TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, November 7, 1898.

The President, J. Ewing Mears, M.D., in the Chair.

EXCISION OF THE ASTRAGALUS FOR THE RELIEF OF TALIPES EQUINO-VARUS.

Dr. William Barton Hopkins exhibited for Dr. Morton, who was unavoidably absent, the following cases:

The first child, Albert B., aged eighteen months, was admitted to the Orthopædic Hospital on April 19, 1898, with double equino-varus, the deformity being very marked, with displacement of the astragalus forward. On May 12, after division of the flexor tendons of all of the toes, and also the tendo Achillis, the astragalus was excised. The usual incision was made from near the base of the fourth toe across in a straight line to the external malleolus; the astragalus was found in advance of the tibia; both feet were similarly treated. The incisions were closed with a few sutures, ample space being left for drainage, usual dressings were applied, and the feet placed at right angles in splints, with large openings at the angles of the splints, so that no pressure should be made on the heel. The wounds healed by primary union. Perfect result followed, with good ankle motion.

The second case, Morris H., aged twenty-four months, was admitted October 7, 1898, with talipes equino-varus of the right foot. The operation similar to that already described was performed on October 10, the result being in every way satisfactory.

The third case, I. C. W., aged forty-three years, was admitted March 13, 1897, with congenital talipes equino-varus and excessive deformity, having for years walked on the upper surface of the foot. The operation was performed March 23; after the division of the flexor toe tendons, tendo Achillis, and plantar

fascia, the usual incision was made, the peronei tendons being drawn aside, the astragalus and cuboid bones were excised, and a part of the scaphoid; in fact, all bony parts which interfered with rectification of normal position were removed. Patient was discharged, with a useful straight foot, and good ankle-motion, May 18, 1897.

DR. DE FOREST WILLARD said that the term inveterate talipes varus was hardly applicable to a child of two years of age, as was one of these children at the time of operation, while the other one was even younger. In adults the removal of the tarsal bones is often the wisest course, but in young children it did not seem to him that the results obtained are any better than in the average talipes case operated on by multiple tenotomies and forcible straightening. The motion at the ankle-joint is not as good, and the removal of the cuboid, in addition to the astragalus, certainly interferes very seriously with the length and with the elasticity of the foot in later life, which is one of the important elements in the cure of any case of club-foot. It is not simply getting the foot straight, but the giving of elasticity to the step, which is so important; in young children, in the majority of cases, this can be done. In adults it is obviously, impossible, after a person has walked for thirty or forty years upon his deformed feet and the bones are thoroughly misshapen and wedge-shaped, that one could ever again obtain the proper appearance or elasticity, and the surgeon must be satisfied with a more or less rigid foot that can be planted fully and squarely on the sole. Even a considerable amount of rigidity is allowable in such cases, because a man can walk with a foot that is stiff. The question of expense in procuring an apparatus is also an important one, as is also the question of pain from corns, excoriations, and excrescences, so that the operation becomes a very valuable one in these adults. In young children under one year of age, in the majority of cases,—certainly 80 or 90 per cent.,—the operation which permits all the bones to remain in place, at the same time straightening the foot, gives in the end a better walking result. Not every case can be treated in the same way; in fact, almost every case requires a different method and must be studied individually. Some cases do better with tenotomies, others with open section, others with the removal of the astragalus, but he did not think that the removal of the astragalus and cuboid should be at

all a routine operation in young children; on the contrary, it should be employed at this age only in exceptionally rigid cases.

THE IGNORANCE OF SURGEONS REGARDING FRACTURE OF THE LOWER END OF THE RADIUS.

DR. JOHN B. ROBERTS said that in an article on fracture of the base of the radius, published in a New York journal a few months ago, the author, a professor of surgery, stated that skiagraphic investigation showed that these fractures of the radius were frequently associated with transverse fracture of the head of the ulna. The statement would, perhaps, have gained professional acceptance had the author not reproduced the skiagraphs on which his opinion was based, and given the ages of his patients. These details made it evident that the supposed fracture was the skiagraphic picture of the normal unossified epiphyseal cartilage between the shaft and lower end of the ulna.

Some weeks ago he incidentally saw a fracture of the lower end of the radius under the care of a well-known surgical teacher and writer. It was being treated with anodyne lotions and a Bond splint. In Dr. Roberts's opinion the fracture was the usual injury with backward displacement of the lower fragment; it had not been reduced, and it ought to have been immediately subjected to sufficiently great force to drive the upper fragment down into position, even if anæsthesia was necessary for the accomplishment of this essential step. When he stated his opinion, the surgeon in charge, to his profound astonishment, said that he believed the fragments were partially impacted; that the position was pretty good; that he preferred to leave such cases alone, since manipulation, such as was proposed, would probably increase the mobility at the point of fracture; and that a compress over the elevation due to the displacement might perhaps be judicious. The surprise of the speaker at these statements can scarcely be expressed. That fractures at the base of the radius must be reduced; if deformity, protracted convalescence, prolonged rigidity of joints, and pain are to be avoided, was, he had thought, accepted by every surgeon of the present day. That a compress, applied over the deformity due to impacted and unreduced fragments, was a futile substitute for the muscular force to be exerted on first seeing the injury was, he supposed, recognized by all surgical teachers.

His arguments, supplemented by a diagram giving his idea of the bony conditions present, failed to convince his colleague of the danger of inaction; and, as he had no professional connection with the case, he retired from the room before the splint was reapplied to the unreduced fracture.

These two instances are sufficient evidence that much that has been learned regarding the anatomy, pathology, and surgical therapeutics of radial fractures during the last ten or fifteen years needs constant reiteration in journals, societies, and class-rooms. Ignorance of scientific progress in fields somewhat different from those in which men are working may lead them to incorrect conclusions; or the want of time during the busy days of professional life may prevent them paying sufficient attention to the progressive developments of clinical and experimental observation.

It has been his experience to be obliged to set many fractures of the lower end of the radius, which had previously been put up in splints without reduction of the displacement. This oversight he has found very prevalent among general practitioners and resident physicians in hospitals. He has attributed the neglect to reduce the fragments by the former class to the teaching of twenty years ago, when the pathology of the lesion was misunderstood; by the latter to insufficient attention to the instructions of their surgical teachers.

He has learned to never expect to see the fracture completely reduced by resident physicians and general practitioners. Some of them, however, do appreciate the supreme importance of immediate and complete reduction and accomplish it; and in other instances the fracture has been attended with little or no displacement, and the neglect to reduce the fragments is not demonstrable.

He has now come to feel that perhaps the oversight in recent graduates is due to the fact that their teachers do not insist upon the importance of reduction; and that undergraduate students do not see this fracture properly treated in the clinical amphitheatre and class-room.

These reflections had induced him to present for discussion by the Academy of Surgery the present topic; for he knew that much physical suffering would be avoided and the surgical art advanced by having the young graduates, whom the Fellows of

this body teach, impressed with the idea that failure to reduce, as soon as possible, a fracture of the base of the radius is an injustice to the patient and an opprobrium of surgery.

In conclusion, he stated his position in regard to this fracture in five propositions, upon which he solicited discussion.

(1) Fracture of the lower end of the radius is one of the most satisfactory of all fractures to treat.

(2) The patient, as a rule, has little discomfort after the first twenty-four hours, except from the disability and the annoyance of the sling and dressing.

(3) Stiffness of the fingers and wrist-joint is seldom present to any marked extent after a week.

(4) Deformity after treatment is usually so slight as to be unnoticeable to the average observer, except in cases where there has been marked comminution of the lower fragment.

(5) These assertions are only justified when the surgeon insists upon forcing the lower fragment into its proper anatomical relation with the upper fragment. This is to be done by the exercise of such a great amount of force as will break up all impaction or entanglement and bring the broken surfaces into accurate coaptation. This sometimes, but not usually, requires general anæsthesia; and may demand that the surgeon bend the broken bone across his knee in order to disentangle the interlocked fragments.

DR. W. B. HOPKINS said that surgeons to out-patient departments of large hospitals had peculiar facilities for familiarizing themselves with the best methods of reduction and treatment of fractures of the lower end of the radius. From his own experience, during fourteen years' attendance at the Out-Patient Department of the Pennsylvania Hospital, where as many as thirty-eight and even forty-two fractures of the lower end of the radius have been treated in one month, the importance of reduction was so thoroughly recognized that any dressing which had been applied elsewhere was immediately removed and the deformity forcibly corrected. Referring to a paper by himself in the *Philadelphia Polyclinic* of May 15, 1886, he quoted the following paragraph:

"*Reduction.*—The importance of immediate and as perfect reduction as possible, even if it is necessary to use an anæsthetic for its accomplishment, cannot be over-estimated; and it must

be borne in mind that what appears to be slight malposition at first will steadily and surely pronounce itself as the swelling subsides, and when it is too late to reduce it by either sudden or gradual means, an ugly fork-shaped deformity will frequently present itself, if complete reduction has not been performed at the beginning. The fragments can usually be brought into accurate apposition by direct and forcible pressure and counter-pressure with the thumbs and index-fingers, and, once in place, very rarely show any tendency to become disarranged."

Regarding the after-treatment, he believes a state of absolute rest, of not only the forearm and hand but also the fingers, during the period of traumatic inflammation, interrupted only by the surgeon's visit, when every joint is to be gently but fully extended once, pronated and supinated fully once, the fracture meanwhile being properly supported, is a method based upon sound principles, and one which in practice he knew to be satisfactory. With regard to the dressing, it must be borne in mind that the lesion produced by a force sufficient to cause this fracture is not confined to the bone alone; the tendons, their sheaths, blood-vessels, fasciæ, and ligaments are liable to any extent of bruising, stretching, or tearing, and the mere fact that the fragments of the radius have been reduced and usually remain locked in place does not negative giving the wrist at least as much care as if it were sprained. He could hardly understand, therefore, Dr. Roberts's willingness to allow a patient with fracture of the lower end of the radius to go about with no more support or fixation than is given by a broad band of adhesive plaster encircling the wrist. The broad band of adhesive plaster, if applied with sufficient tension to give any support, is liable to cause, during the stage of ascending inflammation, swelling of the distal portion of the extremity, which latter increases the tension, and consequently the constricting effect of the band, with a result which, if uncared for, might be disastrous.

Dr. H. R. Wharton agreed with Dr. Roberts as to the importance of complete reduction in fractures of the lower end of the radius. He disagreed with him, however, as to the ease with which this is accomplished. He thought that in some cases it is almost impossible to get complete reduction even under anæsthesia, the bones interlocking, making complete reduction almost impossible. This is shown in many cases under careful treat-

ment, where, after recovery, very marked evidence of deformity is seen. In spite of the greatest care in treatment, cases do occur in which it is almost impossible for a patient to have much function in the arm for a long time. He had seen cases carefully treated in which the reduction of the deformity apparently had been very carefully practised, and in which there was a great deal of pain and stiffness in the wrist and fingers. In a great many of these cases he thought the fault did not lie in the fact that there is a certain deformity of bone, but that the patient is either of a gouty diathesis, and this injury is the exciting cause of irritation about the seat of injury, or in some cases there is distinct neuritis. In such cases there will be seen glossy fingers and redness of the skin following fracture of the radius, in which a reduction has been so thoroughly accomplished that it is impossible to say there is a distinct deformity. This condition occurs often in women advanced in life. In children a fracture of the radius is more satisfactorily treated; here the injury often consists in a separation of the lower epiphysis. In such cases reduction is accomplished without much difficulty, and the deformity is very slight and the functional result is very good. It is a mistake to attribute all bad results in this fracture to carelessness of the surgeon in reducing the fragments. In spite of the greatest care in reduction, in certain cases, a bad functional result in fracture of the lower end of the radius will follow. He agreed to a certain extent with Dr. Roberts that the treatment of fractures of the radius is generally satisfactory, although some cases may suffer pain and have rigidity of the fingers, but eventually they get good use of the hand.

Then, there is another question, that of pronation and supination. In a great many of these cases pronation and supination are more or less interfered with, in spite of what appears to be complete reduction. The antero-posterior deformity may be reduced, but there may be a lateral displacement of the fracture, which interferes with pronation and supination. It is the exception when one examines a case of healed fracture of the lower end of the radius that one cannot tell from the appearance of the part that such an injury has occurred. One sees a little adduction of the hand and a little undue prominence of the styloid process of the ulna. This is due possibly to some displacement of bone,

but it may be due to natural shortening of bone in union. There is always some slight shortening in the process of repair of bone.

DR. TAYLOR instanced one case under his care, a boy seventeen years of age, with a fracture of the lower end of the radius. He used the fluoroscope and examined it with great care and found the fracture. There was a certain amount of deformity before he reduced it. He again examined it with the fluoroscope and the reduction was seen to be absolutely perfect, both from above downward and laterally. He then placed it on a splint, holding it with great care, and bandaged it to the splint, and then examined it again. He now found that in the interval between the placing it on the splint and applying the bandage there had been a certain amount of displacement. He again took it off, reduced the deformity, and bandaged it again, using more care than before. Now, with the fluoroscope, the reduction was seen to have remained perfect. The result was excellent. This case illustrated the possibility of a recurrence of the deformity no matter how perfect the reduction of the fracture; and since it is manifestly impossible to say what one will recur and what one will not, he therefore much preferred using some form of splint that would keep the hand and arm quiet—the wrist and arm—for a number of days.

DR. JOS. HEARN said that he had never found difficulty in retaining this fracture in position when he got the fragments reduced. The late Dr. Levis called his attention to the ease with which he could reduce them by bending the wrist backward. Once they are in place they stay there, as a rule. Moore, of Rochester, treated his cases by a compress and suspending the patient's arm in a sling, and letting it hang in that position. It had been his experience that when he got them reduced they are very easily retained, so that he never had one to change position. He insisted on the patient taking an anæsthetic in order that he might properly reduce the deformity.

DR. MEARS alluded to the practice of fifty years ago. As is well known, great interest was taken at that time in the treatment of fractures at the lower end of the radius. It was a matter of great moment to make the diagnosis so as to ascertain whether it was a classical Barton fracture or Colles's or Smith's. The splint which was universally used was that of Bond. He had met with two instances in which the splint was applied without any effort being made at reduction of the fragments. It might be interest-

ing to know whether, in the numerous cases which had come under the care of Dr. Hopkins, in the Pennsylvania Hospital, and under the care of Dr. Roberts, many of them had been the Barton fracture. He had a case some years ago, in St. Mary's Hospital, of this variety of fracture, in a lad some sixteen or seventeen years of age, where, as the result of a fall from the fourth story of a factory, the fragment was displaced four inches above the joint, and was clearly defined in its position.

The question as to the character of the dressings applied in the cases reported is of great importance, and should receive careful attention in the discussion of the subject.

DR. G. G. DAVIS said that Dr. Roberts had submitted four definite propositions. The first was, "Fracture of the lower end of the radius is one of the most satisfactory of all fractures to treat." He thought some people consider that fractures are all more or less unsatisfactory, and he would agree with Dr. Roberts in this first proposition, that it is about as satisfactory as other fractures.

The second proposition was, "The patient, as a rule, has little discomfort after the first twenty-four hours, except from the disability and the annoyance of the sling and dressing." He believed it was exceptional for the discomfort to be limited to a period of twenty-four hours; they have discomfort for a longer period.

Third proposition: "Stiffness of the fingers and wrist-joint is seldom present to any marked extent after a week." That would indicate that in the treatment (he does not state here that union would be complete in a week's time) the other symptoms of fracture, such as stiffness and pain, are absent after a week's time. His experience had been that the stiffness does persist after a week's time. There are certain cases—perhaps a considerable number—in which there is no tendency to deformity, and in which massage can be employed with advantage almost daily from the first. In such a case there is rapid restoration of flexibility and function; otherwise it takes longer.

Fourth proposition: "Deformity after treatment is usually so slight as to be unnoticeable to the average observer, except in cases where there has been marked comminution of the lower fragment." On this head he thought that the point already made by Dr. Wharton, that the projection of the ulna is usually evident,

was well taken. He believed there were few cases where some deformity was not present,—that is to say, a slight antero-posterior deformity or some slight shortening, sufficient to pass the hand slightly towards the radial side.

As to the treatment of the fracture, he would hesitate about allowing any fracture to remain unsupported without something to bridge over the line of fracture, whether there is a tendency of the deformity to recur or not, and in his opinion this could be most neatly done by the single straight splint on the back of the wrist. He also commended the plan of Roser, who used a posterior splint and allowed the hand to hang, the hand hanging down and the splint projecting beyond the wrist, the triangular interval being filled up with a wedge-shaped pad, so that the hand was carried in a flexed position. He had not always found this fracture easily reduced. He remembered very well one case in which it was impacted so hard in a stout man that, in spite of an anæsthetic, and the greatest effort of which he was capable, he was unable to reduce the impaction. There are other cases, however, in which by sharply flexing and adducting the hand, bending it towards the ulnar side and sharply flexing it over the knee, and with a dragging motion one is able to bring the fracture down.

HOT AIR IN JOINT-DISEASES.

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My experience with the use of superheated air has extended over a period of two years, and has embraced a wide range of conditions of the joints, with failure, disappointment, partial successes, signal benefit, and in some cases results that were thoroughly gratifying.

The exaggerated statements that are sometimes made would lead one to believe that hot air will absolutely cure every known lesion, but after continual disappointments have accompanied efforts to cure incurable conditions, one naturally finds that certain conditions appear to be benefited and others undoubtedly relieved, while there are a few that are really cured.

The ovens that I have used are the Betz and the Lentz make. The Betz oven is heated over an alcohol lamp, with a three-inch sheet-iron pipe communicating the heated air directly from the lamp to the interior of the oven, direct contact with the patient being avoided by a shield running the length of the oven. A vent-hole in the top of the oven controls the flow of heated air, which is still further controlled by a damper in the sheet-iron inflow pipe. A thermometer is inserted through the top of the oven into the interior. The part to be heated is, after thorough wrapping, placed within the oven upon a canvas support regulated so that it will be approximately equidistant from the sides of the oven.

During my earlier experience with this oven I met with two accidents, neither of which proved serious, although

sufficiently alarming at the time. The first one was caused by the open lamp, nearly full of alcohol, upsetting while lighted, and spreading flames on the floor. Fortunately, the patient had not yet had her arm put in the oven, otherwise her skirts could not have escaped. Immediately after this I abandoned the open alcohol lamp, and used a small gas stove with equally satisfactory results, and without the danger attending the use of alcohol.

The second mishap occurred while using alcohol, and was caused by the flame passing up through the ingress-tube and setting fire to the cotton wrapping around the patient's leg. The draught-hole in the top and the damper were immediately closed, which smothered the fire, and the patient's leg hurriedly withdrawn from the oven. The oven in cases of application is usually placed upon a chair, so that the distance from the top of the lamp to the patient's leg is only about twelve inches, which will account for the flame shooting up with the direct draught and igniting the inflammable cotton. Since the above accident I have always used flannel instead of cotton.

The Lentz oven is arranged for gas, having Bunsen burners underneath, heating a metal plate which is in contact with the bottom of the oven. In this apparatus the flame cannot enter the interior chamber or come in contact with the patient, but when the bottom becomes red hot, it is possible to scorch or burn the patient, as I found in several cases before I abandoned the use of cotton. Three patients have been burned or, more properly speaking, scalded, in the use of the ovens in the hands of myself and my assistants. They have all occurred after the ovens had been in use for about a half hour, and were, I believe, due to the cotton becoming saturated with perspiration, which, becoming hot, scalded the patients. This has never occurred since I have used flannel to envelop the limb and exercised the utmost care to avoid the accumulation of moisture within the oven.

Recent experience has shown the great value of humi-

dine, a preparation made by the Pennsylvania Salt Manufacturing Company for the purpose of absorbing moisture in refrigerators. While the proper use of the ventilation-holes in the Lentz ovens does much to get rid of the excess of moisture, resort to them too frequently cools off the interior to a sufficient extent to make it difficult to obtain and maintain the highest degree of heat. The higher degrees of heat cannot be borne by a patient if the parts are wet, and very excessive wrappings about the limb prevent the heat from reaching the parts, therefore the use of humidine greatly facilitates the use of the oven in that it avoids the danger of scalding the patient and permits the use of lighter wrapping of flannel.

I have in my possession one other oven that was used extensively, more than forty years ago, by an irregular practitioner. It is a double-sleeve arrangement, the space between the sleeves being made to permit the passage of steam around and in contact with the interior sleeve, thereby heating the interior cavity into which a patient's limb is inserted. The limb, after being inserted, is held in place by a rubber enveloping and constricting arrangement to make the cavity air-tight. A small tube communicating with the interior cavity is provided, so that by means of an air-pump a partial vacuum is obtained and maintained around the limb. By means of the air-pump the excess of moisture is, of course, removed, but as steam at 212° F. could not heat the interior cavity above that point the patients were unable to obtain the benefits that are now ascribed to the use of temperatures approaching 400°.

I have found it expedient to have the personal attention of a physician during the time of use of the oven, for there is great room for discretion in its use. It has usually been found impossible to have the patient bear the heat of over 300° to 320° at the first sitting, and I cannot say whether or not the patient is influenced by the mental astonishment at the audacity of using a higher degree of heat than steam, which is known to be destructive. The second application is

usually accompanied by no untoward events, and this may be based upon the placid condition of the patient having passed through the first ordeal without being cooked or scalded, and with sufficient appreciable benefit to be encouraging to the hope of ultimate recovery.

Acute sprains of the knee, ankle, wrist, and elbow have appeared among the most favorable cases when seen shortly after injury, and excellent results have been obtained even after a considerable time has elapsed. A typical illustration is afforded in my own person. In falling from my bicycle I struck the palm of my hand in the position that so often results in a fracture of the lower end of the radius, but which, in my own case, caused only a very severe sprain. Within an hour I placed the hand in the oven, carrying the heat to 380°, during an hour, and repeated it in twenty-four hours. Pain subsided while in the oven the first time, and entirely disappeared at the second. The wrist was kept quiet for thirty-six hours, and no recurrence of pain or inconvenience has occurred. The well-known use of hot water in similar cases was the cause of my resorting to the oven in this case, and with most gratifying results.

My greatest disappointments have been in cases of both acute and chronic gout, rheumatism, and rheumatoid arthritis. I have not only not been able to relieve to any appreciable extent the pain or modify the evidence of inflammatory action, but in a large number of cases the existing conditions seemed to be made worse by the heat. In but one case was there decided relief from pain obtained, and in that one there was a possibility that the condition was not that of a beginning acute attack of rheumatism. The patient had for years been subject to acute inflammatory rheumatism, running from joint to joint, with a period of subsidence of one year. Awaking one morning with what appeared to be a recurrence in the wrist, the presumption was that this was the beginning of one of the severe attacks so greatly dreaded. The oven was used for an hour, the temperature gradually rising to 380° F., during which time the severity of the pain

gradually subsided, until at the end of the hour the wrist was entirely painless, and there has been absolutely no recurrence for three months.

Hydrarthrosis appears to offer a field of usefulness, in that the effusion often rapidly disappears, either because of the local sweating or by the increased power of absorption; the tension upon the joint being removed, the pathological process which caused the effusion is placed in a favorable condition for resolution. I have found that rather lower degrees of heat, kept up for a longer time at each sitting, produced the best results, and, by comparison, I should suggest the use of a temperature of about 300° continued for two hours. The use of a degree of heat of 380° to 400° for one-half to one hour, while well borne by patients, did not produce an equal amount of sweating, and therefore did not appear to me to be as beneficial as the lower temperature mentioned. I have found it impossible for the patient to bear the pain of the high heat of 360° to 400° when the parts are wet with perspiration, while the lower degrees, ranging from 250° to 300°, are easily borne, without inconvenience even when the enveloping flannels are saturated. It, therefore, is apparent that for sweating purposes high degrees of heat are not applicable, and are apt to be followed by more or less severe scalds.

Fibrous ankylosis is the field that I have found the most susceptible of benefit from the application of extreme heat. Joints that have become more or less firmly ankylosed as a result of acute inflammatory and traumatic synovitis, or from disuse following an injury, appear to soften under the high degrees of heat, very much in the same way as old glue will soften when heated. This softening of bands of adhesion is often most marked, as evidenced by repeated experience in breaking up ankylosed joints. While the parts were at the accustomed temperature the joints would often appear to be ossified. An hour with the temperature starting at 300° and rapidly running up to 380° to 400°, with occasional ventilation to get rid of the excess of moisture from perspira-

tion, was almost always followed by such a change as to enable manual efforts alone to move the joints 10 to 15 degrees, and by powerful mechanical appliances to 20 to 45 degrees, and it must be noted with comparatively little pain either at the time or following. It has not been an unusual occurrence to have patients walk several squares immediately after a stiff knee has had free motion imparted to it from 20 to 45 degrees. Within an hour after heat and manipulation some of the former stiffness would recur after the first two or three applications, but gradually with the full co-operation of the patient and the re-establishment of muscular co-ordination, the freedom of the joint increased. Fifty applications, made upon alternate days, has been the greatest number in recovering ankylosed joints, and this was in a case of an ankylosed knee of two years' standing. It is not to be expected that a normal joint can always be reproduced, but it is a decided gain over an absolutely stiff joint to have even 5 degrees of motion.

Numerous failures have occurred in cases of ankylosis which have been broken up and a considerable amount of motion obtained, but in many the manipulation was sufficiently painful to require more courage than the patient possessed. The rapid and transitory anæsthesia by ethyl bromide has been employed, and a painless passive motion instituted after the use of the oven, but occasionally the subsequent pain was unendurable and the treatment abandoned.

Under the heading of ankylosed joints may properly be mentioned the cases of inveterate flat-foot that have yielded to correction by the use of high degrees of heat, approaching 400° F., and followed by powerful mechanical manipulation. Many of these cases have had corrective pressure by means of a screw applied to the extreme point of endurance, and it has been astonishing to witness the efforts of patients to stand even more pain from mechanical force as they witness the arch of the foot being reformed, and they realize that their disability is gradually disappearing.

A large experience with the oven in cases in various

stages of tubercular disease of the bones and joints inclines me to view this method favorably, although time enough has not yet elapsed to make definite statements as to its permanent value. It appears, however, to be a rational deduction that the softening process that enables a fibrous ankylosis to yield, and the rapid disappearance of effusion about a joint would present favorable conditions for absorption and repair in tubercular invasion. The necessity of maintaining immobilization must not be overlooked, and the well-known favorable results and absolute recoveries produced by immobilization without the use of the oven naturally induces a hesitation to credit the oven with the benefits accomplished when both methods are employed.

I believe that decided and appreciable benefit has been obtained in tubercular arthritis by recourse to the highest degrees of heat, but when sufficient time has elapsed to justify a definite statement based upon time and results, the presentation of the subject will be other than it must necessarily now be,—a preliminary consideration.

The subject under discussion may be summarized as follows:

(1) The highest temperature (370° to 400°) is possible only when the patient is well covered with flannel and the moisture kept to a minimum.

(2) The highest temperature is applicable to ankylosis and tubercular joints.

(3) The lower temperature (250° to 300°) is of use in sweating, and may be maintained for two or three hours daily.

DISCUSSION.

Dr. De Forest Willard said that he had employed this treatment largely during the past year, both in private and hospital practice. His experience is similar to that of Dr. Wilson in fibrous ankyloses, in the plastic exudates following fractures, and in other injuries about the joints. High heat is one of the most helpful agents in producing absorption and in diminishing the resulting stiffness which is so common in adhesions in the ten-

dons, in the sheaths, in the muscles, in the soft parts, or in the bone itself, and in recent sprains and injuries.

In regard to arthritic troubles,—rheumatic and gouty ones,—in the rheumatic individuals, in the majority of cases, this treatment has been satisfactory. In some gouty conditions it has been very comforting and certainly a relief to the individual. In regard to tubercular joints, he had been very cautious in reference to its employment. Theoretically there is great danger of disseminating tubercular bacilli or ptomaines by the carrying onward of the germs by means of increased circulation. In this way one may do more harm than good.

THREE UNUSUAL COMPLICATIONS OF HERNIA.

Dr. J. Chalmers Da Costa reported three cases of hernia presenting complications of an unusual sort.

The first case was a man with an extremely large hernia,—an enormous hernia. He was well aware that the trend of surgical opinion is that it is not justifiable to operate, as a rule, upon enormous herniæ. In the first place, it is very difficult to reduce such a hernia after incision, the protrusion, in the words of Petit, having sacrificed the right of domicile in the abdomen. In the second place, operations of such a character are dangerous; and, in the third place, such operations are unsatisfactory, the hernia tending to return. Had he been brought in contact with this case and had found that no complications existed, he would not have attempted operation. When this man was brought into the Jefferson Hospital, a year ago last May, the hernia was obviously in a condition of either beginning strangulation or incarceration. The patient was forty-nine years of age, a hat-blocker by trade, and his occupation required him to work with considerable force a lever which moved some machinery. He first noticed this hernia when he was fifteen years of age, and it had grown of recent years with a great deal of rapidity. He suffered chiefly from its excessive weight; he could not wear any arrangement to hold it up, and his work was interfered with. Three days before admission pain began in the hernia and there was a very great amount of pain in it. The pain was in the mass and was associated with colicky pain throughout the abdomen.

There had been absolute constipation for several days; there was nausea, but no vomiting, and the hernia was very tender to the touch. Upon opening the sac, it was found to contain the appendix, the cæcum, most of the ascending colon, considerable of the ileum, and an enormous mass of omentum. A portion of the ileum was found deeply congested and strangulated; it was twisted and firmly adherent to surrounding structures. The great bowel lay to the outside and to the posterior portion of the sac. It was a question whether the sac was complete at this portion or not. The adhesions were separated, hot saline fluid was applied to the bowel, and the natural color returned. A great mass of omentum was removed, and it was found to reach from the tip of the operator's fingers to the elbow when spread out. An attempt was made to return this hernia into the belly, and it was found to be most difficult to accomplish. In fact, it was effected by main strength. The surgeons and assistants stood upon stools, and, with what appeared to be an almost ferocious attack upon the hernia, succeeded in restoring it to the abdominal cavity. The peritoneum was sutured, as in a laparotomy wound, and a sort of Bassini operation was made, necessarily of a very crude description, because of the atrophied condition of the tissues. The patient made a satisfactory recovery. At present, one and a half years after operation, there is a slight relapse of the hernia, but not a large one, and it is readily manageable by a truss. Since this operation he has developed an umbilical hernia, but not of a large size. At the present time the umbilical hernia is not larger than a walnut, but is growing, and has ample prospects for the future. A truss has been placed over the umbilical hernia, and a truss over the inguinal hernia, and both protrusions are kept satisfactorily reduced.

The second case was a young man, twenty-two years old, who came into the service of Professor W. W. Keen at the Jefferson Hospital, and was turned over to him for the purpose of performing an operation. The man had had a marked inguinal hernia of the left side for a number of years; but it never gave trouble and he never wore a truss. Some thirty-six hours before admission it became strangulated; he was attended by a physician, who placed an ice-bag on it, administering morphine, and made several attempts at taxis. These attempts were futile. The patient was brought into the hospital. There was a considerable

amount of tympanites, and he occasionally vomited a greenish fluid, which was not stercoraceous. There was pain and tenderness in the hernial mass, and absolute absence of impulse on cough. To reach the constriction and cut it the long incision was made. This permits of a thorough inspection of the parts and renders easy a subsequent radical cure, and its merits have been pointed out by Mr. Lockwood. The sac was opened and the constriction cut at the internal ring. A small portion of the small bowel was in the sac, it was in good condition, and was restored. It was decided to do a Halsted operation. On lifting up the cord for the purpose of removing the accessory veins, which were large, it was noticed that there was a blood-clot running for a long distance along the accessory veins of the cord. Ligatures were applied above and below, and the portion of vein was cut away, when it was discovered that the clot was purulent. Cultures were at once taken, and it was shown by subsequent studies in the laboratory that there was present the staphylococcus pyogenes albus. A radical cure was made, but it was considered expedient to pull the stumps of the veins into the wound and anchor them there, after disinfection with pure carbolic acid. There were no complications, but a few days after the operation it was discovered that the patient labored under a chronic urethral discharge. Cultures were taken and gonococci were found present. The problem in this case is, Was the phlebitis, with an infected clot of accessory veins, connected in any way with the existence of the previous gonorrhœal discharge, or was it due entirely to taxis carried out at such a recent period establishing a point of least resistance.

In the third case there was a complication still more unusual. This man was forty-eight years of age, a laborer, who suffered from a prolapse of the mucous membrane of the rectum. He was operated on in the Jefferson Hospital a number of weeks before by the use of a cautery, but the operation had failed to cure the prolapse, and he came again into the hospital for the purpose of having it removed. He had had for a considerable length of time a reducible hernia of the left side. The prolapse was excised and the mucous membrane sutured. He did very well for three days, except that he coughed a great deal. On the evening of the third day, while having a violent attack of coughing, he was seized with pain in the abdomen, and found that the rupture had come down,

that it was painful, and that he was unable to reduce it. He called for the resident physician, who made an attempt to reduce it, but failed. While manipulating the hernia the resident physician was surprised to hear and feel a crackling, when he pressed on the mass, as if air were diffused through the tissues. On reaching the hospital Dr. Da Costa examined into and confirmed this fact. There was distinct crepitation which could be heard and felt. It seemed to be deep within the sac. This crackling could be traced from the left side to the right side, apparently along the course of the colon. The question as to what had happened was doubtful. The first thing thought of was that some stitches which were put in at the operation had given way, and that during the fits of coughing air had been diffused into the subserous tissue. On examining the stitches they were found intact. Inability to reduce the hernia determined operation. An incision was made, the hernia was exposed, the sac was opened, and the hernia was found to be composed of the large bowel, and within the mesocolon was a collection of air which crackled when pressed on; it contained air in what looked like bubbles, opalescent bits like large globules of milk. Dr. Da Costa introduced his hand into the abdomen and was able to discover that the ascending, transverse, and descending mesocolon, and the mesorectum were in the same condition. In fact, the distention was so great downward towards the pelvis that it was difficult to pass the hand. The wound was closed, and again examined. Upon examination of the rectum there was found above the lines of stitches an ulceration which had apparently followed the cauterization, and when the bowel was pressed upon air escaped from the ulcer in distinct bubbles. A tube was introduced into this opening and carried into the subserous tissue, and in the course of four or five days this very large collection of emphysematous material passed away and the individual recovered. It is very strange that no infection of the subserous tissue followed.

TWO CASES OF HYPERTROPHY OF THE PENIS; ONE DUE TO TRAUMATISM; THE OTHER, TO ELEPHANTIASIS.

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THE origin of hypertrophy of the penis is not yet understood; from cases that have been reported to the medical profession, the disease would seem, in some manner, to be associated with injuries to the lymphatic vessels. Robert W. Taylor gives an account of a case where the organ grew to the length of eleven inches, the circumference being proportionately increased after the individual had received a gunshot wound of the lymphatic vessels of the groin. Many instances of hypertrophy of the corpora cavernosa have been detailed; in the *Medical Times* for January, 1875, there is the case related of a man thirty years of age. The organ had commenced to enlarge, when the individual was a boy of six years of age; the integument over the penis being normal.

In the case of the person who came under my charge enlargement seemed to follow traumatism; its history is briefly as follows:

He is an acrobat, thirty-eight years old. Has always enjoyed good health; his family history is negative so far as abnormalities, tumors, or malignant diseases are concerned. Has never had any venereal disease. At the age of twenty-five the organ was of normal size. He is married and his wife has borne him two children.

Shortly after his marriage he observed that when he donned

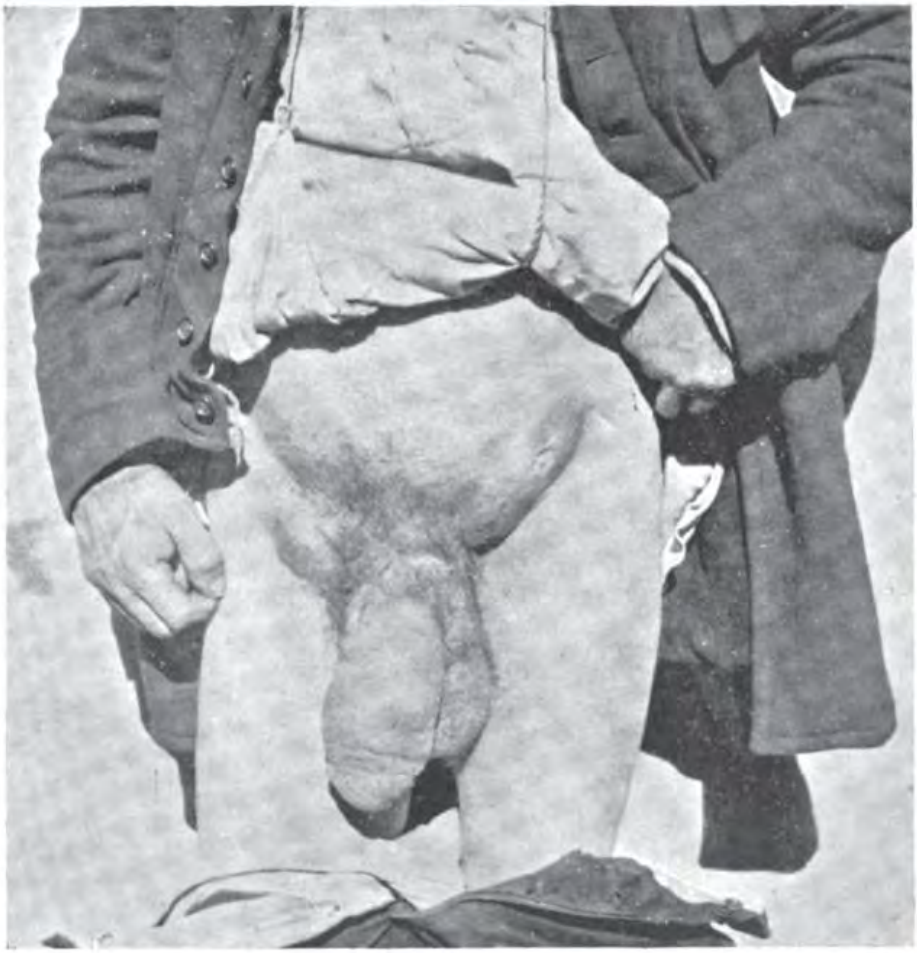

FIG. 1.—Hypertrophy of the penis due to traumatism.

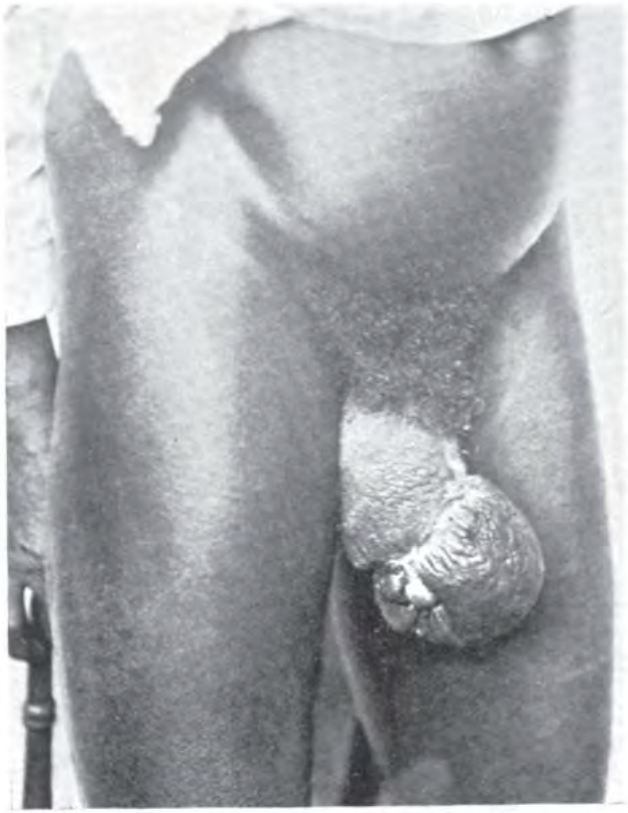

FIG. 2.—Elephantiasis of the penis, before operation.

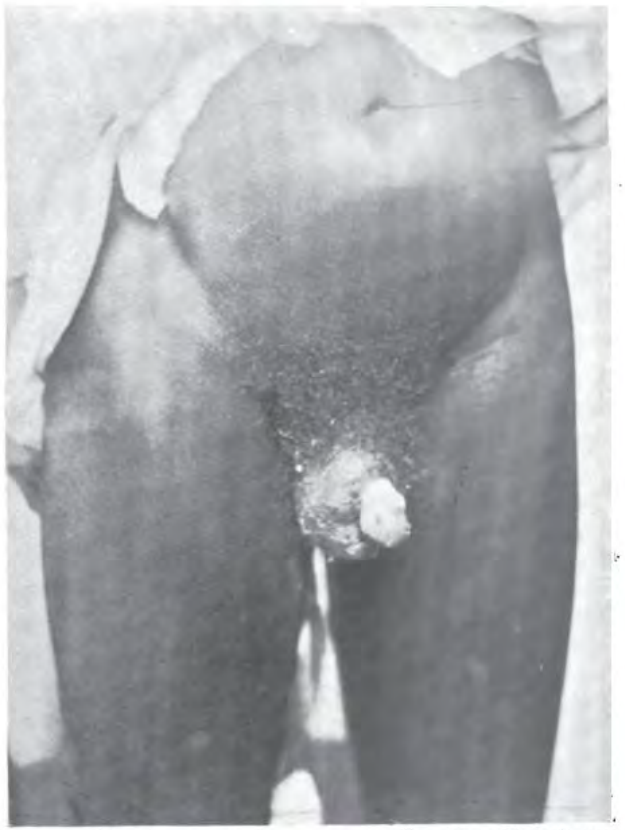

FIG. 3.—Showing result after removal of hypertrophied tissue in case of elephantiasis of the penis.

his tights, in which he appeared during his exhibitions, that his appearance was quite unseemly. In order to rectify this condition, he devised a harness so adjusted that he could strap the penis to the scrotum between his testicles. For several years he utilized this apparatus when he appeared in the ring; but frequently when performing his gyrations the organ would become twisted, causing pain, tenderness, and swelling, lasting for several days, followed by a subsidence to his normal condition.

After using the apparatus for the space of two years he observed that the organ was increasing greatly in size. This condition was unaccompanied by pain. Finally sexual congress became impossible. Some three weeks before presenting himself at the hospital while attempting to turn professional somersaults with the organ strapped between his legs the foreskin was wrenched, bruised, and slightly chafed; this condition was followed by inflammation and œdema of the prepuce, with suppurating periadenitis of both groins. He begged to have amputation of the penis performed, as the size and weight of the organ had become so great that it was impossible for him to carry on his business.

The penis was of gigantic size; it was of normal shape; the enlargement was uniform; the skin perfectly smooth and healthy, moving freely over the subcutaneous connective tissue. There was no tenderness on pressure. There was an acquired phimosis, with enlarged suppurating glands of both groins. The length of the organ from the pubis to the end of the prepuce was ten and one-half inches; the circumference at the middle of the body was nine and three-quarters inches. (See Fig. 1.)

The patient was circumcised, and on removing the foreskin an enormously developed but perfectly healthy glans was brought into view. The tissue forming the foreskin was normal, and no more bleeding took place than was natural. The glands of the groin were removed without difficulty. Microscopic examination of the foreskin discovered nothing abnormal. The individual recovered promptly from the effect of the operation without any untoward result.

The differential diagnosis between hypertrophy and elephantiasis of the penis was readily made in this case. The organ had preserved its normal shape, and was symmetrically enlarged; the skin was smooth and normal in appearance and

not attached to the subjacent structures, while in elephantiasis there is always hypertrophy of the fibrous structure as well as of the subcutaneous connective tissue; the skin being thrown into numerous furrows running in longitudinal directions and crossed by other furrows which divide the skin into firm, brawny, and elastic nodules. Finally, in elephantiasis the glans is not enlarged, and is generally hidden in the lobular skin of the prepuce, presenting an umbilicated appearance.

Elephantiasis of the Penis.

Elephantiasis is rarely met with in America or Europe, but sporadic cases are occasionally seen. In the tropics, however, it is often found, and is frequently endemic to certain districts, attacking the organs of generation of both sexes, next in frequency after the lower extremities.

The disease appears to be a hypertrophy of the fibrous tissue of the skin and subcutaneous connective tissue, attacking the last-named structure first. This is followed in time by an increase in the size of the neighboring organs, disturbing the circulation, and giving rise to chronic inflammation of the lymphatic vessels of the part.

It is very unusual for elephantiasis to attack the penis primarily, but it frequently follows involvement of the scrotum. Dr. Thin, in the *Transactions of the London Pathological Society*, 1880, gives a case of elephantiasis of the penis, where no appearance of a multiplication of cells by division could be detected under the microscope, and hence infers that the whole of the cells are derived from the white blood-corpuscles. Lewis, Bancroft, Manson, and Henry have of late years pointed out that elephantiasis, if not caused by, is at least frequently associated with, the presence of a parasite, the filaria sanguinis hominis, of which there are three varieties,—filaria diurna, filaria nocturna, and filaria perstans. Of these three divisions it is probable that the filaria nocturna, which gives rise to certain forms of elephantiasis as well as the conditions known as lymph-scrotum and hæmatochyluria, is the most common. The embryos in tropical cases are present in the

blood in large numbers at night and almost entirely absent during the day. Stephen Mackenzie asserts that if the patient sleeps during the day and is awake at night the condition is reversed. Osler states that these parasites cannot be found in every case of elephantiasis, and reports two cases coming under his own observation where filaria in the exuded fluid or in the blood at night could not be detected. He further observes that the majority of cases of elephantiasis which occur in this country are non-parasitic, while the directly opposite condition pertains in cases occurring in China. The parasite is found principally in tropical climates, and, according to the observations of many American writers, it exists extensively in the Southern States. The filaria sanguinis hominis appears in the blood in its embryonal form, and is fully developed only in the lymphatics.

The scrotum is more frequently the seat of the disease than the penis; this organ, as a rule, being affected secondarily. Two cases are reported involving the penis alone, one by R. W. Taylor and the other by R. F. Weir, of New York. In Taylor's case the patient was a young Hebrew, in whom the condition followed an injury to the organ. In Weir's case the hypertrophy followed a stricture of the urethra associated with an abscess resulting in a urinary fistula.

The history of the case which came under my care is briefly as follows:

The individual was a colored man, about forty-five years of age; sailor by occupation. Family history negative. Patient states that he never had any venereal disease. About six months before coming to the Philadelphia Hospital, while at sea, having abstained from sexual intercourse for four months, he noticed a small, slightly elevated, hard lump, about the size of a pea, on the left side of the frænum. This lump increased slightly in size, became irritable, and ulcerated at the base, from the necessary friction produced by coming in contact with the clothing. Gradually sloughing set in until the tumor hung by a strip of skin which he cut through with a pair of scissors; the resulting raw surface healed rapidly. About three weeks later the entire penis

began to enlarge until it gradually reached its present dimensions. He has never had any pain or experienced any difficulty in urination. He has lost slightly in weight.

On examination the glans penis was small and almost entirely hidden by a firm fibrous mass which entirely surrounded the end of the organ. Between the penis and the scrotum there was a distinct line of constriction, the skin of the latter being perfectly normal. The left testicle was easily discovered, but the right testicle could not be found, and was supposed to have undergone atrophy. The skin of the penis was cut up into furrows, running longitudinally, which were crossed by others running more or less obliquely, dividing the organ into lobules, which were hard, firm, and elastic. (Fig. 2.) From the pubis to the glans penis, along the dorsum of the organ, the measurement was eleven inches. The circumference of the mass in its thickest portion was nine and one-half inches. On palpation a distinct doughy sensation was imparted to the touch, but there was no pitting on pressure. A very careful study of the blood was made by my colleague on the staff, Dr. F. P. Henry, but the filaria sanguinis hominis could not be detected. The patient's temperature was normal. Sexual power was completely lost. Examination of the urine negative.

The patient was etherized and an incision made along the entire length of the dorsum of the penis, being about ten inches in length. The skin was found to be tough and fibrous, and, on division, a thick, white, elastic, fibrous tissue was exposed, it was impossible at first to identify either the corpus cavernosum or spongiosum. To guard against wounding the urethra a small-sized bougie was passed into the bladder. The tough fibrous tissue was then dissected entirely away from the penis, when a strong thick band was found passing along the entire length of the under surface of the organ, which was formerly attached to the central tendon of the perineum. On removing the fibrous mass from the vicinity of the base of the penis, the missing testicle was found pulled up out of place. It was dissected loose, and replaced in the scrotum. The hæmorrhage, which was not so profuse as had been expected, was easily controlled by means of hæmostatic forceps, and very few ligatures were required. After the operation an ordinary antiseptic dressing was applied, and the body of the penis allowed to granulate. The complete heal-

ing of the wound occupied four months, at the end of which time the patient had entirely recovered. On examination, after recovery, it was found that the newly formed skin was tightly adherent to the body of the organ which held the penis in a horizontal position. The patient stated that he was in perfect health and that sexual powers were completely restored.

A brief abstract from the interesting pathological report, made by Professor H. F. Harris, is herewith appended.

"On microscopic examination the epidermis covering the diseased area is found greatly thinned and the epithelial ridges are almost entirely destroyed. Here and there, however, thin rods of epithelium, which are evidently the remains of these ridges, project down for a short distance into the true skin; the cells of which these rods are composed contain much, almost black, pigment, and they do not react to either basic or acid aniline dyes. Just beneath the epidermis there are numerous rounded masses of more or less entirely keratinized epithelial cells. They are sometimes in contact with the epidermis, but more generally seem to be quite free in the derma proper, without any connection with the epithelial layer. While the cells of which they are composed are in most instances keratinized, in some cases the cells which form the outer boundaries of the masses still preserve the morphologic and staining peculiarities of the younger cells, sometimes those cells are piled upon each other several deep. The epithelial cells of the epidermis, as a rule, preserve their normal size, shape, and general relation to each other, but they do not stain as readily as normal cells. In addition to this, many cells in the prickly layer are swollen to twice the normal size. The protoplasm of these cells is homogenous and takes acid stains faintly, the nuclei stain feebly or not at all. Occasionally a leucocyte can be seen between the cells. The layers of cells which form the deeper portions of the Malpighian layer are almost black from the presence of a dark-brown pigment; the pigment is so dense that the peculiarities of the cells in this situation cannot be made out with certainty.

"The greater part of the tissue is evidently from that part of the penis upon which no hairs occur, but in sections from one of the pieces a few were observed. No changes in the shaft could be made out. The cells of the inner cells of the outer root-sheath

are plainly in a state of degeneration; their nuclei stain faintly or not at all, and their protoplasm is faintly colored by the acid dyes. Even the outer cells of the outer root-sheath are elongated and their nuclei are very irregular in form. The cells of the sebaceous glands present more nearly a normal appearance than any of the other epithelial structures, but they are in many cases elongated and take stains poorly.

"Sweat-glands are only occasionally found. The coils are often separated from each other by dense masses of cells. These cells will be referred to later.

"The true skin is enormously hypertrophied. This is principally due to an increase in the amount of collagenous tissue, but not in an inconsiderable degree to the presence of collections of cells around the blood-vessels of this tissue. The collagenous tissue occurs in thick bundles which are almost invariably disposed in planes parallel to the skin surface. In the deeper portions of the skin wall defined fibrils of elastic tissue are often found; they are in general run from the deeper layers of the skin towards the surface. At intervals through the tissue comparatively large, robust bundles of involuntary muscle fibres occur. They are not probably of a new formation, but result from the hypertrophy of the pre-existing muscle of the parts. In the true skin, extending downward for a considerable distance, there are numerous small, very dark pigment masses, generally of a rounded or irregular form. These granules may be seen in the process of formation from the lower layer of the epidermis.

"The blood-vessels are comparatively scant, but those which are present present interesting changes. Contrary to the observations of others, I have found the changes in the arteries much more pronounced than those in the veins. The alterations in the latter consist principally in a marked dilatation of their calibre; in addition to the endothelial cells lining their inner coats shows a marked decrease in their power of taking stains, and in some cases they do not stain at all. Rarely the outer coats of these vessels show marked thickening, and in almost every instance are more markedly cellular than normal. The arteries are all small, and very frequently their lumen is encroached upon by thickening of their walls, and in these instances the intimas are represented by a structureless hyaline membrane which takes the acid stain. The muscular coats are rarely so stained that their true nature can

be recognized. Replacing the muscular coat in many of the vessels are collections of cells which have the appearance of lymphoid cells; sometimes these masses of cells exactly occupy the muscular area, but in other cases they encroach upon the intima and push it inward. The adventitiæ of the vessels are in most instances decidely thickened, and contain lymphoid and plasma cells. The entire walls of some of the vessels are hyaline; here the intimæ are generally swollen. Occupying the lumina of some of the arteries are yellow, entirely homogeneous masses which take acid stains, but no basic ones, and would appear to be hyaline thrombi. None of these were seen in vessels whose walls were hyaline, but were frequently observed in those the muscular walls of which were infiltrated with cells.

"The perivascular lymphatics are almost always greatly dilated and contain collections of lymphoid and plasma cells; within these collections of cells, usually near their edges, mast-cells frequently occur, but no pyonuclear leucocytes were found.

"Between the bundles of collagenous tissue, and having no apparent connection with the lymphatics of the blood-vessels, are often collections of cells which in every way resemble those just spoken of; whether they are only a part of these masses cut so as not to show the vessels or entirely separate could not be determined. Scattered through the tissue generally plasma, lymphoid, and mast-cells are of frequent occurrence. The tissues are abundantly supplied with characteristically branched connective-tissue cells. None of the cells mentioned are elongated or twisted, as would be supposed to be the case had they been subjected to considerable pressure. A careful study of the section failed to reveal the presence of micro-organisms.

"Attempts to study the nerves of the tissue by Golgi's silver method were unsuccessful, as, is often the case, impregnation did not occur."

(The photographs of these interesting cases were kindly taken for me by Professor Henry W. Stelwagon.)