agent should make a strong appeal. It is particularly indicated in children, one injection giving immunity. The reaction is very slight, producing only a little tenderness of the arm for a day or two.

In conclusion I would like to impress on my readers the necessity of making an early diagnosis. Plan the campaign for the patient. Have out-of-doors sleeping quarters arranged, or, where the weather is too cold, substitute a window tent after the style of Dr. Knopf. The details must be studied out more carefully than can be barely mentioned in this brief summary. Rest, fresh air and diet, with judicious administration of tuberculin, offer the rational treatment in our present knowledge of the disease.

A DESCRIPTION OF AINNUM AS SEEN ON THE CANAL ZONE, WITH REPORT OF INTERESTING CASES OCCURRING IN ONE FAMILY.*

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In the evolution of medicine many diseases of obscure origin have been unraveled and put on a rational basis. It is true that some of these diseases are rare and have no practical significance, but are, nevertheless, quite interesting. As the cases present themselves they are recorded in the literature as curiosities and the individual authors suggest ideas as to their origin; most often these suggestions are made on a theoretical basis. One of these diseases is ainnum, and I wish to present a resume of this interesting condition and record cases of unusual interest that have come to my attention.

Ainnum, dactylolysis spontanea, is a tropical disease, of great chronicity, generally limited to African and East Indian peoples, characterized by spontaneous amputation of the little toe of one or both feet, although very rarely other toes may be involved. A most characteristic feature of this affection is the peculiar constricting ring formed over the affected toe or toes; in fact, this constricting ring is the most pathognomonic sign of ainnum. Pathologically ainnum presents marked trophic changes in the diseased parts.

Although very rare in the United States, where

most cases have been noted among the negroes in the Southern States, in West Africa, especially along the Gold Coast, it is not uncommonly met with. The first case was recorded by G. Messum¹ in 1821, and by Clark² in 1860, but it was not until 1867, when Dr. J. F. da Silva Lima,³ of Bahia, completely described ainnum, including the pathology by Dr. Wucherer. He found it present exclusively among the descendants of the old African slaves. A. Collas⁴ and Crombie and Crawford⁵ found the disease among Hindus. Collas was the first to suggest that it is a form of dactylolysis lepra spontanea. Since then ainnum was found in many tropical and sub-tropical regions. It was found particularly prevalent in the West Coast of Africa, the large Brazilian sea coast towns, India and the West Indies. N. D. Brayton⁶ gives a very excellent resume of ainnum, with a complete bibliography of cases in the United States. Up to 1905 not more than twenty cases of this condition had been recorded in the United States. For obvious reasons, ainnum is not uncommon in the Canal Zone; nearly all of us have seen one or more cases in the course of our experience on the Isthmus.

Almost all the cases described were observed in men; occasionally it has been met with in women. The fifth toe is the one most often involved. In fifty cases described by da Silva Lima, only five had the disease in others besides the little toe, e. g., the fourth, but very rarely indeed in other toes. Essentially it is a disease tending towards symmetry, first commencing in the little toe of one foot and then attacking the fifth toe on the opposite foot, or both little toes may be involved simultaneously. It is a chronic disease lasting from five to twenty years, although cases running a more acute course and lasting not more than two or three years have been observed. Heredity plays an important role, as is seen in the cases described by da Silva Lima, Dhuring and myself. Age is quite an important factor; it rarely attacks those who have not reached adolescence. In following up the literature, I was struck by the comparative old age of some of the patients, as well as the unusual advanced age in some of the members of their families. As already remarked, ainnum has been met with almost exclusively in dark-skinned races. Da Silva Lima, who made extensive investigations, was unable to find the disease among the Brazilian natives or among the Creoles. It is also interesting to note that in several cases reported in America there is a history of direct African parentage.

Ainnum generally commences as a small circular

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depression at the internal and inferior aspect of the root of the little toe on a level with the web. Manson¹ has sometimes seen a small ulceration in that region at the beginning of the disease. The depression increases in depth and width and gradually works along the entire aspect of the toe. Most often the groove is found over the first interphalangeal articulation and next frequently right over the second phalanx. Later on, the toe is surrounded by a groove one-fourth inch to three-eighths inch in depth, the outer aspect of the toe being the last involved. The skin in the immediate vicinity of the groove is thick, dry, tough, and scabous. It is firmly adherent to the underlying structures, so that attempts to move it are entirely disappointing. There is generally no inflammation, induration or ulceration, and movement of the toe is not impaired except in the last stages, when it is abnormal on account of the long, fibrous pedicle. Although there may be no pain in the beginning of the disease, it is very severe during its course. Why the text-books describe it as painless is a mystery to me. I found that in most of the cases I read about in the literature, pain was a very characteristic symptom. It is particularly noticeable over the groove and bitter'y complained of even when at rest. The part of the toe distal to the fibrous ring increases in size to about twice or more than the original and assumes the shape of a large cherry or a small potato. The plane of the toe is changed. The affected part gradually separates from its neighbor and falls off spontaneously or is removed by interference. The wound formed generally heals well, although ulceration may take place, due to the uncleanness of the people affected. Of the nervous manifestations one must mention that there is no muscular atrophy, that the sensory disturbances are diminished or increased, but never entirely lost. In my cases I have also demonstrated the absence of the plantar reflexes, whereas all other reflexes were unaffected. There are no constitutional symptoms.

Wucherer,² Schuppel,³ Dhuring,⁴ E. les,⁵ and more recently Darling, have made thorough pathological examinations of specimen toes taken from patients suffering from alimhum. Although their reports differ somewhat, yet, in the main, the findings are similar. Of course, the pathological findings vary greatly with the stages of the disease. I will attempt to give a resume of the findings in a well-marked case.

The epidermis is increased, the stratum lucidum slender, the papillary layer elongated, and in the rete Malpighii the pigment is found irregularly

distributed. The constricting ring is made of dense fibrous connective tissue covered by a layer of epidermis. The process travels from the base at the constricting band, gradually to the top, involving all the structures in proper turn, and while the proximal parts show atrophy, the distal parts show degenerative changes.

In the part distal to the constricting ring the pigmentary layer shows many germinal cells, while in the neighborhood of the ring the deeper layers of the skin show atrophy. The corium papilla are elongated, the surrounding capillaries dilated, and the perivascular lymph spaces are filled with corpuscular elements, especially young connective tissue cells.

The subcutaneous tissue is increased at the expense of muscle, tendon and soft parts, while here and there may be seen islands of fat cells. The sweat glands are very much atrophied and in the spaces between the glands there is a great deal of cellular infiltration, consisting of young connective tissue cells, fat, and lymph cells. The original cells show cloudy swelling, together with granular and hyaline degeneration.

The blood vessels are everywhere numerous; the larger arteries are engorged, all the coats thickened by the connective tissue replacement, including the proliferation of the subendothelial connective tissue, leading ultimately to endarteritis obliterans. The smaller arteries show very much thickening of the adventitia and much perivascular infiltration. The veins are dilated, thickened but empty. The lymphatics are also dilated and the lymph spaces in a state of engorgement.

In the bone there is a condition of rarefying osteitis, advancing from the periosteal side. The destruction in the interior is rapid, the cavities filled with reticulum of connective tissue, blood vessels, numerous round cells and fat globules, the bone corpuscles being few in number. The ultimate result is the change of all the parts into dense fibrous tissue.

To summarize the pathological findings. We meet first a condition of inflammatory oedema. Later on there is found degeneration of original elements, followed by atrophy. The highly organized tissue, such as sweat glands, blood vessels, muscles and bone are all changed into connective tissue. In all there are evidences of interfered nutrition due to pressure, vaso motor and trophic manifestations.

F. C. Wellman¹² reports a case of alimhum and summarizes the various theories advanced hitherto:

1. Due to injury, foreign bodies, etc.—Manson, Eyles.
2. Self-mutilation, instruments, etc.
3. Congenital spontaneous amputation—Proust.
4. Form of mutilating leprosy—Zambaco Pasha.
5. A form of tropho neurosis.—Wucherer, Scheube, Darling.
6. A form of localized scleroderma—da Silva Lima.

In addition to the above, Wellman suggests that the chigger (*Sarcopsella Penetrans*) may be a causative factor in some of the cases.

It is quite reasonable for purposes of discussion to combine 1 and 2 as belonging to the same category, namely, external influences. Ainnum has been ascribed to injury by foreign bodies coming in contact with the most dependent part of the foot, the little toe. It is claimed that barefootedness of the class of people affected is a very important factor. Many authors who have reported cases in the literature have ruled out absolutely external injury. If barefootedness were a cause, the natives of many countries should be attacked, whereas most of the cases reported were in negroes living in cities and wearing shoes. Da Silva Lima has not seen the disease in the barefooted Brazilians or among the Creoles. Why should the disease attack males almost exclusively and shun the barefooted women? How is the hereditary factor to be ruled out? Although the natives of Africa, India, Polynesia and other parts of the globe inflict upon themselves many injuries by wearing ornaments upon exposed parts of the body, such as nose, lips, toes, etc., yet ainnum could hardly be due to them.

3. Proust¹² contends that ainnum may be due to congenital malformations. He claims that as a result of some interference in the development of the foetus some parts may become arrested, but progress after birth causing amputation of fingers and toes; that the umbilical cord or fibrous projections may ensnare parts, causing arrested development, leading later on to spontaneous amputation.

Now, congenital amputation has been described by various authors, Reclus¹³ among them. Reclus at first adhered to the same views as Proust, but later modified them. Congenital amputation is observed soon after birth or in early youth; males and females alike attacked, but females largely predominating; there are no racial characteristics; fingers, toes and other parts may be involved simultaneously; is not associated with pain and is often stationary. On the other hand, ainnum (1) occurs in dark-skinned races; (2) rarely com-

mences before adolescence; (3) affects males exclusively; (4) involves the fifth toe, rarely others; (5) is sometimes hereditary; (6) is associated with pain; (7) is always progressive.

4. Zambaco Pasha¹⁴ is the most enthusiastic supporter of the theory that ainnum is a form of mutilating leprosy. He studied his cases in Syria and especially at Beyrout, where leprosy is very common. Many diseases of obscure nervous origin such as syringomyelia, morphea, scleroderma diffusum and ainnum are attributed by him as leprous manifestations. Dr. Collas, who observed ainnum among Hindus, is quoted by him as holding similar views about the disease as himself.

It is to be noted that all of his cases were Caucasians of all ages and both sexes. The lesions are described as occurring alike in hands and feet, fingers and toes with irregular distribution. The clinical symptoms are those of anaesthetic leprosy, with all the nervous symptoms—anaesthesia, analgesia, electrical and thermal disturbances, together with muscular atrophy. There were also observed perforating ulcer, atrophy of the nails, and pigmentation of the skin. Zambaco Pasha also has leanings towards the hereditary tendencies of leprosy, and considers the pathological findings in spontaneous mutilating leprosy and ainnum as similar.

De Brun¹⁵ takes issue with Zambaco Pasha. He, too, observed his cases at Beyrout. In more than 900 cases observed by him, not one was seen where the fifth toe was exclusively affected. Although he found a constricting band in some of the fingers and toes, it was rather irregular, not circular, as in ainnum.

Ainnum rarely begins before period of adolescence, anaesthetic mutilating leprosy may occur at any age. The racial factor is distinct in ainnum, but not in leprosy. Although very seldom other toes besides the fifth may be involved by the ainnum process and is often symmetrical, in leprosy fingers, toes and other parts are affected (Polymorphian). Ulcers, fissures, suppuration and other inflammatory conditions are seldom noticed in ainnum, but are very common in mutilating leprosy. Local asphyxia, which is comparatively common in affected members of leprosy, is never seen in ainnum. The hereditary factor in leprosy is denied by Manson and others. Also in leprosy one notes that constitutional symptoms and the nerve reactions are distinct.

There is quite a dispute as to the pathological findings in ainnum and spontaneous mutilating leprosy. However, Wucherer, Schuppel, Eyles and Darling have examined many specimens of ainnum

toes, but found no evidences of leprosy. Quite recently Drs. Herrick¹¹ and Erhardt read a paper before the society on the value of trophic bone changes in the diagnosis of leprosy. They showed a distinct difference in the X-ray findings in the bone lesions of leprosy and ainhum. Whereas in leprosy there is concentric atrophy with shrinking and shortening of both shaft and distal extremities of the phalanges, in ainhum only the distal phalanx was found primarily involved with narrowing and lengthening of shaft.

.5 and 6. That the skin changes in ainhum are not unlike those seen in pure scleroderma cannot

Right Foot—Amos Hannah. Note: The light and dark spots are artefacts due to faulty development.

be disputed. Unna holds that ainhum is a primary degeneration of the skin, a sort of scleroderma, which, by its seat of lesion at the base, leads to secondary stagnatory necrosis.

Now, scleroderma is itself considered a disease on a tropho-neuritic basis. But there are several features found in scleroderma which are lacking in ainhum. Scleroderma attacks females mostly and does not shun children. The skin affection is patchy and pigmentation is common. Osler¹² observed in his cases of sclerodactylism trophic

changes in several fingers of both hands; there were scars and sores over the joints while muscular and nail atrophy was common. Even morphea, localized scleroderma, may be irregularly distributed, attacking arm, leg, trunk as well as face. There is no pain in scleroderma.

One must conclude that ainhum is a distinct disease—a special tropho-neurosis. It is necessary to take into consideration the site of predilection, the race, sex, age, symmetry and hereditary factors, the absence of constitutional symptoms and the peculiar pathological findings.

I take this opportunity to express my thanks to Col. Wm. C. Gorgas for his help in obtaining literature from the Surgeon General's Library, and to Dr. S. T. Darling for valuable suggestions and pathological examination of one of the specimen toes.

The cases I will here describe are interesting in many ways. The family history reveals a strong hereditary tendency affecting all the males in three generations and apparently transmitted by the male progeny.

Case 1. Jeremiah Hannah.

Family History.—His father came to Fortune Island from Africa. He had ainhum in both toes, but suffered so much pain that he amputated them himself by means of a horse hair. J. H. has a brother who had ainhum in the left toe; caused it to be amputated a year ago. An only nephew (A. H., case 2) has the disease in the right little toe. Patient's mother had two sons previous to her marriage with his father, but neither of his step-brothers developed ainhum. The patient knows of no other cases of the disease in the immediate or remote family. Both his parents died at a very old age.

Personal History.—He is 46 years of age and as far as he remembers always enjoyed good health. He married at the age of 26, but no children were born. Before coming to Panama, a short time ago he worked a farm on Fortune Island.

Present Illness.—Patient does not remember exactly when the process commenced, but claims that it began when he was quite young. He noticed a depression between the distal interphalangeal joint of the left little toe. Soon a constriction was discovered which became deeper and larger as the disease progressed, accompanied by pain and swelling in the region of the groove. Later on, the same process was observed in the right little toe. The pain was at times so excruciating that he could not wear boots and was

forced to lie up for long periods at a time. The pain and swelling would occur at infrequent intervals, and was often associated with peculiar prickly sensations ("burning like pepper"). Any undue exposure to cold or dampness would bring on an attack, which at times was so severe that he spent sleepless nights. There was always present a dull pain in the affected toes, but any exposure would cause it to become unbearable. The pain was always the same character in both toes, would occur at the same time and would subside simultaneously in both. Patient tells me that the constricting band has been growing deeper and larger and the pain constantly growing worse.

Examination.—There are no marked signs of disease to be found. The second aortic sound is somewhat accentuated and spleen somewhat enlarged. There are no nervous disturbances with the exception of the absence of the plantar reflexes. He is rather an intelligent negro.

Foot.—The skin is found dry and wrinkled on the dorsal surface; on the plantar surface it is very thick, hard, somewhat fissured in places, atrophic. Both little toes present about the same condition with the exception of the groove, which is deeper and wider on the left side than on the right. Also the left toe is a little more swollen than the right. The groove begins at the interdigital space about the plantar margin. Here it is fully one-half inch in depth and curves over the dorsal surface about the middle of the second phalanx. Over this region it is about one-eighth inch in depth and disappears entirely at the outer margin. In the immediate region of the groove the skin is tied down to the underlying structures and is not moveable, while the other parts are. It is hard, callous-like, but not ulcerated. The toes appear decidedly swollen, especially in the inner and dorsal aspects. They are in a disturbed position, lying in a plane facing upwards and outwards. The nails are present but roughened. Pressure on the toes causes a dull pain, while abduction is followed by very severe pain around the margin of the groove and is most marked on the left side. Inasmuch as the groove extends fully two-thirds the circumference of the toes they appear to be attached to the feet by means of a thick pedicle.

Case 2.—Amos Hannah, aged 20. The family history is given in brief above. His father had ainhum and was relieved from the suffering by amputation. Both parents and a sister are alive and well. There is nothing of interest in the early life of the patient.

Present Illness.—Began about four years ago underneath the right little toe on a level with

the middle of the second phalanx, accompanied by pain and burning sensation, often of paroxysmal character and affected by cold and other external stimuli. The constricting band has grown both deeper and wider until now there is a thick pedicle separating the affected toe from the rest of the foot.

Examination.—Patient is young and rather well developed. He shows a few degenerative signs, such as small ears, very high cheek bones, large and massive jaws, decidedly large breasts

Left Foot of Jermia Hannah.

and nipples, small scrotum and testicles. Chest and abdominal organs are normal. Even for his class he shows a poor mentality.

On the whole, the peculiar condition in the right toe is quite similar to the above. The skin on the plantar surface of the right foot is rough and scabous. There is no swelling or pain except in the little toe, which presents a little furrow over the middle phalanx. There is an area of blanched skin particularly at the dorsum and interdigital space. The toe is twisted so that the plantar surface looks inward and the dorsal outward, while the terminal part is swollen and club-shaped. The whole area is painful on manipulation. The

plantar reflex is absent on the right foot and there is but a slight reaction on the left.

The affected part was amputated beyond the line of the groove and the wound healed rapidly. After removal, the patient was entirely relieved from his pain and suffering.

**Pathological Report by Dr. Darling.
Examination of the Ring.**

(Specimen toe of Amos Hannah.)

The keratinous ring presents the usual thick horny appearance seen in this condition. It rises above the general level and is lodged in a fessula lined on either side by normal epithellum. This ring is made up of thick laminae of keratinous squamous epithellum. The stratum malpighii is relatively narrow and the corium beneath is bereft of papilla and is extremely narrow. In fact, the corium and the periosteum of the bone so rapidly merge into one another that they can hardly be differentiated. This obliteration of the papilla, it is very evident, is due to the constricting horny ring.

The stratum malpighii increases in amount as the normal skin is approached and its cells become larger and vesicular. The papillae also become more evident, though they are still nodose and not deep and filiform as in the normal skin at this location. At the margin of the horny ring the corium is greatly altered by ulceration, for it is infiltrated by polymorphonuclear leucocytes, red cells and fibroblasts. Many newly formed arterioles and capillaries are also seen. At this point the usual picture of althum is not seen, but rather one of ulceration and repair.

Examination of Tissue Distal to the Ring.

The epithellum and corium present the usual deep filiform appearance usually seen in the skin of this region, and the blood vessels, sweat glands, nerve bundles and the paccinian corpuscles appear normal.

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ACUTE PANCREATITIS.*

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Acute pancreatitis was first recognized and described by Fitz in 1889, but it has been comparatively few years that it has been known to be at all frequent. At present the pancreas occupies one of the most important places in abdominal surgery, so that I feel justified in presenting a few facts concerning acute disease of that organ.

In 1895 a successful operation for acute pancreatitis was performed by Korte, of Berlin, but he failed to make the diagnosis at time of operation. Since laparotomies have become so common the condition is found more frequently, but not often is the diagnosis made prior to operation. Deaver states that in ninety-nine cases of cholelithiasis operated by him in 1911, the pancreas was affected in 45 per cent, and he states that acute pancreatitis "is common, not rare." However, I find no record of pancreatitis as a cause of death in the mortuary statistics of Alabama.

Occurrence—Acute pancreatitis usually occurs in adults between 20 and 50 years, but may occur at any age. Two-thirds of the cases are in males, generally stout.

Etiology—There are two chief factors in the causation of pancreatitis; 1, the corrosive action of the trypsin of pancreatic juice, and, 2, infection.

Polya has shown experimentally on dogs that trypsin, the proteolytic enzyme of pancreatic juice, as well as the pancreatic secretion itself, when injected into the pancreas produces hemorrhage, necrosis, fat necrosis and death. Although the pancreatic juice is capable of producing these marked and rapid changes in the pancreas, it must first be set free from its normal channel. As to how this is accomplished has

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