily, and this was covered by a scab. His male type of sore did not ulcerate. The superficial layers formed a/

a dry scaly covering which broke away leaving thin red skin. The sores contracted,became less elevated,and finally dusky, while the red patch on the skin changed to a white scar becoming in time slightly depressed. The male type never showed so extensive scarring as the female type and the latter showed more destruction of tissue. Wenyon also considered that the male type might turn into the female type. He noted that it was exceptional for deformities to arise from dermal leishmaniasis.

At Quetta the sores did not invariably ulcerate. The ulcers varied tremendously, and their time of production was considerable. Usually the patient was very uncertain as to how long the early sores had been present, but he usually reported after the sore had been present for 2 or 3 months, by which time it had assumed moderate proportions.

Case 2. Pte. N. Photo. 1. 3 sores, one on dorsum of forearm with raised pink-blue margin. Duration 14 days. The other on left eyebrow also one on back of neck. Duration also 14 days.

Case 3. Pte. M. Photo 2. 2 sores, one on neck with scab surrounded by a broad pink scaly margin. Duration 1 week. The other a septic ulcer on the index finger with pink blue discoloured margin.

Case 4./

Case 4. L/Corporal M. Photos 3 and 4. Only a 14 day history given. The description emphasizes the presence of a yellow scab surrounded by a large raised pink scaly areolar margin.

In an ulcer seen in another soldier induration was noticed after 3 weeks.

Case 5. L/Corporal W. Photo. 5. This sore was of the type described by Wenyon as Male. It was described as a small raised sore not ulcerated. Duration 2 months.

Case 6. Pte. D. Photo. 6. A case of average duration 3 months.

Case 7. Lieut. F. Photo. 7. A case to illustrate a sore on the tip of the nose.

Case 8. Pte. C. Photo. 8. A case to illustrate multiple sores about the ankle.

Case 9. Sepoy P.S. Photo. 9. This case illustrates very clearly 3 sores of different character in one patient. On the forehead is a typical flat ulcer without much induration. On the right cheek is a crater-shaped ulcer with well marked circular rim. On the nose and extending outwards from it is a fungating granulomatous tumour resembling the case previously described from Egypt.

Case 10./

Case 10. Sepoy S.S. Photo. 10. Another fungating granulomatous tumour-like sore on the elbow.

Case 11. Civilian H. Photo 11. A peculiar case of multiple serpiginous ulcers on the face. This might easily be confused with Tinea.

Case 12. Lieut. G.S. Photos. 12, 13, 14, 15. A case to illustrate an extreme degree of infection. 123 sores were counted on the body, face and limbs. This was the only case where sores were met with on the trunk. Presumably the dissemination was the result of autoinoculation.

Case 13. Civilian M.Z. Photos 16, and 17. Another case of multiple infection.

DISTRIBUTION.

Carter (14) in two series of cases collected between 1903 and 1909 in Arabia and India gives the location of sores on the body and with this in Table 4 is given for comparison the smaller series of Quetta cases. In the Arabian series the majority of sores occurred on the lower limbs, many also were seen on the upper limbs but comparatively few were noticed on the face. In his Indian cases seen in Baluchistan Scinde District, which includes the country round Quetta, the majority of cases had sores on the face, then the lower limbs, and only occasionally were sores seen on the upper limbs.

This year, however, in Quetta among the British troops sores were seen chiefly on the upper limbs and this was also noticed amongst the Indian troops. Amongst the latter very few sores were seen on the face compared with the British Troops.

The average number of sores affecting British troops was 10 per individual, whereas in the Indian troops only 2 per individual were counted.

It is suggested that the secondary sores presumably caused by autoinoculation were produced more readily in British Troops in whom the immunity caused by the primary sore was less well developed.

TABLE 4.

A comparison between distribution of sores in a series during 1903-1909 in Arabia and India, and in Quetta 1936.

	Arabia. 1153 cases	Baluchistan and Scinde 109 cases	Quetta British 26 cases	Quetta Indian Troops 55 cases
Face	26	109	42	9
Neck	nil.	nil.	12	3
Back	nil.	nil.	31(1 case)	nil.
Chest	nil.	3		1
Arm			74	10
Elbow			12	4
Forearm	113	15	15	3
Wrist			4	7
Hand			22	29
Finger			5	2
Thigh			3	nil.
Knee			nil.	3
Leg	914	35	33	16
Ankle			3	9
Heel			2	nil
Foot			2	10
Total sores	1153	162	260	106
		Average of sores per individual	10	1.9

DIAGNOSIS.

Little need be said of this. From the clinical picture, except in the earliest cases, little difficulty was experienced in determining the true nature of the disease. It was at this early stage that help from the laboratory was invaluable. As time went on also the laboratory technic became almost infallible and it was seldom after the first month of the outbreak that cases had to be examined more than once by the microscope. This was partially due to the fact that clinical workers were more on the outlook for cases for undoubtedly early cases free from secondary infections were easier to diagnose in the laboratory than the more chronic ulcers.

TREATMENT.

The large variety of therapeutic agents recommended for this disease in the past points to the need for some as yet undiscovered specific remedy. Treatment has resolved itself into local and therapeutic measures.

Warna (15) writing in 1931 on the prevalence of Oriental sore in the Punjab, recommended Intravenous Antimony Tartrate, which had since 1913 been a popular remedy, in 1% solution freshly prepared in doses of 1 to 5 c.c. and found 8 to 12 injections were sufficient to effect a cure in most cases, but gave as many as 20 injections in the severer infections. 1 c.c. was the initial dose. The remedy was reserved for multiple lesions, and he considered antimony the only one suitable for such conditions.

Manson describing the treatment for multiple sores considers much smaller quantities of the more recent pentavalent antimony compound were required to effect a cure than the 5% solution of sodium antimony tartrate of which 15 grains in all were required; on the other hand the Editor of Indian Medical Gazette writing in 1931 (16) pointed out that the pentavalent antimonials were less successful than antimony tartrate solutions, and also reported only moderate success with trivalent antimonials, antimosan and fouadin.

Napier/

Napier and Gupta (17) writing on the allied condition Post Kala Azar Dermal Leishmaniasis in 1934 record that they used neostibosan and urea stibamine with some degree of success with a preference for the former. These authorities also got good results with the trivalent fouadin.

Other general therapeutic agents employed have been vaccines as used by two workers Schwartzmann and Chadukin who used a saline suspension of washed flagellates. Salvarsan and Emetine have been tried but have not proved satisfactory.

Local treatment has been employed by many workers in the past with varying results. Thus Manson details the following unguents which have been applied to single or multiple sores either as the sole therapeutic measure or combined with the general measure already detailed.

1. Hot fomentations with Eusol dressings and applications of nitrate of mercury ointment (suitable for sores on the face).
2. Tartar emetic ointment 1-2% in B.P. Soft paraffin.
3. " cignolin ointment.
4. Pellidol (Bayer) ointment.
5. Desitin (Klin Ke) ointment.
6. Phosphorated oil ointment.
7. Permanganate of Potash ointment.
8. Orisol (Berberine sulphate) ointment.

Other authorities have described and used other ointments without universal success.

A method which has been used extensively in India is the local injection into and under each sore of solutions of the substance Berberine sulphate. The usual technique, according to Manson, has been to inject ¼ grain in 1.5 c.c. distilled water into the immediate vicinity of the sore, giving 2-4 injections and this combined with dressings of hypertonic saline has been usually sufficient. Four points round the sore were infiltrated. The disadvantage of this means of treatment has been the severe pain locally produced and on this account the unsuitability of this form of treatment for lesions of the face and in the vicinity of the eye is obvious.

Karamchandari (18) writing in 1930 of a series of 50 cases treated, laid down that weekly injections of Berberine sulphate were most suitable, the average number of injections required was 3, to produce a cure in an average of 17 days. The drug should be new and freshly prepared and he advised ⅓ grain in 1.5 c.c. water. He considered the treatment preferable to Tartar Emetic for single sores, but the treatment was held to be too tedious for multiple lesions.

Hayward (19) in a series of 39 cases cured all with 175 injections an average of 4½ injections per patient. In another series of 264 cases, of which 79 were diagnosed clinically, he found it necessary to give injection treatment as follows:-

1/

1	injection	132 cases
2	injections	51 "
3	"	35 "
4	"	14 "
5	"	13 "
6	"	11 "
7	"	2 "
8	"	1 "
10	"	1 "
13	"	3 "
14	"	1 "

He noted that all who had five or more injections were definitely cured.

Chatarjie (20) in 1934 gave a series of cases treated with Intravenous orisol (May and Baher) a substance akin to Berberine sulphate. He required to give 24 injections for each sore, and considered the remedy as specific although the treatment has its obvious disadvantages.

Emetine has also been used locally by injection.

Other local measures detailed by Manson and other authorities come under certain definite headings.

1. X-Rays. Stated by Manson to be rapid and efficacious. In Iraq single full pastille dose cured within 10 days. This was equally efficient in ulcerated and non-ulcerated cases, and the resulting scars hardly noticeable.

2. Ionisation.

3. CO_2 snow. 5-30 seconds application and repeated every 10 days. This was routine in the Mayo Hospital, Lahore, where three applications were found to be necessary. A cylinder of CO_2 costing Rs 20 treated 200 cases, at a cost of 5 annas a sore. In advanced cases the value of the treatment was uncertain.

While the above list by no means covers all the therapeutic agents, it gives a fairly representative description of the various methods which have been employed in dealing with the disease. It remains to describe the methods used by certain workers to destroy individual sores by surgical means.

Manson recommends that ulcers on the nose should be scraped with the Volkmann spoon and resulting surface rubbed with nitrate of mercury ointment and a dry dressing or powdered permanganate subsequently applied.

Byam and Archibald recommend the excision of the papule before ulceration.

Royers recommends scraping of ulcers and Stitt excision. Warna (15) advises radical treatment by excision or scraping as a certain cure, but disadvantageous because of the extensive scar and the unwillingness of the patient to accept this heroic form of treatment. He considers it the only possible method of treatment in the North West Frontier of India, and considers it can be done under local anaesthesia.

Until the full force of the Epidemic was realised at Quetta this year treatment was carried out by Medical Officers according to their individual tastes, suitability of drugs and their availability. At the Indian Military Hospital where Indian soldiers were treated, a few cases were treated by Emetine intravenously with Hydrochloric acid applications and Elastoplast locally. Others had Neostibosan .2 gm. in 1 c.c. distilled water and Elastoplast or Calcium chloride 15 grains in 10 c.c. distilled water injected intravenously. This latter method proved efficacious but had the disadvantage of causing thrombosis in the median basilic vein. Treatment was recorded as satisfactory but slow. Eventually these different methods were supplanted by a routine which will now be described.

The patient, who was treated practically always as an outpatient, was taken into the operating theatre and put under nitrous oxide anaesthesia. Before being put under, his upper limbs were secured on a wooden cross piece which projected at the sides of the table. After anaesthetising the sores were scraped with the sharp spoon until every piece of diseased tissue was removed. This took an appreciable time and considerable force had to be applied. Once the scraping of the sore was completed it was found that no damage could/

could be inflicted by the spoon on the healthy skin underneath. Pure carbolic was then applied on wooden probes mounting pledglets of cotton wool. The excess of carbolic was then wiped off and an Elastoplast bandage of a size to cover the scraped ulcer was applied and the patient was returned to duty. After 14 to 21 days, on removal of the Elastoplast, it was found that the ulcer had healed.

In the British Military Hospital very early sores were treated by local injection of Berberine Sulphate and successful results were always obtained. As few cases were sufficiently early, however, and many suffered from multiple sores on the extremities and face this form of treatment was not used to any large extent.

A few cases were treated with Neostibosan intravenously and intramuscularly without any dramatic results except that the less chronic cases cleared up in about 1 to 2 months time. On the more chronic indurated sores no appreciable improvement was noticed and eventually the same scraping treatment was adopted as was in vogue at the Indian Military Hospital. After some hesitation sores on the face, neck and even close to the eye were treated with suitable precautions. The treatment at once proved successful, notably in the face cases, who had been under treatment by Neostibosan for over a month. The condition cleared up/

up in a period varying between 14 - 28 days. The treatment also proved popular owing to its speed. No case had to be admitted to hospital, and the soldiers returned to duty immediately and reported after a fortnight without further dressings when on removal of the plaster a healthy healed surface was revealed.

In Table 5 (page 49) will be found the tabulated results of scraping treatment.

Treatment by ionisation proved unsatisfactory in the only two cases treated. Treatment by Carbon di-oxide snow and X-Ray therapy was not attempted as the former was not available and the X-Ray Unit was not considered suitable for the type of work required.

CASES TO ILLUSTRATE TREATMENT.

Case 14. Photo No.18. Pte. M. A bad case of Multiple (11) Facial Oriental sore. Considered at first unsuitable for treatment by scraping so admitted to Hospital on 1.2.36 and put on Neostibosan intravenously of which he had 6 injections (.2 gm. each in 1 c.c. distilled water) at 3 days interval. No improvement was noticed so the patient was given zinc ionisation every second day for 14 days with no effect (Photo 19). It was then decided to give him surgical treatment by scraping which was done according to the method described above on 9.3.36, in two stages. Photo 20 taken immediately after first operation, shows Elastoplast Bandage applied and unscraped ulcer on nose. Photo 21 shows the same patient bandaged and ambulant. Photo. 22 shows the cured result. Taken on 30.3.36.

Case 15. Photo. 23. Pte. W. Facial Oriental sore. This patient had a hard raised plaque on his forehead and ulcers elsewhere (6). He received the same treatment as Case 14 and showed no improvement on antimony and ionisation treatment so was scraped on 23.3.36 (Photo. 24, 25) and cured by 3.3.36 (Photo 26).

Case/

Case 16. Photo 27. Corporal W. A single sore on chin treated with 6 injections of neostibosan. No improvement 25.2.36. The condition clinically resembled anthrax - malignant pustule - with which it might have been confused had it not been for the Epidemic. Scraped on 9.3.36. Photo 28. Cured 30.3.36. Photo. 29 and 30.

Photograph 31. Shows the above 3 patients in the Military Hospital, Quetta, immediately after operation.

Case 17. Photo 32, and 33. Taken on 23.3.36. Staff-Sergt. A. Five sores on face and forearm. Scraped the same day. Cured 30.3.36. Photo 34 and 35.

Case 18. Photo 36. Sergt. Low. Scraped 19.3.36. Cured 30.3.36. Photo 37.

Case 19. Photo 38. L/Corporal W. (Same case as No.5 Photo 5). Scraped 12.3.36. Cured 3.3.36. Photo 39.

Case 20. Photo 40. Pte. D. Two large ulcers on both arms. Scraped 12.3.36. Cured 30.3.36. Photo 41.

Case/

Case 21. Photo 42. Pte. S. Three ulcers on left hand. Scraped 7.3.36. Cured 30.3.36. Photo 43.

Photograph 44 illustrates a group of outpatients 6 (in khaki) and inpatients 2 (in blue) waiting for operation. Photograph 45 illustrates the same outpatients returned to duty after 1 hour, all fit for work and none the worse of the treatment.

Case 22. Photo 46. A particularly large ulcer measuring 3" by 2". Sepoy J.S. 11.3.36.
The same immediately after scraping 11.3.36. Photo 47.
The same cured 30.3.36. Photo 48.

Case 23. Photo 49. Sub-conductor L. Multiple Oriental sore (33) many on face. Illustrate a case cured by combined therapy with Neostibosan 6 injections, and Berberine Sulphate 7 injections. The treatment was extended over a period of over 2 months.

Case 24. Major J. Photo 50. A case cured by 4 injections Berberine Sulphate. Very slow and chronic.

Case 25. B.H. Photo 51. A case to illustrate treatment by the application of pure carbolic acid. Cured.

Case/

Case 26. D. Photo 52, 53. A case to illustrate the type of depigmented scar seen in an Indian after scraping on 1.3.36. Photo taken 30.3.36.

Case 27. Naik M.S. Photo 54. Scraped 9.3.36. Photographed on 26.3.36 to show a good healed scar on the dorsum of hand.

Case 28. Photo 54. C. To show a healed scar on left temporal region and an ulcer (untreated) on right wrist. The former was treated by scraping.

TABLE 5.

Analysis of Treatment.

1. Treatment by anaesthetising, scraping, carbolising, and application of Elastoplast bandage.

Series of 81 cases.

British Soldiers	Total cases treated	26
	Cured	11
	Normal progress at time of recording.	15
	Failures	Nil.
Indian Soldiers	Total cases treated	55
	Cured	17
	Cases not followed up, record not available, gone on leave or to another Station. Presumed cured.	32
	Normal progress at time of recording	3
	Failures	3
	(other Treatment adopted).	

2. Berberine Sulphate injected locally gr.$\frac{1}{4}$ in 1$\frac{1}{2}$ c.c. distilled water.

Series of 5 cases.

Cured 5*

* 2 given injections of Neostibosan.

3./

3. Emetine intravenously. 15 m. Treated with hydrochloric acid and Elastoplast.

1 case.

Cured	1

4. Calcium chloride gr. XV in 10 c.c. distilled water given intravenously.

Series of 5 cases.

Cured	5

5. Neostibosan gram .2 in distilled water given intravenously or intramuscularly.

Series of 8 cases.

Cured	2*
No improvement, treatment abandoned.	3
Slow progress, treatment being continued	3

* 2 given injections of Berberine Sulphate.

6. Application of Pure carbolic acid.

Series of 3 cases.

Cured	1
Under treatment	2

It is recognised that the cases quoted do not furnish a sufficiently balanced series to make fair comparisons between the different forms of treatment employed. The problem confronting the Medical Authorities did not permit of a scientific investigation into the respective merits of each form of treatment. The task was to find by experiment, as quickly as possible, what was the quickest way to cure a Soldier and get him back to duty without delay.

In the Military Hospitals at Quetta medical opinion was unanimous that Surgical scraping was by far and away the best, cheapest and quickest treatment available and it was accordingly adopted as the Routine Method and all others were abandoned.

It is pointed out that Oriental sore resembles leprosy in that after a given time a natural cure will result. Some consideration should be given to this fact when long continued forms of treatment are described.

Berberine Sulphate Treatment seems to be the best form of treatment for early cases or for those who do not care for an anaesthetic. It is not suitable as far as can be seen, for cases of multiple sores though it is possible the drug exercises a general as well as a local effect.

For the future it seems that two forms of treatment/

treatment require investigation.

(1) By X-Rays. This, if recorded results are to be believed, promises to be the ideal form of treatment.

(2) The employment of local anaesthesia preparatory to scraping.

PROPHYLAXIS.

1. Sand Flies. Breeding grounds. To eliminate these as far as possible will be the aim at Quetta. This is an enormous task in view of the havoc in the city and surrounding country. Buildings are being steadily demolished, hollows and ravines filled up, and vegetation reduced. This will remain a problem for several years to come.

At one time the feasibility of spraying poison from aeroplanes on to the city was mooted but was not found practicable.

A certain amount of work has been done in the Army of recent years to deal with the flies themselves. Sandfly nets are so stifling to the occupant that few can endure the atmosphere inside. They are not on this account issued to Troops.

At Bannu in 1934 experiments were carried out in Barrack Rooms in an endeavour to trap the mosquitoes and Sand flies. The Barrack Rooms, with the exception of one window which contained an illuminated net trap, were darkened. Various substances - sulphur, creosote, etc. - were burned in the Rooms which were closed to all ventilation. Mosquitoes and Sandflies as a result were driven into/

into the trap, caught, classified and destroyed. It appeared that such a systematic attack might have some influence on the Malaria incidence. But administrative reasons make such a campaign difficult and unpopular unless its worth can be proved.

Men are provided with repellents - Bamber oil and similar substances - but the success of such measures depends to a certain extent on individual endeavour not always easy to control.

Dogs can be controlled, licensed and examined regularly by Veterinary Officers.

Manson Bahr mentions: "in the East it is "generally believed that infection may be con- "veyed by laundry which has been washed by natives "who are infected with these sores."

Probably the only real solution of the problem will be to remove Troops to sites where Sandflies do not frequent, remembering the short distance these insects fly and the nature of the country they habitually frequent.

SUMMARY.

1. Some epidemiological and endemiological aspects of Oriental sore are discussed.

2. Quetta and Baluchistan generally have always been an endemic area for Oriental sore.

3. The likely vectors are P. papatasii and P. sergenti.

4. Oriental sore greatly increased in Quetta subsequent to the earthquake.

5. It is suggested breeding grounds in and near the city, for the two named species of Sandflies flourished in the devastated areas.

6. The surgical method of treating Oriental sore in Quetta is described.

7. Suggestions to prevent the disease are put forward.

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