THE SKIN LESIONS OF NEURAL LEPROSY IN THE VIRGIN ISLANDS OF THE UNITED STATES*

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INTRODUCTION

A field study of leprosy in the Virgin Islands was made during 1939 and 1940 and described in a former article (1). Among 127 cases of leprosy known to be living in the Islands in November, 1940, there were 37 with lepromatous lesions, 58 with active neural lesions and 32 were classed as arrested or quiescent cases. Biopsies were made on 23 of the patients who had one or more skin lesions characteristic of neural leprosy and, in addition, follow-up observations on 7 persons on whom a diagnosis of neural leprosy with biopsies had been made in 1934 by Dr. James Knott, then Chief Municipal Physician of St. Croix. The majority of these 30 cases had few skin manifestations, many a single lesion, and they represent, with some exceptions, cases of minimum changes which ordinarily would not be detected except during an intensive survey. It is the purpose of this article to present the salient clinical and histologic features of this group of cases.*

GENERAL FEATURES OF LEPROSY SKIN LESIONS

Certain fundamental and commonly accepted features of leprosy skin lesions which are apparent from the extensive literature on the subject may be summarized briefly. The lesions are divided into two main types on the basis of the clinical and histologic findings. These are lepromatous and neural. Lepromatous cases show diffuse or nodular infiltrations of the skin which are often poorly demarcated. At times lepromatous lesions are darker than the surrounding skin. Neural skin lesions, on the other hand, are usually round or oval, sharply circumscribed and appear lighter than the surrounding skin. They often are perfectly flat; but in some the borders may be erythematous and raised, granular or

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papular; or the entire surface may be considerably thickened and slightly indurated. As a rule, sensory perception is diminished or absent over a part or all of the neural lesions, but it is usually normal over lepromatous lesions.

Microscopic changes in the lepromatous lesions are well recognized, usually characteristic and specific, and will not be considered here. In neural skin lesions, the histologic changes vary considerably. There may be slight or moderate infiltration with small round cells, the so-called "banal" inflammation which may occur in the dermis or deeper; it may be diffuse or focal, and is frequently perivascular. More marked changes consist of infiltrations with epithelioid cells, which may be scattered or diffuse, superficial or deep, often located about hair follicles, sebaceous or sweat glands and nerves and commonly associated with a few or many giant cells often of Langhans' type. Acid-fast bacilli cannot be found except in rare instances and then usually in very small numbers in cases showing marked clinical and histologic changes. Tuberculoid leprosy is considered as a type of neural leprosy.

Clinical and Microscopic Features of Cases Seen in the Virgin Islands

The clinical and histologic features of the neural skin lesions seen in the Virgin Islands were in agreement with the cases seen elsewhere and summarized above. In general, the lesions were pale, flat macules, single or multiple, usually with at least a portion of the periphery of the lesions granular or papular. In many the macules assumed an annular form with evidences of peripheral spread and central clearing and were incompletely outlined with arcuate edges. Some pigmentary changes were present in nearly all cases and varied from hypopigmentation throughout the entire area of the lesion to decreased pigment in all or part of the periphery. In many instances minute spots of hypopigmentation were seen one or two millimeters outside the edge of the larger macule, giving the impression of satellite lesions which had spread from the parent lesion. In some cases the surfaces of the involved areas appeared erythematous, particularly at the borders. Frequently there was atrophy of the skin which was smooth, parchment-like and had lost its normal markings. Some lesions showed fine branny scales. Disturbances of sensory perception were demonstrated in one or more lesions in practically all cases, varying from partial to complete anesthesia. At times sensory changes were general over the entire area of the macule. Occasionally only a part of the periphery was involved, especially when there was normal pigmentation in the center. Only one case in this group of 30 had raised, indurated, swollen lesions which are usually called major tuberculoid. Only two of the seven examined in 1934 showed active lesions in 1940. The changes seen clinically and microscopically in the 23 new cases, first studied in 1940, were similar to the findings in the seven in 1934.

In the thirty cases studied, from one to ten sections of the skin from each area were made. All tissues were stained both with hematoxylin and eosin and with carbol fuchsin. The essential microscopic changes among these cases appeared to differ in degree rather than kind, all showing some form of granulation tissue in the corium. Seven of them showed slight to marked banal subacute or chronic inflammation with infiltration with lymphocytes and histiocytes. Twenty-three cases showed a tuberculoid type of granuliform inflammation, that is, aggregations of epithelioid cells, usually occurring in discrete foci, with or without giant cells, surrounded by moderate numbers of lymphocytes or other cells of chronic inflammation. Little or no central necrosis was present in any lesions studied. Small nerve fibers of the corium were commonly involved in the granulation process.

The epithelioid cells when stained with hematoxylin and eosin appeared as long, interlacing, polyhedral cells with poorly defined cell borders. The nuclei were large, elliptical, pale, with well defined membranes and small inconspicuous, single, basophilic nucleoli. The cytoplasm was pale, faintly stained, finely granular and rarely it was vacuolated or "foamy."

In most cases the epidermis showed no abnormality. Occasionally there was some atrophy, hyperkeratosis or parakeratosis. The papillary projections were preserved in most specimens but in some of the most marked infiltrations of the upper corium there was flattening and thinning of the epidermis. The pale areas did not consistently show paucity of pigment microscopically, suggesting the possibility of the pale appearance being in part due to decreased translucency of the upper epidermis.

The tuberculoid foci were located both superficially and deeply in the corium and in the subcutaneous tissues. Usually the most marked infiltrations were about the accessory structures deep in the corium. No acid-fast bacilli were found in any of the specimens studied. In a very few of them were found cells with foamy cytoplasm suggestive of lepra cells.

In the following section we present a resume of case histories of several of the patients seen first in 1939 and 1940 and of all 7 of the patients seen first in 1934.

Cases Seen First in 1939-40

Case 22082: A. B., a four-year-old Negro, whose mother had lepromatous leprosy, was examined in St. Croix on August 15, 1940. On the skin of the left arm there were two small, pale lesions. One, located on the lateral surface of the upper arm, was a pale oval area, 8 x 10 mm. in size. Except for several small papules in the center the surface was smooth and atrophic. The other lesion, which was similar in appearance and measured 1 cm. in diameter, was situated over the distal end of the right radius. Pain sensation appeared to be diminished but it was difficult to be sure of this point because the child was so young. The lesions

were said to have been present only a few weeks or months and a note on his hospital record dated January 31, 1938, stated "no evidence of lepra." A diagnosis of leprosy N1 was made and a biopsy was done on September 9, 1940. No acid-fast organisms were found in smears from the biopsy material. (See Plate I—Figure I.)

Microscopic examination. The epidermis is moderately atrophic. There are small foci of pale, vacuolated, epithelioid cells among numerous lymphocytes. The largest aggregations are to be found in the middle and deep corium. No giant cells are found in the sections studied. No acid-fast bacilli are found. (See Plate I—Figure 2.)

CASE 22068: G. K., a 24-year-old Negro, robust and healthy looking, was examined in St. Croix on June 18, 1940. His past history revealed nothing of importance, and contact with leprosy was denied. He had had a "rash" on his arm for "several years." He had several carious teeth. His epitrochlear lymph nodes were enlarged but a Kahn test of the blood was negative. On the posterior surface of the right upper arm was an annular lesion about 10 x 7 cm. in size, forming a broken ring. At the lower border there were hypopigmented papulate segments. The inner border was formed by a smaller, oval, annular lesion of fine hypopigmented papules. At the upper segment there was a smaller ring of papules, about 1.5 cm. in diameter. The center of the entire lesion appeared essentially normal except for a slight decrease in pigment toward the periphery. There was loss of temperature sense over the entire area and loss of tactile sense over the smaller annular lesion. Over part of the lower border of the latter there was only slightly disturbed sensation. A diagnosis of leprosy N1 was made. On September 6, 1940, a biopsy was made of the periphery of the lesion. (See Plate I—Figure 3.)

Microscopic examination. The epidermis shows no abnormalities. There is moderate banal, perivascular infiltration with lymphocytes only. No characteristic tuberculoid foci are found in the sections studied. (See Plate I—Figure 4.)

CASE 22072: A. L., a 24-year-old Negress, well developed and fairly well nourished, was examined in St. Croix on June 19, 1940. There was no history of contact except that a cousin with whom the patient played as a child was admitted to the leprosarium in 1928 with lepromatous lesions. She had always been in good health except for slight swelling of the right lower leg and an eruption on the left lower leg. The eruption had been present since she was 14 or 15 years of age. At times it had been treated with various strong chemicals but it continued to spread. She had been seen in the hospital in September and November, 1936, when a note was made of "suspicious spots which have been treated with strong chemicals." She had bilateral pterygia, slight elephantiasis of the left lower leg and a skin eruption over the right lower leg. The skin lesion covered a large area extending from the knee to the ankle and involving almost two-thirds of the circumference of the leg. The central portion was composed mainly of pigmented, smooth, atrophic, scarred areas, the result of treatment with "white vitriol." The arcuate borders were vaguely hypopigmented, slightly raised and dotted with papules 1 to 2 mm. in size. Most of the

skin was anesthetic to light touch and pin prick. The left peroneal nerve was thickened, larger than the right, but it was not nodular. A diagnosis of leprosy N1-2 was made and on September 6, 1940, a biopsy was made. (See Plate II—Figure 5.)

Microscopic examination. The epidermis is thinned and the papillae flattened above the granulomatous, large aggregations of cells below. There is no clear zone in the papillary region. There are many nests of epithelioid cells, many of which are vacuolated. These foci are found both superficially and deeply in the corium and are surrounded by many lymphocytes and an occasional giant cell. (See Plate II—Figures 6 and 7.)

CASE 22080: L. C., a 12-year-old male Negro was examined in St. Croix on March 1, 1940. Contact with leprosy could not be established. A note on his hospital record on January 7, 1938, when he was 10 years old, stated "ring lesion of left cheek, probably tuberculoid lepra. Has had it for over a year. Smears from lesion and left septum negative for Hansen's bacilli." The patient showed no abnormalities except for carious teeth and a lesion on the left side of the face. Over the left malar region there was a broken ring of papules measuring 2.5 x 3 cm. The center of the area was scarred and faintly hyperpigmented and the border was lighter in color than the surrounding skin. There was some loss of tactile and thermal perception over the center of the area. The papules of the border were 1 to 2 mm. in size and in places were confluent. On September 6, 1940, a biopsy was made. Smears from the lesion and from the biopsy specimen failed to show acid-fast organisms. A Kahn test of March 1, 1940, was negative. (See Plate III—Figure 8.)

Microscopic examination. Part of the epidermis is "ironed out" with loss of the papillae due to the massive granulomatous process throughout the corium and extending into the subcutis. There are large and small discrete and conglomerate tuberculoid foci with a central mass of epithelioid cells about which are lymphocytes and giant cells. There is no clear zone in the papillary region. (See Plate III—Figures 9 and 10.)

CASE 22081: H. D., a 14-year-old Negress was examined in St. Croix, on June 12, 1940. She had always been healthy. She had played with the daughter of a paroled patient, who was acting as attendant at the leprosarium at the time but who was a burned-out neural case and bacteriologically-negative. She also had gone to school and played with another girl who had leprosy N1. No other contact with leprosy was elicited. Except for mild follicular conjunctivitis, carious teeth and a single skin lesion, there were no abnormalities. On the lateral surface of the right upper arm, there was a hypopigmented macule, irregularly circular in shape, 2.5 cm. in diameter. The border of the lesion was sharply defined, slightly raised and finely granular in appearance. There were several small satellite lesions, 1 to 2 mm. in size, close to the upper margin. The central area was anesthetic to light touch, partially anesthetic to pain and to thermal sense. A Kahn blood test was negative. A diagnosis of leprosy N1 was made and on September 6, 1942, a piece of tissue was removed from the granular border. Smears from the tissue showed no acid-fast organisms. (See Plate IV—Figure 11.)

Microscopic examination. The epidermis shows little or no abnormalities. In the sections studied there are to be found scattered, medium-sized foci of epithelioid cells in the upper corium, together with moderate numbers of perivascular lymphocytes both in the upper and lower corium. (See Plate IV—Figure 13.)

CASE 22075: T. T., a 32-year-old Negress, was examined in St. Croix, on April 20, 1940. Her general health had been good. In 1932, she lived for a few weeks with a half-sister who was sent to the leprosarium with lepromatous lesions. The patient stated that she had the skin eruption described below for about 6 months. She was well nourished, healthy looking, with no obvious abnormalities except carious teeth and skin lesions on the left upper arm and chest. A few inches below the left clavicle there were two distinct, sharply circumscribed areas of hypopigmentation, with finely granular borders. There was a large, vague, indistinct area of hypopigmentation extending from the outer part of the left pectoral region laterally to the deltoid region and to the lower third of the upper arm on the anterior surface. The upper borders were distinct, slightly raised and finely granular but the lower edges faded away into the surrounding skin. There was no tactile anesthesia but there was disturbance of pain sense over the lateral and lower portions of the larger lesion. A Kahn test was negative. A diagnosis of leprosy N1 was made and on September 6, 1940, a biopsy was made. (See Plate IV—Figure 13.)

Microscopic examination. The epidermis shows no abnormalities. There is slight banal inflammation with infiltration with lymphocytes about the vasa of the upper corium and a few about the hair follicles. No epithelioid cells are found in the sections studied. (See Plate IV—Figure 14.)

CASE 18340: P. B., a 72-year-old Negro, fairly well developed and nourished, with obvious deformities of both hands, was examined in St. Thomas on February 17, 1939. He complained of pain and disability in both hands, and a skin eruption which had been present for several months. His record at the Municipal Hospital showed that he had been treated for numerous conditions between 1918 and 1938 but nothing had been found suggesting leprosy. On September 15, 1938, he was admitted to the hospital where he remained for several months. His clinical record during this period stated that there was marked swelling of the fingers of both hands, especially the right; there was swelling of the feet and ankles; the knees were painful on motion and the elbows could not be fully flexed; the sense of touch was absent over the dorsal surface of the left foot. A nasal smear was negative for acid-fast organisms. A Kahn test was negative. A note of December 12, 1938, stated "drop-foot, right." Evidently leprosy was suspected but a diagnosis of arthritis was made. The present examination (2-17-39) revealed several round or oval, slightly hypopigmented areas on the dorsum of the hands and forearms and over the left knee, varying in size from 2 to 15 cm. in diameter. The borders of most of them were slightly indurated and raised several millimeters above the surrounding skin and were purple in color. There was nearly complete anesthesia of the left arm below the elbow, the ulnar side of the right forearm, and the dorsum of the right hand. Most of the macules were completely anesthetic. There was partial atrophy of the thenar, hypothenar and

interosseous muscles of both hands and moderate contraction deformities of all fingers. Both ulnar nerves and the right peroneal nerve were greatly enlarged and acutely tender. Smears from the nose and from the edges of several of the macules showed a few acid-fast granules, but no bacilli. Wassermann and Kahn tests were negative.

On March 29, 1939, a biopsy was made from the edge of one of the lesions. By April 20, the condition had changed greatly, and all skin lesions were reduced to pale flat macular areas showing anesthesia.

Microscopic examination. The epidermis is normal or slightly thin. Deep in the corium about the accessory structures of the skin there is heavy infiltration with lymphocytes. Among these are small groups of epithelioid cells and a few giant cells. In the sections studied these do not have the usual compact arrangement but the individual cells are typical of those usually seen in the tuberculoid foci. No acid-fast bacilli are found.

The diagnosis in this case was leprosy N3, with major tuberculoid lesions. It is of special interest that signs of leprosy appeared so late in life, at the age of 71 years.

CASE 18858: T. D., a white boy, 8 years of age, was examined in June 16, 1939, in St. Thomas where he had always lived. He had always been well, but for about 4 months his parents had noticed a pale spot on the back of his right thigh. A paternal aunt, whom the patient visited infrequently, was discovered to have lepromatous leprosy in 1937. On the right posterior thigh was a circular lesion, about 3.5 cm. in diameter, with a tongue projecting medially for 1.5 cm. The entire area was hypopigmented, smooth except for the faintly pink, finely granular periphery. The lesion was completely anesthetic to light touch, pain and temperature. A diagnosis was made of leprosy N1, and on June 28, 1939, a portion of the periphery of the lesion was removed. Smears failed to show acid-fast bacilli.

Microscopic examination. The epidermis is undulated and normal. There are discrete, small, well-defined foci of epithelioid cells surrounded by many lymphocytes. These aggregations are found in the upper corium occasionally, but most of them are about the hair follicles and glands of the deep corium and the subcutis. No acid-fast bacilli are found.

On September 9, 1939, the lesion appeared unchanged, but on April 9, 1940, it was largely obscured by a scar from a "burn from sitting on a hot turtle shell" a month previously. On August 15, 1940, the lesion could not be seen and only scars from the burn and the biopsy remained. This case represents a macular lesion of neural leprosy, which persisted for a little more than a year and then disappeared entirely following a severe burn of most of the lesion.

CASE 18413: R. A., a 12-year-old Negress, well developed and nourished, was examined in St. Thomas on March 21, 1939. No leprosy contact could be traced. Her hospital record showed that she had a macular lesion on the left arm some time before 1937 when she was treated for "trichophytosis" of the left elbow. In April, 1937, a note stated that the lesion did not resemble ordinary trichophytosis and nasal and skin smears were made but no acid-fast organisms were found. In September, 1937, and Jan-

uary, 1938, the same lesion was present. The patient was found to have carious teeth and an umbilical hernia. On the posterior surface of the left upper arm, just above the elbow was a circular, light colored macule, 4 cm. in diameter. A narrow zone at the periphery was finely granular, slightly raised and erythematous. The central portion was smooth, with loss of normal markings, indicating atrophy. The entire surface of the area was anesthetic. A diagnosis of leprosy N1 was made, and on April 13, a section of the border of the lesion was removed. She was last seen in April, 1940, at which time the lesion appeared essentially the same.

Microscopic examination. The epidermis is undulated on the surface and has a thin cornified layer. The germinal layer pigment is prominent and the papillae are normally preserved. In the upper corium there are numerous perivascular foci of lymphocytes. Larger foci of lymphocytes are found deeper in the corium about the accessory skin structures. Here, too, are small groups of epithelioid cells with several giant cells. No acid-fast bacilli are found.

CASE 22064: L. S., a 19-year-old Negro, normal except for a skin eruption, was examined in St. Croix on May 8, 1940. He had always been in good health. He had attended school with two boys who later were sent to the leprosarium. His hospital record showed he had his tonsils removed in 1930 and that he was treated for a scalp laceration in 1938. He noticed a light spot over his abdomen sometime in 1938 which had increased in size and other lesions had appeared. There were numerous, round, hypopigmented areas, varying in size from a few millimeters to 12 cm. in diameter, widely scattered over the back, the extensor surfaces of both arms, and over both legs. The largest lesion was centered over the umbilicus and was 12 x 13 cm. in size. The borders of most lesions were raised, papular and hyperemic. There was definite anesthesia over most of the involved areas. A Kahn test was negative.

A diagnosis of leprosy N2 was made and on September 6, 1940, tissue was taken from the edge of one of the active lesions. No acid-fast organisms were found in repeated smears from the skin lesions.

Microscopic examination. The epidermis has a normally undulated surface and moderate cornified layer. Scattered in the papillary region throughout the corium and in the subcutis are numerous tuberculoid foci. The arrangement of the epithelioid cells, the giant cells and the peripheral lymphocytes is typical. There is no central necrosis. The largest of the foci are found deep in the lower corium about the accessory skin structures. No acid-fast bacilli are found.

CASES IN WHICH DIAGNOSIS OF LEPROSY WAS MADE IN 1934

1. G. B., a 25-year-old Negro, was examined in St. Croix, December 1, 1934. No contact with leprosy could be elicited. He had always been in good health. A rash had been present on the right side of his face for at least 6 months, involving most of the cheek and extending to the midline of the nose and upper lip. About 1 cm. along mucosa of the lower lip, was a pitted, irregularly scarred area, the result of application of sulphuric acid. The area was hypopigmented and on the skin between the scars

was a finely papular eruption. On the right ear there was an area of hypopigmentation and papular eruption. The right great auricular nerve was visibly enlarged and nodular. At the right corner of the mouth, there was an area of anesthesia to touch and temperature. A diagnosis of tuberculoid leprosy was made and a biopsy was done.

Microscopic examination (December, 1934, biopsy). The sections include no epidermis. There is massive, conglomerate, tuberculoid infiltration extending throughout the tissue. Aggregations of epithelioid cells and giant cells with eccentric nuclei are surrounded by a diffuse, poorly defined zone of lymphocytes. Occasional areas show very slight central necrosis, about which the epithelioid cells tend to be arranged radially.

The patient was observed about a year later when the lesion had disappeared except for the scarring and a slight right facial paralysis. He was examined again on May 4, 1940, when he showed the scarred areas mentioned, partial right facial paralysis, an area of anesthesia about 5 cm. in diameter about the right corner of the mouth, and another over the posterior side of the right ear.

2. G. C., a 29-year-old Negro, was examined in St. Croix on July 17, 1934. He had a spreading rash on his face for 3½ years and his mouth had recently become twisted and he could not close his right eye. Above the right eye, over the malar prominences, and the bridge of the nose, were ill-defined, hypopigmented areas, with masses of small papules. The right supra-orbital nerve was enlarged. There was slight right facial paralysis, and there was slight thermal anesthesia over some of the lesions. A diagnosis of leprosy was made and biopsy was done.

Microscopic examination (December, 1934). The sections include no epidermis. Throughout the tissue there is massive tuberculoid infiltration with nests of epithelioid cells surrounded by many lymphocytes. There are many giant cells. No central necrosis is found but there are a few places in the surrounding connective tissues where there is slight necrosis.

Within 6 months the skin lesions and facial paralysis had entirely disappeared, and when seen on May 15, 1940, he showed only keloidal scars at the sites of biopsies and an area of anesthesia about 5 x 3 cm. in size above the right eye along the course of the supra-orbital nerve.

3. M. E., a 9-year-old Negress, was examined in St. Croix on December 7, 1934, when she complained of "ringworm" of skin of the face and legs, which had been present for nearly 4 years. As an infant she had been exposed to a grandmother who had leprosy. Physical examination showed several raised, circinate, papular lesions over face and extremities, with vague loss of pigment around some of the papules. The lesions varied in size, from a few millimeters to 15 centimeters in diameter. No mention was made of sensory changes. A biopsy was done.

Microscopic examination (December, 1934). The epidermis is thin and ironed out. The skin shows many hair follicles around which are found many large, tuberculoid foci. There is no necrosis. Giant cells are numerous and the arrangement of the foci is as usual.

Follow-up examination (April 24, 1940). The patient showed several

groups of light colored papules, 1 to 2 mm. in size, along left lower eyelid, around the left nostril, over the left ear, and left shoulder. Over the left antecubital region there was an oval area 9 x 6 cm. in size, of patchy hypopigmentation and scarring, and a similar area, 11 x 12 cm. in size, over the posterior surface of the right thigh. Both areas were completely anesthetic. A diagnosis of leprosy N1-2 was made.

4. P. G., a Negro, 11 years of age, was examined in St. Croix on November 28, 1934. He complained of "ringworm" on the face, which had been present for a year. As an infant he had been exposed to leprosy in his home. Physical examination revealed several round, hypopigmented lesions with granular borders, over the face. There was no apparent anesthesia, but a diagnosis of tuberculoid leprosy was made. Smears were negative for acid-fast organisms. A biopsy was done with a skin punch.

Microscopic examination (December 28, 1934). Microscopically the skin sections show well cornified epidermis with preserved rete pegs. There are many hair follicles. In the corium, about the follicles are many lymphocytes and small foci of epithelioid cells. No giant cells are found in the sections studied.

The patient was reexamined on August 17, 1940, at which time he showed no signs of leprosy.

5. L. P., a 7-year-old Negress, was examined on January 15, 1934. Her general health had been good. No contact with leprosy could be elicited. Over the bridge of the nose, extending down to the tip, more on the right side, there was an irregular, raised area with papular edges showing slight desquamation. There was a narrow band of apparently normal skin separating this from a similar, small, oval lesion on the right ala nasi. On the left forearm and left thigh were similar lesions, but showing hypopigmentation. Tactile sense appeared to be diminished over all lesions. Acid-fast organisms were not demonstrated. A diagnosis of leprosy N1 was made and the patient was admitted to the leprosarium where she remained until paroled on February 26, 1936, when the lesions had become quiescent.

Microscopic examination (January, 1934). The epidermis is undulated and has a moderate keratin layer. There are many hair follicles in the section. There are numerous, medium-sized tuberculoid foci in the corium with moderate numbers of Langhans' type giant cells. Surrounding these there is heavy, diffuse and focal infiltration with lymphocytes. There is shown no central necrosis in any of the foci.

When examined August 6, 1940, the only remaining trace of the lesions was a large superficial pigmented scar above the left knee which showed no sensory changes.

6. L. S., a 7-year-old Negress, was examined on November 30, 1934, because of household contact with the disease. On the dorsum of the right wrist there was a patch of confluent papules located on a hypopigmented base measuring 2 cm. in diameter. Over the fourth knuckle of the right hand there was a similar smaller lesion. The right ulnar nerve was three times the size of the left. There was thermal anesthesia over the center of

the larger lesion. Smears from the lesions failed to show acid-fast organisms. A diagnosis was made of tuberculoid leprosy and a biopsy was performed. On April 5, 1937, only a few non-anesthetic papules remained on the wrist at the site of the former lesion.

Microscopic examination (November, 1934). The undulated epidermis varies greatly in thickness. There is a thick, cornified layer with some parakeratosis. In some places the epidermis is ironed out, being without rete pegs and consisting only of a few flattened layers. Immediately beneath this, extending to the depth of the specimen is a massive granulomatous process, with many large aggregations of epithelioid cells, with both Langhans' and foreign body types of giant cells, surrounded by moderate numbers of lymphocytes. There are some pigment-laden phagocytes in the papillary zone.

On March 28, 1940, the only remaining sign was a smooth, slightly raised scar 1 x 0.5 cm. on the dorsum of the right hand at site of the biopsy. It was anesthetic to touch and pin prick.

7. M. S., a 50-year-old Negress, was examined on December 8, 1934, She complained of spots on the skin, increasing in size and number during the previous 10 years. Some of these had been burned with sulphuric acid. Physical examination showed many hypopigmented, round and oval lesions scattered over the face, trunk and extremities, varying in diameter from less than one to several centimeters. The macules were entirely flat and apparently inactive except for a few small, narrow segments of the periphery of some where the surface was finely granular and scaling. There was complete anesthesia of most lesions. Smears from several lesions failed to show acid-fast bacilli. A diagnosis of tuberculoid leprosy was made and a biopsy was done on December 8, 1934.

Microscopic examination (December, 1934, biopsy). The epidermis is thick with considerable cornification of the surface. The papillae are well preserved. Immediately beneath the epidermis, without any clear zone, are large tuberculoid masses. There is no central necrosis but the aggregations of epithelioid cells with many giant cells are surrounded by moderate numbers of lymphocytes.

On March 29, 1940, there were widespread, hypopigmented macules scattered over the entire body, many of them coalescing. There were various degrees of hypopigmentation. Some lesions were round, many had serpiginous borders, evidently formed from the coalescence of smaller lesions; the centers of many were slightly atrophic, in a few places the borders were faintly pink and finely granular. Most of the lesions, as well as the dorsum of the left hand and ulnar side of the right arm, were entirely anesthetic. There had doubtless been slow but steady growth of most lesions in the previous 3½ years, although there were few signs of activity. Smears failed to reveal acid-fast bacilli.

Comments

The finding of 23 out of 30 cases showing well-defined tuberculoid changes appears unusual. However, this group is not a cross section of the leprosy cases seen in the Virgin Islands but repre-

sents mild cases which might only be found in an intensive survey of the population. These probably represent cases with high resistance to the disease (2).

The tuberculoid microscopic changes seen here are considered typical of those found elsewhere in neural and tuberculoid leprosy. They are considered consistent with but not diagnostic of leprosy. Clinically the cases of this study represent well established cases of leprosy. The milder reactions were banal in type and the more severe infiltrations were tuberculoid. These appear to differ only in degree.

Five of the seven cases studied in 1934 were free from visible evidence of the disease in 1940. Apparently this type of the disease frequently shows spontaneous disappearance of lesions. Since the twenty-three new cases were of similar type, many of them may be expected to be free of symptoms in a few years.

Lepromatous leprosy is a systemic disease and often involves all the tissues of the body. In neural leprosy the patient apparently shows marked resistance to the disease, which progresses very slowly. Here the infective agent shows marked neurotropism. The associated skin lesions rarely show *Mycobacterium leprae,* and have a fairly characteristic histologic picture. Whether these lesions are really evidence of trophism (3) rather than local infection is uncertain. In marked cases allergy may play an important part (4, 5).

Conclusions

1. This is a study of 30 cases of leprosy discovered in an intensive survey of the Virgin Islands.

2. Biopsy material from these cases shows banal inflammation in seven and tuberculoid infiltration in twenty-three.

3. All cases studied were free from acid-fast organisms.

References

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PLATE I

FIG. 1. Right forearm of 4-year-old male (A. B.) showing pale, atrophic lesion with papules particularly about the poorly defined periphery.

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FIG. 2. Photomicrograph (X142) of biopsy specimen, from lesion shown above in Fig. 1, shows a somewhat atrophic epidermis, and moderate tuberculoid infiltration. In mid-dermis and deeper are foci of epithelioid cells surrounded by lymphocytes. Many of the former are vacuolated. No necrosis or giant cells are present.

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FIG. 3. Right posterior upper arm of 24-year-old male Negro (G. K.). The annular lesion measures 7 x 10 cm. with the borders incompletely outlined by pale, papulate segments about a center which appears normal except for slight hypopigmentation toward the periphery. The entire area was devoid of temperature sense and parts of the lesion showed loss of tactile sense.

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FIG. 4. Photomicrograph (X142) of above lesion. The epidermis is normal. There is moderate, banal, perivascular infiltration with lymphocytes. No epithelioid cells are found in the sections studied. The infiltration is largely limited to the corium.

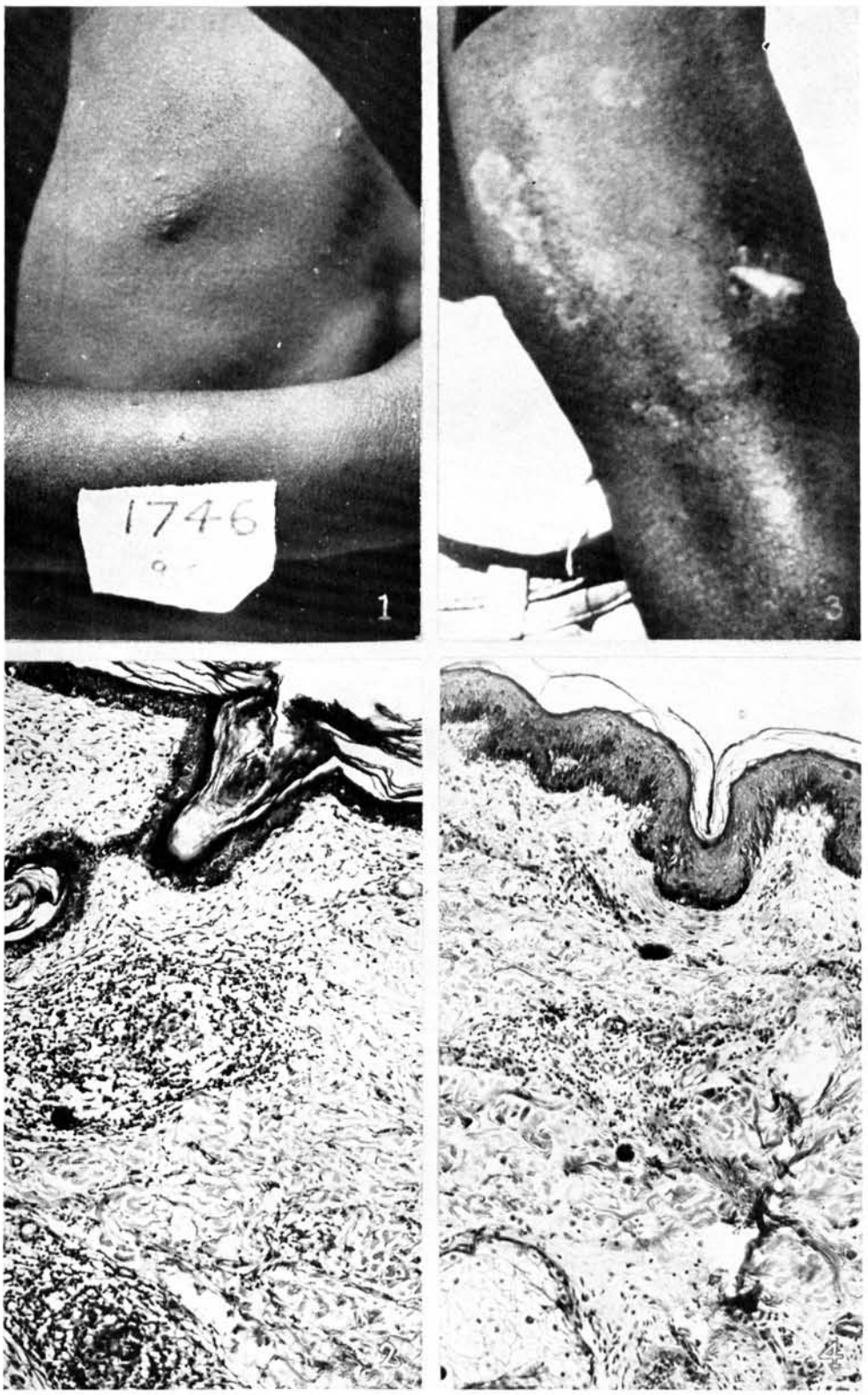

PLATE I

Plate II

Fig. 5. Leg lesions in a 24-year-old Negress (A. L.) showing slight elephantiasis and a skin eruption. The skin lesion covered a large area, extending from knee to ankle and involving about two-thirds of the circumference. The central portions were composed largely of pigmented, smooth, atrophic scars, the result of treatment with "white vitriol." The arcuate borders are poorly defined, slightly hypopigmented, slightly raised and studded with papules from 1 to 2 mm. in diameter. Most of the skin was anesthetic to light touch and to pin prick.

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Fig. 6. The epidermis is thin, and the rete pegs shortened. Throughout the dermis and extending into the subcutaneous tissues there are massive aggregations of cells. These conglomerate masses are composed largely of central nests of epithelioid cells surrounded by many lymphocytes. A few giant cells are present but none show in the photomicrograph. There is no clear zone in the papillary region, the granulomatous process extending clear up to the epidermis. (X142)

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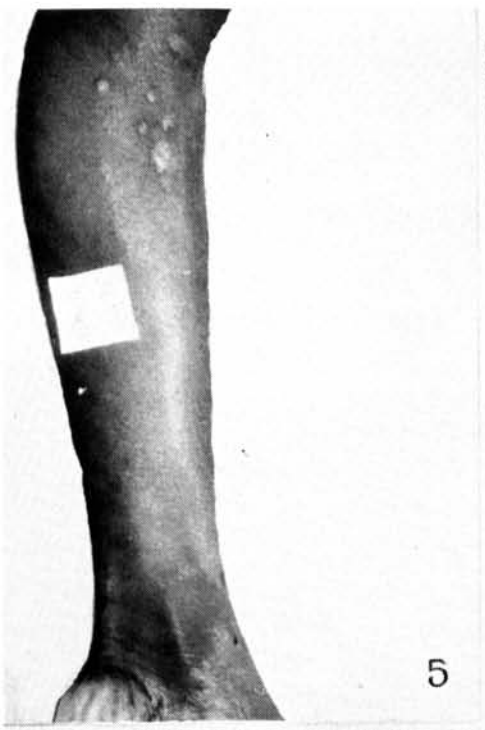
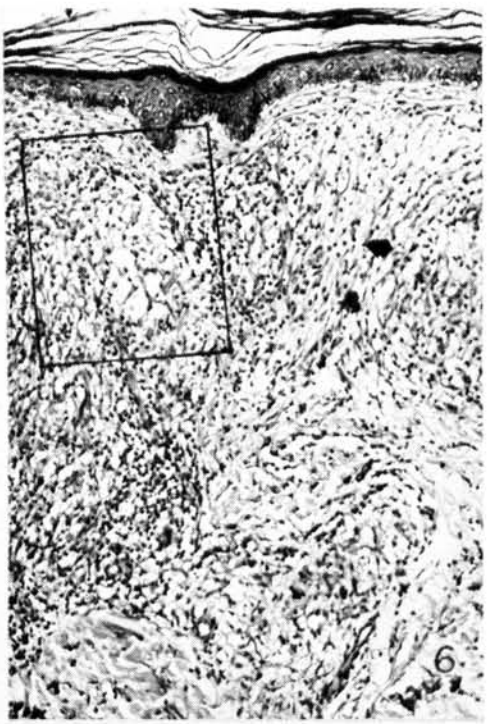
Fig. 7. High power photomicrograph (X415) to show the cellular details. Many epithelioid cells are vacuolated but they do not contain acid-fast bacilli. The nuclei are elliptical and both they and the cytoplasm are pale.





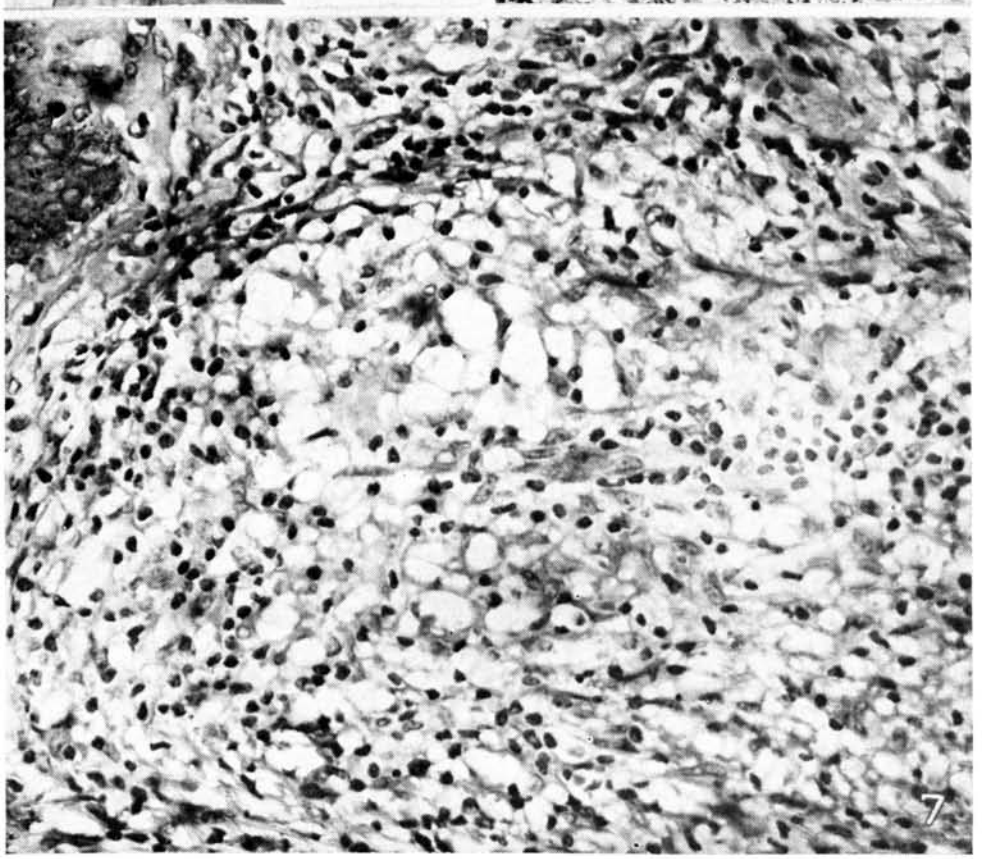


PLATE II

Plate III

Fig. 8. This 12-year-old Negro shows an annular lesion over the malar region composed of a broken ring of papules. The center of the lesion is scarred and slightly hyperpigmented while the border is slightly lighter than the surrounding skin. There was some loss of both thermal and tactile sense in the center of the lesion. Some of the papules are confluent.

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Fig. 9. Photomicrograph (X142) showing flattened epidermis with massive granulomatous infiltration throughout the corium and extending into the subcutis. Large and small, discrete and conglomerate central masses of pale, epithelioid cells are surrounded by lymphocytes and giant cells. There is no clear zone in the papillary region.

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Fig. 10. High power (X415) photomicrograph of the above lesion to show the details of the histologic picture. Note the elongated, pale, epithelioid cells with poorly defined cell borders, rather pale, elliptical nuclei and obscure nucleoli. The cytoplasm is pale, granular and in some places slightly foamy. A Langhans' type giant cell is shown. (X) There is no central necrosis.

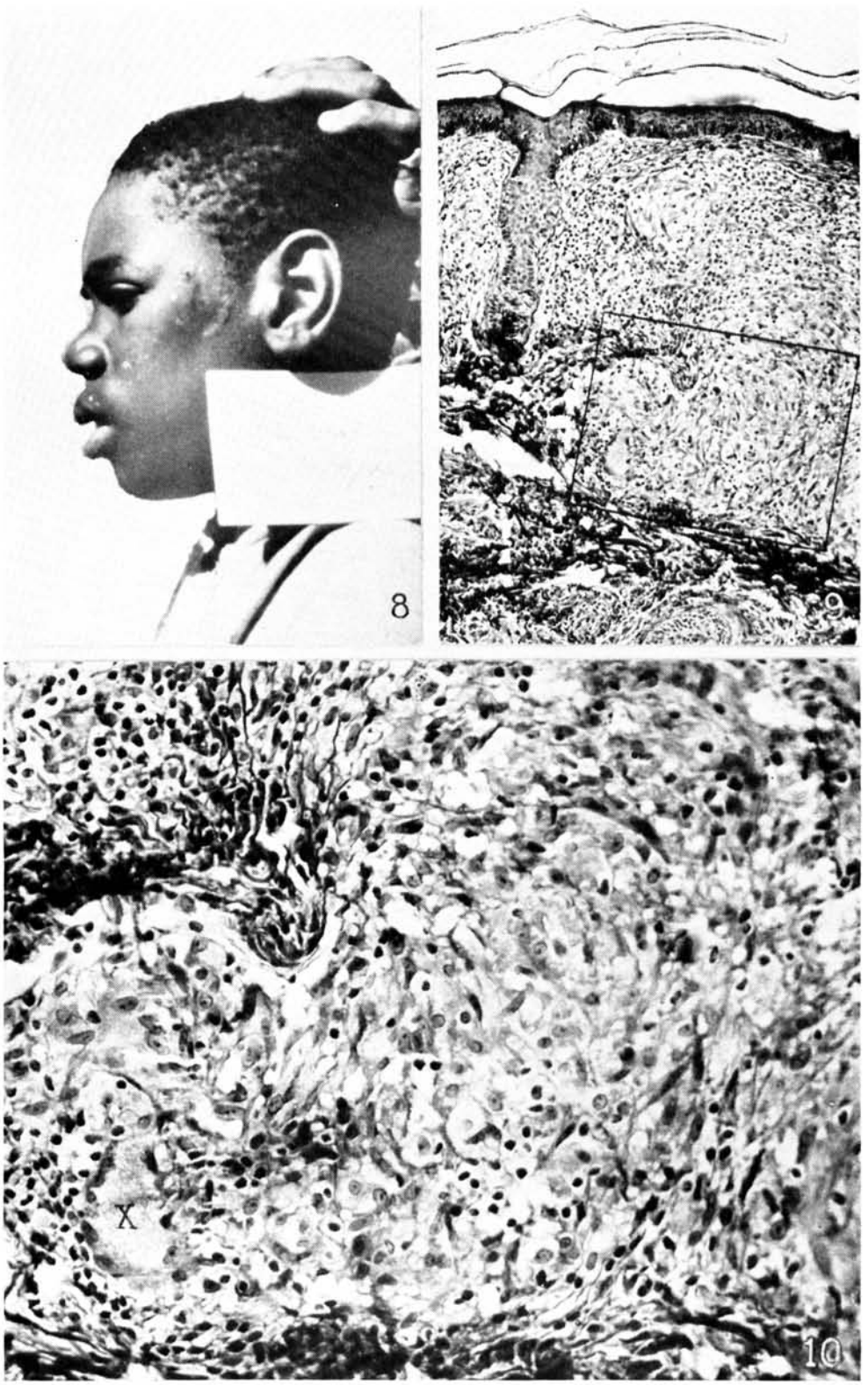

PLATE III

PLATE IV

FIG. 11. Right upper arm lesion, on a 14-year-old Negress, shows a pale macule with sharply defined, very slightly raised, finely granular border. Close to the upper margin of the larger lesion are several minute, pale, satellite lesions. The central region was anesthetic to light touch, and partially anesthetic to pain and thermal sense.

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FIG. 12. Photomicrograph (X142) of the above lesion seen in Fig. 11. Below an essentially normal epidermis there are medium sized foci of epithelioid cells surrounded by moderate numbers of lymphocytes. There is moderately marked perivascular infiltration with lymphocytes both in upper and lower corium.

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FIG. 13. Skin lesions in this 32-year-old, well-developed Negress were confined to the left upper arm and chest. Below the left clavicle there are two distinct, sharply defined pale areas with finely granular borders. Another large, poorly defined pale zone extended from the left pectoral region out over the anterior and lateral left upper arm. There was decreased pain sense over parts of this larger lesion, but neither lesion showed demonstrable loss of tactile sense.

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FIG. 14. Photomicrograph (X142) of the above lesion shows only slight, perivascular, banal infiltration with lymphocytes. There are also some lymphocytes about the hair follicles. No epithelioid cells are found in the sections studied.

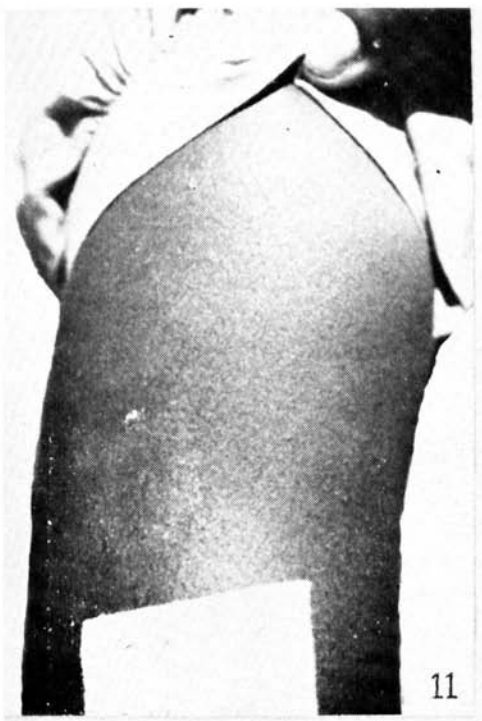

Plate IV