a moderate amount of hydrocele, the morbid process sometimes involving the epididymis and the cord. In recent cases, mercurial treatment speedily effects a cure; in cases of long standing atrophy may occur, or degeneration of the organ, with abscess of the scrotal wall, followed by fungous protrusion. Microscopic examination has shown connective tissue proliferation, usually involving the whole organ and sometimes the tunica vaginalis, especially if the disease has invaded the epididymis. The history of the child, the presence of syphilitic lesions elsewhere on its body, and the slow development of the disease, as compared with a form of cancer sometimes seen in the testicles of children, assist in diagnosis.

Morbid Anatomy.—The histology of the diseased testicle in hereditary syphilis has been studied by Parrot and Hutinel.[1] The lesion is a proliferation, interstitial or diffuse, of round embryonic cells resembling white blood-corpuscles. In the interstitial form, in which the gland may or may not be perceptibly altered, the cell-growth results in small tumors of various sizes, irregularly placed around the arterioles, which traverse the trabeculæ. In the diffuse form, in which the organ is much enlarged, a similar cell growth is found permeating the meshes of its connective tissue generally. The process begins at the mediastinum testis, follows the vessels of the trabeculæ, penetrates between the seminiferous tubules, and finally results in hypertrophy and sclerosis of the organ, with partial or entire obliteration of the tubules, whose lining epithelium undergoes granulo-fatty degeneration. Fatty degeneration and final absorption of the new growth take place, resulting in atrophy and, in rare cases, in complete destruction of the organ. Probably, the cases which are attributed to arrest of development, in which the testis is small or entirely absent, are those in which the organ has been attacked in early life by the lesions of hereditary syphilis. Our knowledge of the lesions of the ovaries is limited to the statement of Parrot that in two cases he found in the substance of these organs bluish spots with small whitish grains. It is probable that they may be affected in a similar manner as the testis.

Affections of the Synovial Sheaths.

In two cases of hereditary syphilis under our observation the extensor tendons of the hands were involved, as indicated by marked fusiform swelling over the metacarpal bones, of doughy consistence and freely movable under the skin, which was slightly distended and reddened. Its development was rapid and associated with other lesions, particularly osseous, its subsequent course indolent and not appreciably affected by mercurial treatment. In one case cure resulted from the application of a compress over a piece of mercurial plaster,

[1] Étude sur les lésions syphilitiques du testicule chez les jeunes enfants. Rev. mens. de méd. et de chir., Paris, Fev., 1878.

after withdrawal of the fluid with the hypodermic needle. Other tendinous sheaths than those of the hands may be affected.

Affections of the Nails—Onychia.

The nails are more frequently involved in hereditary than in acquired syphilis. There are two varieties of onychia; the ulcerative, which is the more frequent, and the nutritive, due to impairment of nutrition.

Ulcerative onychia begins at the side or base of the nail, as a papule or pustule, which soon ulcerates, the process extending along the concave base of the nail, being limited indefinitely to that location, or along the lateral margins and finally involving the matrix of the nail, which, in the latter case, is soon cast off. The distal phalanx becomes very painful and enlarged, the finger resembling in shape an Indian club. The thickened everted edges of the ulcer, its sloughy base and sanious discharge, and the coppery hue of the surrounding skin, are characteristic.

This form of onychia may be met with alone or associated with general papular or ulcerative eruptions and is most frequently seen during the first year or two of the child's disease. In cases improperly treated it may be developed later, and though its course is generally chronic, it may be decidedly shortened by appropriate treatment. The nails of the hands seem to be more often affected than those of the feet.

The growth of a deformed and useless nail or cicatrization without a new nail may be expected in severe and protracted cases not subjected to treatment. In such cases, osteitis of the phalanx may indicate amputation. The second form of onychia is even more chronic than the preceding, and a much later manifestation of the disease. It begins as a swelling at the base or around the margins of the nail, of a coppery hue, which shades off into the surrounding parts. At the same time the nail loses its smoothness and gloss and becomes thickened, fissured and brittle. The nail has a dirty-white color, and there is always hyperæmia of the matrix and the surrounding parts, with much deformity of the phalanx, which may not be permanent. The nail may be finally restored in a perfectly healthy condition, and the bone is usually not involved.

Affections of the Hair.

The features of alopecia areata in hereditary syphilis are similar to those of the acquired form. It occurs in connection with dermal lesions of the scalp, particularly pustular, where in consequence of its failure to be controlled by mercurial treatment we have been disposed to consider it an intercurrent affection. In other cases the dry condition of the hair seems to be a result of the adynamic influence of syphilis, rather than any specific effect. I am, therefore, inclined to doubt the existence of an alopecia symptomatic of hereditary syph-

ilis, and to regard the effect upon the nutrition of the hair similar to that of any debilitating disease.

Affection of the Thymus Gland.

Paul Dubois,[1] in 1850, first called attention to certain pathological changes which are found in the thymus gland of infants who are born dead, or who die a few days after birth from inherited syphilis. Externally, the gland appears to be normal in size, color and consistency; but if an incision be made into its substance, pressure will cause to exude from the cut surface a few drops of yellowish fluid, which, under the microscope, is found to consist of pus. In the cases observed by Dubois, the purulent matter was uniformly diffused throughout the glandular tissue; but Depaul,[2] Weber,[3] and Hecker,[4] have met with abscesses of the thymus. The thymus gland naturally contains a whitish, viscid fluid, which may, with a little care, be distinguished from the suppuration dependent upon syphilis. Of five cases of this lesion observed by Dubois and Depaul, an eruption of pemphigus was present in four; and in the same number the syphilitic antecedents of the parents were clearly established.

The more recent observations of Weisflog[5] and Wiederhofen[6] have confirmed the views of Dubois, which were at one time rejected by several German authors, who claimed that Dubois had mistaken the normal secretion of the gland for pus, and that the possible changes were not necessarily due to hereditary syphilis. Having studied the literature of the subject, as well as the lesion itself, Weisflog arrives at the following conclusions: 1. It is certain that the thymus abscess described by Dubois exists, and, although not a constant symptom of hereditary syphilis, it is sometimes met with. 2. This lesion, associated with other signs of congenital syphilis, indicates that the father or mother of the infant suffers or has suffered from syphilis. 3. It is possible, but not proved, that this affection may exist in children in whom there are no symptoms of syphilis, but its existence renders the diagnosis of hereditary syphilis probable, even if the disease of the parents is not proved. 4. Such is the great similarity in the appearance of pus and of the secretion of the thymus that they cannot always be distinguished.

There are no facts to prove the theory of Lancereaux that this fluid is due to the breaking down of gummy material. It seems to us more probable that it is due to a degeneration of connective tissue which has been newly formed in the parenchyma of the organ.

[1] Gaz. méd. de Paris, 1850, p. 392. [2] Gaz. méd. de Paris, 1851.
[3] Beitr. z. path. Anat. d. Neugeborenen, Kiel, 1852, Band ii., p. 75.
[4] Verandl. d. Gesellsch. f. Geburtsh, in Berl., Band viii., p. 117.
[5] Ein Beitrag zur Kenntniss der Dubois'schen Thymus Abscesse bei angeborener Syphilis. Inaug. Dissertation, Zürich, 1860.
[6] Ueber Syphilis. Ueber Thymus Abscesse bei hereditärer Syphilis. Separat-Abdruck aus dem J. d. Kinderheilk. Wien, 1852.

Affections of the Lymphatic Ganglia.

General subacute adenitis, invariably present in the early stages of the acquired, is always absent in hereditary syphilis, and is an important feature in the differential diagnosis. Swelling of the cervical ganglia, which often accompanies active lesions in the mouth and throat and upon the scalp, frequently results in abscess, particularly in cachectic children, when the condition can be distinguished from struma only by the history of the case and by concomitant symptoms.

On post-mortem examination, Hutchinson found the bronchial ganglia of a syphilitic child, five months old, infiltrated with fibrinous deposits, and cases of infiltration of cell elements, sometimes in the form of small circumscribed tumors, have been reported by Baerensprung. The ganglia of the gastro-hepatic omentum and mesentery were found most frequently involved, being symptomatic perhaps of visceral lesions.

The Condition of the Blood.

No microscopical observations of the blood in the various stages of hereditary syphilis have yet been made. Lancereaux, one of the first to call attention to the subject, remarks that, considering the number of visceral affections, alteration in the composition of the blood is probable. Increase in its consistency, and effusions, both parenchymatous and into cavities, have been noticed, especially by Hutchinson and Baerensprung. In the case of an infant who died six hours after birth, Lancereaux found ecchymoses under the pericranium, in the cellular tissue, upon the surface of the lungs, and in the pericardium.

Affections of the Circulatory Organs.

The condition of the arteries has not been studied, and our knowledge of that of the veins is imperfect. Schüppel[1] has described profuse cell-infiltration into and about the wall of the portal vein under the name syphilitic periphlebitis. The larger veins also were surrounded by gummatous nodules, their lumen contracted, and their walls so thickened that they felt like cords. These lesions were found in three out of thirty cases seen during a period of two and a half years.

Lancereaux states that the cardiac affections of hereditary and acquired syphilis are similar. Rosen found a gummy tumor in the wall of the left ventricle. Förster[2] alludes to a case of syphilitic endocarditis, whose origin Lancereaux considers doubtful; while Wagner[3] discovered fibrous myocarditis in a syphilitic stillborn infant. According to Lancereaux,[4] interstitial myocarditis and muscular hyperplasia were found in one case by Kantzon.

[1] Arch. d. Heilk., Leipzig., Band xi., 1870.
[2] Behrend's Syphilidologie, t. iii., p. 249, 1860.
[3] Würzb. med. Ztschr., Band. iv, 1863.
[4] Arch. f. path. Anat., etc., Berlin, Band xxxv., 1866.

Lesions of the Umbilical Vein.

Oedmansson[1] and Winckel[2] found stenosis of the umbilical vein in the cord of certain macerated fœtuses whose death was attributed to syphilis. The former thought that it was caused by the atheromatous process. Birch Hirschfeld,[3] who has also observed this condition, thinks that it is due to changes similar to those occurring in the arteries of the brain, as described by Heubner; he also says that it rarely coexists with osteochondritis, which Wegner considers an absolutely constant lesion in hereditary syphilis. If the lesion of the vein is actually caused by syphilis, then Wegner's belief in the constancy of the bone lesion must be erroneous. Should future investigation confirm the view of Hirschfeld, this lesion of the umbilical vein must be considered an important element in causing the death of the syphilitic embryo.

Hæmorrhagic Syphilis in Newborn Children.

Sixteen cases of a somewhat rare condition which has been described under this head have been reported, and we have ourselves met with two well-marked instances. The condition exists at birth or appears soon after, commonly not later than a month, and is frequently the only syphilitic symptom presented. In such cases our suspicions of its origin are suggested by the syphilitic history of one or both parents. In other cases undoubted syphilitic lesions coexist.

The affection is due to a condition of hydræmia caused by syphilis, in which, after withdrawal of blood from a vessel, coagulation takes place imperfectly or not at all. It is usually observed in children of profoundly syphilitic parents. The hæmorrhages vary in extent and severity. In some instances there is merely a limited subcutaneous effusion, especially where the connective tissue is loose and abundant, and in parts exposed to pressure. In other cases the process takes place in the substance or on the surface of mucous membranes, and may result even fatally. In such cases trifling injuries and slight bruises induce effusion of blood. A fatal termination may be expected when the hæmorrhage occurs beneath the serous membrane and into the substance of the viscera. Although the prognosis is not absolutely good in any case, recovery has been known to follow the use of proper treatment.

Affections of the Bones.

Our knowledge of the affections of the bones in hereditary syphilis has been acquired chiefly within the past ten years. Previously, the majority of bone lesions were attributed to rickets or scrofula. In 1870 an important contribution to this subject was published by Wegner,[1] of Berlin, in which he described certain changes found at the junctions of the diaphyses and epiphyses of the long bones of infants with hereditary syphilis. Two years later Waldeyer and Köbner[2] published a paper in which they confirmed Wegner's discovery, although they differed with him in their interpretation of the pathological appearances. Following these German observers, Parrot,[3] of Paris, published in 1872 an elaborate paper, in which he gave many histological facts and brought out one important symptom of these affections. In 1875 I published a work containing a full description of these affections, their pathology, and a *résumé* of previous contributions concerning them.[4]

The bones are affected in various ways by hereditary syphilis. In the early months of infancy the morbid change is peculiarly frequent in long bones at the junction of the epiphysis with the diaphysis. In the first years of hereditary syphilis the small bones of the fingers and toes are also quite frequently affected, while later on a tendency to invasion of the shafts of long bones and of the surfaces of flat ones is noticed. We shall, therefore, describe the diaphyso-epiphysal lesion under the name *osteochondritis syphilitica* and the affection of the long bones under *periostitis*. The lesions of the bones of the fingers and toes are somewhat peculiar, and require a separate description.

Osteochondritis.—This affection is claimed to be one of the most constant manifestations of hereditary syphilis. It is often the only one, and frequently its presence decides the syphilitic nature of coexisting lesions. A knowledge of the fact that this affection is caused exclusively by syphilis has been of great service in the study of hereditary syphilis.

If we remember that the growth of the bone in length takes place at the extremity of the shaft, where the epiphysis is joined to it by a layer of cartilage, and that here syphilitic changes are most often found, we shall see how the normal development of the bone may be greatly perverted or interfered with.

The bones most commonly attacked are those of the forearm, the leg, the arm, and the thigh. The clavicle, sternum, and ribs are also attacked, as well as the metacarpal and metatarsal bones. The number of bones involved varies. It has been noticed that in stillborn infants, and in those dying soon after birth, the majority or even all of the long bones are affected. It is very exceptional for the victims

[1] Jahresb. ü. d. Leistung. u. Fortschr. d. ges. Med., Berlin, 1869, ii. Bd., S. 561, from Nord. med., Arch. i., 4. Quoted by Hirschfeld.
[2] Ber. a. d. k. Sächs. Entbind.-Inst. in Dresden, Leipz., S. 307. Quoted by Hirschfeld.
[3] Beitr. zur path. Anat. der hered. Syphilis Neugeborenen. Arch. d. Heilk., Feb., 1875.

[1] Ueber hereditäre Knockensyphilis bei jungen Kindern. Arch. f. path. Anat., etc., Berlin, Band i., 1870.
[2] Beiträge zur Kenntniss der hereditären Knockensyphilis. Arch. f. path. Anat., etc., Berlin, Band lv., 1872.
[3] Arch. de physiol. norm. et path., Paris, 4 année, 1872.
[4] R. W. Taylor: Syphilitic Lesions of the Osseous System in Infants and Young Children, New York, 1875.

of multiple bone lesions to survive, and it is fair to assume that the number of bones attacked varies with the intensity of the syphilitic diathesis.

In these cases of osteochondritis we find at the diaphyso-epiphysal junction a swelling, which may be visible, but in fat children is often imperceptible. On palpation the bone is found to be encircled by an abruptly limited collar or ring, which usually extends completely around. In some cases the entire epiphysis may be expanded, with or without a distinct ring, at its junction with the shaft. The surface of these swellings and rings is generally smooth; it may be slightly irregular, but is seldom very much ridged. When two contiguous bones are affected they often seem to be fused together. In living children the distal more often than the proximal extremities have been found affected, and the affection is generally symmetrical, especially in very young subjects. In some cases, particularly at the lower end of the humerus and at the upper end of the tibia, the lesion does not surround the bone, but is limited to a segment of the diaphyso-epiphysal junction.

The swellings on the clavicle are usually found at its sternal end, and are sometimes of large size. Those of the sternum are not common in very young children; lesions of the ribs, which occur at their junction with the costal cartilages, are also infrequent, and are generally not as numerous or symmetrical as those of rickets.

These swellings may be developed slowly or quite rapidly. After reaching their full size, they usually remain in an indolent condition, causing little, if any pain, and interfering but slightly with the motion of the joint. Under appropriate treatment they promptly subside. The integument undergoes very little if any change, and becomes tense and thin only when the tumors are exceptionally large. The joints may be secondarily involved and become the seat of subacute synovitis, the effusion being slight or extreme. Those most commonly attacked are the elbow and knee; as a rule the joints with short epiphyses are most liable to hyperæmia and effusion. Pressure, accompanied by internal treatment, speedily disperses these joint-swellings, which usually give rise to but slight inconvenience.

Degenerative changes sometimes take place in these osseous lesions. In their mildest form they consist simply of a superficial breaking-down at one part of the swelling. We first observe fluctuation, soon followed by ulceration of the skin, resembling in appearance that which occurs in gummy tumors. These necrotic changes, however, may be much more active and extensive in the bone than in the cutaneous ulcer, which shows very little tendency to increase in size. The epiphysis may be entirely separated from the shaft, and, if the superficial ulcer is large, it may be extruded. In most cases, where the destructive process is extensive, the syphilitic diathesis is intense, and a fatal termination ensues. In others, however, reparative changes of an interesting and peculiar character occur.

The intervening cartilage having been destroyed, the diaphysis is

united to the shaft only by fibres of periosteum. This membrane becomes much thickened, and forms a more or less complete cylinder, uniting the two fragments with considerable firmness. Bony spiculæ shoot from its inner surface between the two osseous surfaces, and eventually bony union is formed. The periosteum continues thickened for a long time, but gradually resumes its normal proportions as the union between the bones grows firmer.

The effect of these swellings upon the ultimate shape of the bone depends on the intensity of the morbid process. When resolution takes place the nutrition of the bone is afterwards fully restored; but in case of destruction of the intermediate layer of cartilage the bone is usually shortened. These lesions are usually found at birth or within the first month of life. They may appear later, even as late as the twelfth year, when they are developed very slowly, are few in number, and are unsymmetrical. The occurrence of ossification between the segments of a bone no doubt has much influence upon the development of the lesions; we may, therefore, expect to see them at the time when bony union occurs. Identical changes have been observed in children with acquired syphilis, but the affection in such cases was limited to a few bones, or even to one.

This affection results from interference with the nutrition of the bone, and presents three stages. In the first the intermediate layer of cartilage is thickened, uneven and irregular, and under the microscope we find simple increase of the cartilage cells. In the second stage the cartilage is still thicker, and is nodulated on its epiphysal surface, and warty or papilliform processes of calcified cartilage project into the hyaline matrix. Wegner compares them with the papillæ of the cutis, on account of their broad bases and tapering ends. Deposits of lime are also found in the hyaline matrix between these projections. On the periphery, the infiltration encroaches further into the cartilages than at its centre. We find when examining the relations of this calcified line to the spongy bone that there are corresponding depressions into which the spongy tissue passes. Under the microscope we find the longitudinal rows of cartilage more abundant than in the first stage, and there is very little intercellular substance. The vessels are numerous, and at the line of ossification are surrounded by a considerable quantity of connective tissue. The walls of the cavities are broader at their bases and are sclerotic. In many places an osteoid substance is developed from the cartilage and from the medulla which enters with the vessels. This substance is found to be in some places true bone which passes into the spongoid layer. Beyond the *couche chondroide* we find irregularly distributed spots of calcified cartilage forming a zone of considerable breadth. The principal points in the second stage, therefore, are greater proliferation of the cartilage cells, premature sclerosis of the intercellular substance, formation of bony projections beyond the normal layer, and delay in bone formation elsewhere; in other words, irregular osteogenesis, premature in some regions and retarded in others. In

the third stage there is a general enlargement of the epiphyses, with thickening of the periosteum and perichondrium. Under the microscope the following conditions are seen: The lowermost layer of hyaline cartilage is bluish and transparent; this layer is succeeded by an irregular and wavy layer, with serrated processes and having a grayish-white color and of homogeneous formation. This layer is brittle and can be readily removed. Next to this is placed a layer of grayish-red or yellow substance, soft, and sometimes viscid, which is gradually lost in the spongy substance of the diaphysis. The medullary tissue of the latter continues for some distance, and instead of being normally red, is gray or grayish-red. This layer seems to destroy the firm cohesion of the epiphysis to the shaft. In this stage the proliferation of cartilage cells and the lime infiltration is excessive. In the layer next to the bone we see nucleated cells, spindle-shaped cells, and granular detritus. Waldeyer and Köbner consider this to be granulation tissue growing into the cartilage from the medulla. Wegner, on the contrary, denies that it is true granulation tissue.

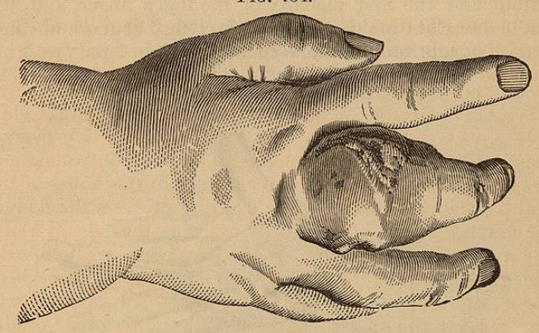
Periostitis.—While osteochondritis occurs in early infancy, periostitis is a later affection, attacking the bones of syphilitic children who have already begun to walk. Whether the active use of the bones has any influence in developing periosteal inflammation we cannot say positively, although its occurrence in the bones of the leg renders this view probable. In the majority of cases the femur and tibia are first attacked, sometimes as early as the second year, but generally at the fourth or fifth. When long bones are involved thus early, the greater part of the shaft usually suffers. The bone becomes very tender, and soon is seen to be much enlarged, even to twice or thrice its normal thickness. It seems bent anteriorly, producing marked deformity. The fibula is also sometimes affected and generally both legs are attacked. The bones of the forearm are, next to the tibia, most prone to this disease. The earlier it appears, the more likely is the affection to involve both limbs symmetrically; at later periods it may be unilateral and more localized, perhaps forming circumscribed nodes. The skull-bones are sometimes the seat of these nodes, which are apt to be quite large and multiple. In very severe cases they sometimes break down and form troublesome abscesses. Although periostitis usually occurs before the twelfth year, we have seen it as late as the fifteenth and even the nineteenth year.

Dactylitis Syphilitica.—In the early months of hereditary syphilis, children are often attacked by swelling of the phalanges and the metacarpal and metatarsal bones. These lesions are of the same character as those of acquired syphilis. The proximal phalanges are most often attacked, and the distal least commonly; sometimes all three phalanges are involved at the same time. The bones may be enlarged to twice or thrice their natural size, the deformity, of course,

differing with the phalanx involved. One or more bones of one or of each hand may be involved; in one instance, I have seen every phalanx of each hand swollen. Sometimes the metacarpal bones are enlarged; the lesion is less frequently seen in the toes and metatarsal bones. The swellings progress slowly or with surprising rapidity. In their early stages the integument is unchanged; at a later period the overlying parts become inflamed and an abscess is formed. The condition is well shown in Fig. 134, taken from a cast of one of my own patients.

If uninfluenced by treatment, these swellings run a very chronic course, but when treated early they gradually subside. In some cases exsection of the bones is required, but generally the destructive changes are more extensive in the skin than in the bones. Apparently hopeless cases often yield to persevering internal and local

Fig. 134.



treatment, without the necessity of an operation. At the termination of the disease the shape of the phalanx may be restored, or it may be lengthened, or even very much thinned and shortened.

Dactylitis is usually observed in very young children; it may also occur as late as the twentieth year. In the latter case it is usually preceded by other osseous and articular lesions. This late form of hereditary dactylitis is well shown in a case reported by Volkmann, and included in my monograph on the subject.[1] The patient, a girl, having suffered from various lesions of hereditary syphilis, at the age of fourteen was attacked by numerous osseous and articular lesions. In her sixteenth year the bones of the hands were attacked, and she suffered from relapses in them for fully fifteen years. Fig. 135 represents the appearance of the left hand. On the dorsum was a large smooth movable cicatrix, adjoining a small retracted spot at the base of the first metacarpal bone, which was atrophied, and produced a marked

[1] R. W. Taylor, on Dactylitis Syphilitica. Am. J. Syph. and Derm., January, 1871.