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A STUDY OF DISEASES OF AUSTRALIAN NATIVES IN THE NORTHERN TERRITORY.

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DURING the occupation of the Northern Territory by the army a native hospital was built in the vicinity of an Australian general hospital and staffed by the hospital medical officers, sisters and orderlies. The native hospital, having accommodation for 65 patients, consisted of an administrative hut, four huts equipped as wards and a patients' mess hut. It was situated on the banks of the Katherine River. The patients came from all parts of the northern districts of the territory and from Bathurst and Melville Islands.

The intention of this article is to describe and review the diseases met with at the hospital during the period from September, 1943, to October, 1944. It includes also an account of medical conditions found amongst natives in the surrounding settlements which were visited on occasions by medical officers. Visits were made to Elsey, Roper Valley, Roper Bar, Roper River Mission (which lies on the southern border of Arnhem Land), Monteginnie, Mooloolloo, Victoria River Downs, Timber Creek, Coolebah and Willeroo, and at each of these stations a medical survey of the natives was carried out.

Approximately 400 patients, mostly full-blooded aborigines, were treated at the hospital during the period, and about 250 were examined at the settlements. The surgical conditions will not be considered here as they form a separate study. The ophthalmic conditions are being described elsewhere by the ophthalmologist, who made an extensive and detailed survey. It may be mentioned that a large majority of natives were found to be suffering from trachoma in one form or another, from the mild early infections to the most severe and complicated conditions with gross destruction and distortion of the eyelids and globe, and with deterioration and loss of vision.

The medical conditions fall naturally into two groups. The first group comprises those diseases which are usually found amongst the natives and rarely amongst white populations—namely, yaws, ankylostomiasis, *granuloma venereum* and leprosy. These diseases are endemic and ubiquitous amongst natives in the territory, and only in exceptional circumstances do the white people contract yaws or leprosy. No cases of *granuloma venereum* were seen in the white community.

The second group comprises those conditions which are commonly found amongst white and native populations, such as malaria, acute infectious diseases, acute respiratory diseases, pulmonary tuberculosis, cardiovascular and renal diseases, anæmias, nervous and mental disorders, gonorrhœa, non-specific venereal infections and other miscellaneous conditions.

Yaws.

The first major problem that confronts a medical officer in the Northern Territory concerns the prevalence of spirochætal infections amongst the natives. A routine Kline precipitation test of the blood was performed when the patients were admitted to hospital. During the period under consideration 193 tests produced a positive result—that is, in 48% of all admissions. Thirty of these subjects who reacted to the test had lesions which were regarded as typical of yaws in an early, intermediate or late stage, and 51 had lesions which resembled yaws but could not be described as typical. In these 81 cases (20% of all admissions) the diagnosis of yaws was made. It may be reasonably assumed that the majority of the remaining 113 reactors to the Kline test (with the exclusion of the occasional positive result which may have been caused by malaria or leprosy) had had a previous spirochætal infection. The question then arises, is *Treponema pertenue* the offending organism in all these cases?

Early, intermediate and late manifestations of yaws were recognized. It was usually impossible to elicit from natives

a clear account of their past or present illnesses, and they seemed to have no conception of the measurement of time. Histories, therefore, were useless, and reliance had to be placed solely on direct observation. Therefore it was not often possible to identify the stage of the lesions in relation to the time of onset of the disease, nor was it feasible to classify lesions rigidly as primary, secondary or tertiary.

A male patient had a granulomatous ulcer on the knee and spirochætes were seen under darkground illumination in scrapings from the ulcer. The Kline test of the blood at first produced a negative result, but a week later the result was positive. The lesion was regarded as a primary ulcer and it healed after a few intravenous injections of "Novarsenobillon".

A young female adult examined at Moolooloo Station had a similar lesion on the forearm. The solitary ulcer was about half an inch in diameter, raised, with an irregular granular surface. It was regarded as a primary lesion and treated by an intramuscular injection of "Acetylarsan".

This type of lesion was rarely found.

A female child, aged about five years, was admitted to hospital with several pale, granulomatous lesions typical of early yaws. On the upper lip there was a raised, fungating mass with overhanging margins extending along the surface of the mucous membrane where the upper and lower lips met. The mass extended a little to the buccal mucous membrane. At the left angle of the mouth the granuloma expanded on to the cheek and the lower lip, leaving a deep ulceration. In the left axilla on the chest wall were two granulomata about one inch in diameter, circular and raised above the surface. In the right axilla were two or three similar but smaller lesions. In the groin and on the perineum were a few round, yellowish, fungating granulomata. Under dark-ground illumination numerous spirochætes were seen in smears taken from the lesions. The Kline test of the blood produced a strongly positive result. The only treatment in this case was penicillin (800,000 units) given parenterally in three-hourly injections. The lesions began to shrink immediately and were almost healed after three days; after six days they had completely healed, only purplish stains without induration being left in the groin and axillæ, and no visible trace at all being left on the lips.

Another female patient, aged about eight years, had a similar but more extensive granulomatous lesion covering most of the perineum. The inguinal glands were enlarged. Also she had a discharging granuloma inside the right nostril, which was ulcerating the nasal septum and the skin margin of the nose. There was also a deep ulcer on the inner surface of the right little finger. The surface of the ulcer was granular and the margins were well defined. The finger nails of the right hand were thickened, pitted and partially destroyed. The left hand was unaffected. On the left foot was another deep ulceration between the hallux and the second toe extending to the dorsal and plantar surfaces. The surface of the ulcer was granular and the skin surrounding it on the ball of the foot was undermined for an inch or more, an area of depigmentation being exposed. The skin of the anterior surface of the legs was roughened but not ulcerated. Spirochætes were found under dark-ground illumination from a granuloma on the thigh. The Kline test produced a positive result. Again penicillin (600,000 units) was given parenterally, with improvement in a short time; in six days the lesions were completely healed, pale, raised, smooth areas covered with epithelium being left.

The rapid response of these early lesions of yaws to treatment with penicillin is proved. Further investigations are required to determine the adequate and optimum dose and to compare the relative advantages of organic arsenical preparations and penicillin.

Skin lesions that were less typical than those described above were more often seen. Some were lesions that had become secondarily infected, others were retrogressing granulomata. Raised papules, varying in size, with a flat surface, some pale, others hyperpigmented, were observed on the hands, forearms, elbows, ankles, knees and buttocks. The papules sometimes became infected and pustular or were covered with a yellowish crust. After removal of the crusts an ulcerated, granular surface was exposed. This type of lesion was seen more often on the buttocks.

This secondary infection by pyogenic organisms complicated the picture, making the diagnosis difficult. Especially in young children impetiginous sores were frequently confused with yaws. Thirty patients suffering from impetigo, all non-reactors to the Kline test, were treated. The distinguishing characteristics were the pustular crusts covering smooth, shallow ulcers, mainly on the hands, feet and buttocks and occasionally on the face and scalp. The treatment usually consisted of local applications of white precipitate ointment.

Another common skin condition which was confused with yaws was scabies. In the natives the numerous small burrows of sarcoptes quickly became infected, and large pustules were produced. Unless careful search was made for parasites or ova the scabietic origin of these lesions was overlooked. They responded well to treatment with sulphur ointment.

Chronic skin conditions were frequently seen, which were considered to be late manifestations of treponema infections or healed early and intermediate lesions. Scars were difficult or impossible to identify because of the lack of a reliable history. Most natives said that their scars were due to fire (which was not doubted) or to some accidental cause. A scar at the corner of the mouth with a smooth, raised surface and radiating bands looked typical of a healed yaws lesion,[1] but its owner maintained that it was a burn from smoking a pipe. This same native had longitudinal grooves on the finger nails with considerable irregular thickening and some excoriation. The skin on the palms was desquamating and partially depigmented. The skin on the back of the hands was dry, thickened, redundant and scaly. On the forearms the skin was thickened and scaly. Also, there were patches of ichthyotic skin on the dorsum of the feet, on the front of the calves and on the thighs. In addition he had anterior bowing of both tibiæ. The Kline test produced a strongly positive result. The skin condition was regarded as a late manifestation of yaws and there was much improvement in texture of the skin after a few intravenous injections of "Novarsenobillon".

In other cases the skin of the forearms, elbows, knees and abdomen was roughened. The surface felt like rough sandpaper. Sometimes numerous small black papules were present, sometimes large hyperpigmented papules. Localized or more general desquamation was commonly seen. The skin of the soles of the feet was thickened and fissured. Over the lower third of the tibia and over the wrists the skin and subcutaneous tissues were thickened and deeply pitted. These pitted scars seemed to go down to the bone, which was often affected with chronic osteitis beneath the affected skin. These scars had the appearance of healed sinuses or of deep ulcers. Sometimes a little discharge exuded from them. The condition was regarded as a late manifestation of yaws, although absolute proof of the spirochætal origin of the lesions was lacking. All these patients reacted to the Kline test.

Several cases of gangosa were seen; in all the Kline test produced a reaction. In the young female patient described above, an early granulomatous lesion was attached to the nasal septum just inside the nostril, and the surrounding nasal mucous membrane and skin of the nostril were ulcerated. In another female there was a large granulating area of ulceration on the upper lip extending into the nose; where excoriation of the mucous membrane and commencing destruction of the cartilage of the nasal septum were obvious. In other cases the destruction of the nasal septum led to collapse of the bridge of the nose. Advanced stages were most disfiguring, with loss of the nose leaving only an aperture. An X-ray film of one of these patients revealed complete absence of the nasal septum, loss of the turbinate bones and sclerosis of the medial wall of the maxillary antrum. This patient had other extensive bony lesions which will be described later. Intravenous injections of "Novarsenobillon" effected resolution of lesions in the active stages.

Such cases have been described in medical literature as syphilitic.[2] This is not surprising when one considers the destructive type of lesion, with positive response to the Kline test, caused by a spirochæte which is morphologically indistinguishable from *Treponema pallidum*.[3]

Bony lesions that were regarded as being caused by yaws were frequently seen, and sixteen cases of "boomerang legs" with anterior bowing of the tibiæ, usually at the