the blood. The jecorin from the blood seems to differ somewhat from that obtained from the liver; when the former is saponified the solution does not set to a jelly on cooling.

Recently Manasse has found in the suprarenal gland of the beef and horse a substance having many of the properties of jecorin; it did not, however, reduce alkaline copper-sulphate solution, except after prolonged boiling with sulphuric acid, and it did not lose its solubility in ether by drying. Analysis showed that it differed considerably in composition from the liver jecorin: C 41.43, H 7.16, N 0.3, S 1.8, P 4.44.

From the various facts stated above it seems probable that there are several jecorins.

Baldi's discovery of jecorin in the blood has aroused considerable interest among physiologists and physicians. It had been shown by Otto[4] that the blood contains a reducing substance in addition to dextrose; since Baldi's discovery of jecorin in the blood it has been customary to attribute all, or the greater part, of the reducing power of the blood (after removal of the dextrose) to jecorin. Some authors[5, 6] have gone so far as to suppose that jecorin is really simply a combination of lecithin and dextrose; that very little dextrose occurs free in the blood, but that it may be split off from the jecorin under special conditions. Bing[7] states that the blood of animals in which the "diabetic puncture" was made showed a considerable increase in the amount of jecorin in the blood, while the sugar showed no constant increase. Extirpation of the pancreas was followed by an increase of both jecorin and sugar. Kolisch and Stejskal[8] at one time held that in cases of diabetes mellitus the sugar of the blood was not increased, the apparent increase being due to an increase in the quantity of jecorin.

In most of the experiments in which the significance of jecorin in the blood has been discussed, the jecorin was not determined directly; all the reducing substances which were not extracted by water, but which were extracted by ether, were reckoned as jecorin. Mayer,[9] however, has recently shown that normal blood contains glycuronic acid. The combination of glycuronic acid occurring in the blood is soluble in ether, is not fermentable, but reduces Fehling's solution on boiling, *i.e.*, it gives the reactions which have usually been held sufficient to show the presence of jecorin. As all previous observers have neglected the possibility of the occurrence of glycuronic acid in the blood, it is evident that much more work is necessary before any conclusions can be drawn as to the significance of the occurrence of jecorin in the blood in either health or disease.

In making determinations of both lecithin and sugar in the various organs, it is necessary to take account of the jecorin. Thus the quantity of lecithin in an organ is usually determined by the phosphorus in the ether-alcohol extract; such extracts, however, contain jecorin, and as the latter contains phosphorus the results are too high for lecithin. In a similar manner the jecorin may vitiate the quantitative estimations of sugar, especially in such an organ as the liver, where it occurs in such abundance.

Reid Hunt.

[1] Drechsel: Journ. f. prakt. Chemie, N. F., 33, p. 425, 1886.
[2] Baldi: Archiv f. (Anat. u.) Physiol., 1887, suppl., p. 100.
[3] Manasse: Zeitsch. f. physiol. Chemie, 20, p. 481.
[4] Otto: Archiv f. d. ges. Physiol., 35, p. 467, 1885.
[5] Jacobsen: Skand. Archiv f. Physiol., 6, p. 263, 1895.
[6] Henriques: Zeitsch. f. physiol. Chemie, 23, p. 244, 1897.
[7] Bing: Skand. Archiv f. Physiol., 9, p. 336, 1889.
[8] Kolisch u. Stejskal: Wien. klin. Woch., 1897, p. 1101.
[9] Mayer: Zeit. f. physiol. Chemie, 32, p. 518, 1901; also Verhandlungen d. Cong. f. inn. Med., 1901, p. 403.

JEMEZ HOT SPRINGS.—Bernalillo County, New Mexico.

Post-Office.—Archuleta.

These springs are located in the beautiful Jemez Mountains, 45 miles from Albuquerque, with which they are connected by daily stages during the summer months. There are two groups of springs, known as the upper and the lower. The upper group at Archuleta is most frequented. These springs are located in the San Diego Canyon, 620 feet above the level of the sea. They are forty in number, and range in temperature from 70° to 105° F. They are chiefly saline in character. The lower group, two miles south, are ten or more in number, and have temperatures ranging from 94° to 168° F. They are also saline.

James K. Crook.

JEQUIRITY.—*Abrus, Love Pea, Prayer Beads, Jumble Beads, Crab's Eyes. Abrus* L. (fam. *Leguminosæ*) is a genus of six species, related to the lentil and the pea, known to medicine by the species *A. precatorius* L., which is indigenous in British India and very widely distributed in the tropics of both hemispheres. The plant prefers a light or sandy soil, and its slender, woody stems climb high over shrubbery in the edges of forests. The fruit resembles a miniature pea-pod, a little more than an inch in length, and containing from four to six seeds. The roots have been employed as a substitute for licorice under the name of wild or Indian licorice. The leaves possess the same property, containing considerable glycyrrhizin. The seeds are better known than the root, under the name jequirity. They are a quarter of an inch in length, elongated-globose, smooth, shining, bright scarlet, a black spot surrounding the hilum. A black form, with white spot, and a white form with black spot, occasionally occur. They are largely employed for rosaries, ornamental beads, children's toys, and in India, under the name of *retti*, for weighing. They have also been used in India for criminal poisoning, usually of cattle. For this purpose the seeds are crushed and worked into a paste with water. This paste is rolled into a needle-pointed form, mounted upon a stick and used to prick the skin of the fated animal, which quickly succumbs to heart failure.

In South America originated the practice of painting a watery infusion upon granulated eyelids, by which suppuration was induced and the granulations were removed.

The active agent was at first supposed to be the bacteria which appear after a time in the infusion. Later, this theory was disproved, and the properties were reported to reside in an albuminous substance called *abrin*. This was later found, by Drs. Sidney Martin and R. Norris Wolfenden, to be a mixture, and was by them separated into two albuminous bodies, a globulin one-fifth as poisonous as the venom of the common adder and an albumose one-sixth as strong as the globulin. These poisons are destroyed by heat. Their effect resembles that of snake venom, the temperature falling greatly and the blood remaining semi-fluid after death. It is by no means certain, however, that this resemblance is not superficial.

Jequirity has been recommended only for local use. It acts as a powerful irritant to mucous membranes. If taken internally, uncooked and concentrated, it produces vomiting and purgation, the fæces being often bloody. Forty seeds produced these symptoms, with partial collapse, but recovery followed. If it is applied to the eyelids, inflammation quickly ensues, with suppuration usually on the third day. The inflammation is characterized by great swelling and pain. If the applications are continued, there is great systemic disturbance also. The applications have been continued by most practitioners for from three to ten days. Upon their discontinuance, the symptoms usually subside quickly and then disappear, with the removal, or great reduction, of any previously existing pannus. The effect upon conjunctival granules is not so great. In unfavorable cases, ulceration of the cornea and sometimes loss of the eye have resulted, and in severe cases the inflammation has extended over the entire face and even to the salivary glands. Most of such accidents have resulted from the use of too concentrated or bad preparations, or from careless treatment. Nevertheless, the remedy has come to be regarded as a heroic one, and is now not frequently employed. Either an infusion or a powder may be employed, the strength ranging from three to six per cent., and it should be freshly made. The powder should be dusted

upon the inner surface of the lids, or the infusion applied with a camel's-hair brush, or even dropped into the eye.

Henry H. Rusby.

JOINTS, CHRONIC DISEASES OF.—Chronic diseases of the joints can for the most part be considered under one of the two following headings:

I. Diseases affecting the synovial membrane.

II. Diseases affecting the bone.

Other affections, such as those accompanying constitutional affections and miscellaneous conditions demand separate consideration which will be classed for convenience as

III. Miscellaneous.

I. Diseases Affecting the Synovial Membrane.—Chronic inflammation of the synovial membrane is either a continuance of the inflammatory process described under acute synovitis (see article on *Synovitis, Acute*), or it may be, primarily, subacute or chronic. After persisting it is characterized by thickening of the synovial membrane, an increased secretion, and retrograde metamorphosis of the connective tissue. This metamorphosis may develop granulation tissue and attack the cartilage and bone in a degenerative and destructive process, or it may terminate in an alteration and cicatricial change of all the tissues (these have been described in the article on *Arthritis Deformans*), or the process may be chiefly limited to the synovial membrane.

Fig. 2989.—Double Chronic Synovitis of Knees.

(*a*) *Chronic Serous Synovitis* (Dropsy of the joint, Hydrarthros, Hydrarthrosis, Hydrops articulorum chronicus).—The pathological appearances of chronic synovitis vary much, but an increased amount of fluid is always present. Certain cases show no pathological changes beyond this increase of fluid for a long time, and these are the cases which have given rise to the names hydrops, hydrarthron, etc.

The change coming next after the increased vascularity and thickening of the synovial membranes which occurs in acute synovitis is an hypertrophy of the synovial fringes. This varies from a slight hyperplasia to a condition in which fibrous tissue change has set in, and solidified them into a multitude of small fibrous polypi. Meantime the subsynovial tissue has hypertrophied and thickened, to even an inch in some cases, and if the fluid has been long in the joint the synovial membrane and the parts below it look light yellow, pulpy, and boggy. If the effusion has been extreme the capsule has either become enormously thickened or has given way and become much distended. If so, the lateral and internal ligaments, weakened by the continual tension and soaked by the contained fluid, have also stretched, and lateral motion may be found in the knee-joint, even to the extent of 60°. When thickening of the capsule has predominated, cartilaginous and even bony plates may be found in the tissue. The synovial membrane in certain cases begins to encroach upon the cartilage. Normally, it runs into the cartilaginous border for 2 or 3 mm., but now the hypertrophied membrane sends out processes which creep in still farther, as pannus does on the cornea. It may go on to the formation of granulation tissue, but it is not likely that it will. Purulent cases generally follow another type, as will be seen later (Fig. 2990).

Chronic serous synovitis, which begins slowly and not from an acute affection, and which is characterized by the slight pathological changes mentioned above, is an affection whose cause is wholly obscure. It occurs oftenest in young men; it is not associated ordinarily with the rheumatic or any other diathesis, and any attempt to assign a cause is mere speculation. Such cases are oftenest marked by the occurrence of pronounced hypertrophy of the synovial fringes, and a tendency to connective-tissue formation. One phase of the affection is represented by the intermittent form in which the effusion occurs at more or less irregular intervals without obvious cause.

Arthrite Plastique Ankylosante.—There is a form of acute and subacute synovitis which has been described under the acute forms as dry synovitis. This condition is sometimes found as well in the chronic class. It represents an inflammation with a small exudation very rich in fibrin. It is apt to be associated with an infectious cause, as in gonorrhœa. The destruction of the cartilage is slight, and the ends of the bones are soldered together directly by the organized exudation.

II. Joint Affections Beginning in Bone.—The type of degenerative ostitis can be described in a very few words — hyperæmia of the vessels, infiltration from the distended capillaries, and the formation of large spaces (lacunæ of Howship), with absorption of the trabeculæ; fatty degeneration of the bone cells, and their final replacement by embryonic tissue. The mechanism is, then, at hand for any amount of destruction. The greater part of degenerative ostitis of the ends of the long bones follows one type, which is now called tuberculous.

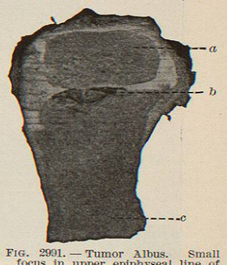

Fig. 2991.—Tumor Albus. Small focus in upper epiphyseal line of tibia. Synovitis of joint but no tuberculous process apart from focus as noted. Death from miliary tuberculosis. *a*, Epiphysis; *b*, primary focus; *c*, shaft. (Nichols.)

This type of disease presents itself ordinarily in the spongy tissue of the epiphyses of the long bones, oftenest near the line of junction with the shaft, sometimes very close to the articular cartilage, however, and sometimes in the

periosteum. It presents itself commonly as a single focus, or at times as multiple foci of diseased tissue (encysted tubercle), rarely as a simultaneous tuberculous infiltration of the whole epiphysis (Fig. 2991).

In the formation of single and multiple foci of disease the first change noticeable to the naked eye is the appearance, in an already hyperæmic spot of spongy tissue, of a small, grayish, rather translucent spot, as small as can be seen, perhaps, which grows more gray and increases in size; and around it a zone of hyperæmic tissue develops, and the neighboring bone becomes a little boggy-looking from an excess of fluid transuded. There is no affection of the synovial membrane, it is purely a localized ostitis, or, more correctly, osteomyelitis (Fig. 2992). The area of disease grows larger, and begins to look, in spots, yellowish, and to show a tendency to cheesy degeneration in the centre; and later in the history of the affection nodules will be found, varying in size from a pea to a hazelnut, filled with a putty-like substance, like the cheesy material found elsewhere in the body, except that here it contains spicules of bone from the trabeculæ, and in the larger foci pieces of dead bone of considerable size. Later in the history of the affection the tuberculous nodule ordinarily breaks down into pus. Oftener than not the original focus is surrounded by smaller tubercles which aid in its extension; but the chief work is done, as we shall see, by the erosive action of the granulations. Sometimes a sequestrum of considerable size may be found in these cavities; the granulations have cut off the source of nourishment from a certain area of bone, and it has died and is loosened from the sounder parts, and lies loose in the cheesy or liquid pus; or a piece of bone too large to be contained in the cavity may die and be detached as a wedge-shaped piece at the end of the tibia. Ordinarily these larger pieces are of a wedge shape, with the base at the end of the bone, the ordinary shape of an infarction. Even the whole epiphysis of the femur may be detached (Fig. 2993). The cavity, it should be noted, is lined by pyogenic membrane; at first it is soft and gelatinous, later it becomes more resistant and tougher. If the retrogressive metamorphoses take place, the surrounding tissue takes on a sclerosis, a sort of scar formation.

From this stage of the process any one of three courses is possible: the diseased focus may be absorbed and so

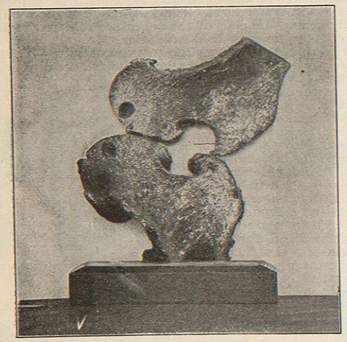

Fig. 2992.—Focus of Disease in Head of Femur.

cured; it may extend to the periphery of the bone and break through the periosteum and empty itself there; or lastly, and probably most commonly, it may extend to the joint and infect that.

In other cases the original invasion of the bone tissue is less focal and more diffused—the epiphysis becomes more pale and later yellow in certain portions which degenerate (Fig. 2994).

Microscopic examination of the contents of the degenerated spots shows a typical tuberculosis.

The tubercles are found in a dense plasma composed of a great quantity of amorphous matter, fatty and calca-

Fig. 2993.—Separation of the Head of the Femur at the Epiphyseal Line.

reous granules, and leucocytes. Outside of this one sees enlarged bone spaces, atrophy of the trabeculæ, fatty-degenerated bone cells, becoming embryonic tissue as one nears the seat of disease. In short, the changes are those which we have seen accompanying long-continued hyperæmia in bone, and which constitute rarefying ostitis.

With regard to the ultimate infection of the joint from the epiphyseal focus, the process is easily understood. The seat of the disease is ordinarily not far from the cartilage when it is beginning, as we have seen; it excites no joint inflammation, but when it reaches a certain stage, even before it breaks into the joint, inflammatory reaction in the joint begins. This is perfectly well established in one of Lannelongue's early autopsies: in a case of early hip disease, a focus the size of a pea was found in the epiphysis, 2 mm. from the cartilage; it was caseous and did not in any way communicate with the joint, yet although there was no effusion the capsule was thickened, the synovial membrane in parts thickened and fungous, and the round ligament already vascular and fungous. The cartilage in certain parts was thinner and losing its elasticity. One other of his autopsies and the early resections of Volkmann show the same point, even more advanced joint changes being found than Lannelongue's autopsies showed, viz., increased synovial fluid, swelling of periarticular structures, and thick and red synovial membrane.

"The danger to the joint begins with the softening of the cheesy masses" (Volkmann). When once the pus has broken through the softened and degenerated cartilage and has reached the synovial membrane, a purulent synovitis is at once started up which speedily assumes a fungous and destructive character, and a "panarthritis" has begun. Thickening of the capsule, infiltration of the periarticular tissues, and thickening of the ends of the bones follow quickly, and abscess formation and all the other complications are ready to follow. It matters little now whether the process began in the synovial membrane or the bone; this stage being the same in its clinical appearances and its capability for evil. Any amount of destruction is of course easily possible—erosion of the articular surfaces, spontaneous subluxations and luxations of the joints, cold abscesses of any extent reaching the surface and continuing to discharge by many sinuses;

and, worst of all, from the local disease comes the dissemination of general tuberculosis, or tuberculous meningitis, or phthisis.

Sometimes, however, the focus is so situated that the line of least resistance takes it to another part of the bone surface away from the joint; Volkmann showed clearly that this was no very uncommon occurrence. As it reaches the periosteum the latter thickens and inflames, and, finally softening, allows the pus from the original focus to pass into the periarticular structures, there to form an abscess which must be evacuated externally or break.

There are certain variations of the above condition. *Arborescent tuberculous synovitis* in which the synovial membrane is covered with branching tags consisting of vascular tissue containing tubercles. *Solitary tuberculous nodules* of the synovial membrane, mentioned by Cheyne, Krause, König, and Riedel. Tuberculosis may be shown by *rice bodies*. *Hydrops articulorum tuberculosis* is the name given by König to a condition of chronic effusion, said to be primarily synovial, in which at first there is no marked thickening of the synovial membrane, while later it may present all the characteristics of a typical tuberculous synovitis. *General miliary tuberculosis of bone* may occur in connection with general miliary tuberculosis.

The generalization of tuberculosis from a diseased joint in the human subject is a process unfortunately of such common occurrence that it can be passed over very briefly, and it shows even more clearly than experimental inoculation the relationship of tuberculosis and this class of joint diseases. A few figures may show the great liability of this. Billroth found that fifty-four per cent. of patients dying with this form of joint disease die of acute miliary tuberculosis; Jaffé, that fifty-three per cent. of the deaths are from general tuberculous infection. Grosch's extensive statistics show that in hip disease tuberculosis is, in spite of antiseptic precautions, the commonest cause of death. Nor does the removal of the diseased joint seem to diminish this liability very much. König did 117 resections for this class of joint disease, and of 25 deaths he found 18 due to general tuberculosis, and 9 more patients hopelessly tuberculous; and he has called attention to the danger of "operative tuberculous infection," when, by opening the lymphatic and blood channels in an operation which at the same time stirs up the focus of disease, tuberculous material is carried over the body and general tuberculosis results.

Caumont found no preventive effect in resection, for in twenty-six cases of hip disease, treated expectantly, one-

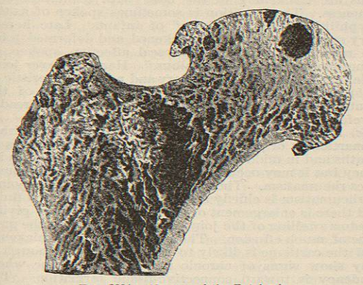

Fig. 2994.—Abscess of the Epiphysis.

fifth died of generalized tuberculosis, while twelve others were resected and one-third died of the same cause.

The frequency with which different joints are affected can be learned only by the consideration of large groups of cases. Schuller gives the following table from 439 cases of Socin and his own: Knee, 35.8; hip, 15.9; elbow, 12.7; tarsus, 11.8; foot, 9.6; hand, 6.2; shoulder, 4.1 per cent., etc.

Billroth and Menzel in 1,996 cases found the distribution as follows: Vertebral column, 35.2; knee, 11.9; head bones, 10.2; hip, 9.4; sternum, clavicle, ribs, 9.3; ankle and foot, 7.5 per cent.

Gibney, in 614 cases, mostly in children, found 209 cases of spinal disease; 271 cases of hip disease; 103 cases of knee disease; 31 cases of ankle disease.

At the New York Orthopedic Dispensary, dealing also almost wholly with children, from 1884 to 1886 inclusive, there were observed: 2,644 cases of chronic joint disease of this type, in which there were 1,178 cases of hip disease; 1,024 of vertebral disease; 83 of ankle disease; 319 of knee-joint disease; 7 of wrist disease; 11 of elbow disease; 11 of shoulder-joint disease; 11 of multiple joint disease.

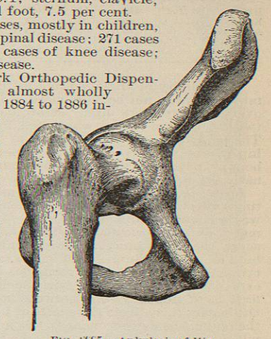

Fig. 2995.—Ankylosis of Hip.

At the Children's Hospital, Boston, in the years 1890–1898 inclusive, there were treated in the wards and out-patient department 3,018 cases of chronic tuberculous joint disease. The distribution was as follows: Hip, 1,284; vertebræ, 1,169; knee, 380; ankle, 119; elbow, 28; shoulder, 14; phalanges, 10; wrist, 10; sacro-iliac, 4.

Age. Tuberculous joint disease is pre-eminently a disease of childhood. It is rarely, if ever, congenital, and under one year it is not common. Of Gibney's 860 cases, already alluded to, 84.5 per cent. of all cases occurred before fourteen. Of 619 cases of hip disease tabulated by Wright, there were:

Under 6 years	40	cases.
From 6 to 10 years	110	"
" 10 to 15 "	129	"
" 15 to 20 "	66	"
" 20 to 25 "	39	"
" 25 to 30 "	17	"
" 30 to 35 "	9	"
" 35 to 40 "	4	"
" 40 to 50 "	3	"
" 54 to — "	1	case.
Total	418	cases.

Two years and under	28	cases.
From 2 to 5 years	62	"
" 5 to 10 "	81	"
" 10 to 14 "	30	"
Total	201	"

Mr. Bryant has tabulated 360 cases as follows:

Under 4 years	126	cases.
From 5 to 10 years	97	"
" 11 to 20 "	86	"
" 21 to 30 "	27	"
" 31 to 40 "	13	"
Above 40 years	11	"
Total	360	"

Taking Mr. Wright's and Mr. Bryant's cases, and adding 365 others reported by Dr. Sayre, we have 1,344 cases of hip disease, of which 1,000 occurred under fifteen years of age. This is perfectly natural, for the tuberculous diseases affect the growing epiphysis or the epiphyseal junction during the period of activity, and tuberculosis of all sorts is common in childhood.

The records of the New York Orthopedic Dispensary show the liability at different ages in the cases of joint diseases of the leg treated for the years 1884–1886:

	Under 3.	3–5.	5–10.	10–15.	15–20.	Over 20.
Hip	115	316	509	140	47	51
Knee	43	69	94	28	22	63
Ankle	12	18	24	18	4	7
	170	403	627	186	73	121

The liability of the aged to tuberculous joint disease must, however, not be overlooked. The fact that people over sixty are more often "scrofulous" than people between thirty and fifty, was noted by Sir James Paget. The patients may be seventy-five or ninety, and cases of hip disease present the same pathological appearances here as in young children. The course of the disease is naturally more rapid and destructive than in the young.

Infectious Osteomyelitis.—Infectious osteomyelitis sometimes affects the epiphyses of the long bones, and in that way secondarily infects the joints. It begins in the bone marrow or the periosteum. The marrow becomes hyperæmic, the periosteum infiltrated and thickened; then in both are seen beginning foci of pus, and sometimes hemorrhages in their tissue; soon pus formation obscures everything, and the bone fairly melts away; large collections of pus may form between bone and periosteum. Ordinarily this affects the shafts of bones, but sometimes the epiphysis, and secondarily the joint, become infected when the foci of disease are near the joint; like the tuberculous foci, they tend to infect it.

Of bacteria the staphylococcus and streptococcus are most commonly seen, although pneumonia, typhoid, and colon bacilli have been found. There are cases in which infection occurs, but absorption takes place before the occurrence of suppuration; thrombosis of the veins of the bone marrow or metastatic abscesses may occur. If the epiphyseal cartilages are attacked, especially in young children, separation of the epiphyses may take place. The clinical symptoms are those of a severe constitutional disturbance attended by high fever, chills, severe pain, and rapid exhaustion. If the joints are involved there may result ankylosis, subluxations, and distortions.

It is probable that many, if not most of the cases described as the "*Acute Arthritis of Infants*" belong pathologically in this divistion. Of 71 cases of this condition

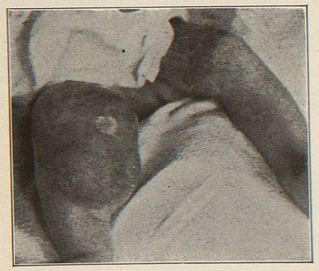

Fig. 2996.—Acute Arthritis of the Knee.

analyzed by Townsend, 20 were less than four weeks old, 10 were less than eight weeks, and 6 were in their third month (Fig. 2996).

Tumors which affect the ends of the bone may involve and impair the joints. They include those of connective-tissue type, fibrous, mucoid, cartilaginous, osseous, sarcoma, osteo-sarcoma, carcinoma, angioma, hæmatoma, echinococcus cyst, and aneurism. Exostoses, when they occur, impede the motion of the joints; chondromata are also seen. Myxomata and lipomata are rare. Joint sarcomata affect chiefly young subjects from fifteen to twenty or twenty-five years of age. The joints commonly affected are the knee, the shoulder, and the wrist.

III. Miscellaneous.—Certain constitutional affections are attended by joint manifestations. The principal ones are as follows:

(*a*) Syphilis.
(*b*) Arthritis deformans.
(*c*) Rheumatism.
(*d*) Gout.
(*e*) Acute infectious diseases.
(*f*) Gonorrhœa.
(*g*) Pathological conditions of the nervous system.
(*h*) Hæmophilia, scurvy, etc.
(*i*) Functional affections of the joints.
(*j*) Inflammation of bursæ.

(*a*) *Syphilis.*—Joint inflammations in syphilis occur at three stages of the disease: (1) in the early secondary stage; (2) in the tertiary stage; (3) in hereditary syphilis. Each of these forms must be mentioned separately.

(1) Coincident with the early general manifestation of the disease there is occasionally, though not commonly, noted a simple serous synovitis. This condition may pass on to a chronic hydrops.

(2) In the tertiary stage a chronic serous synovitis may be present, accompanied by capsular thickening and a tendency to contraction and fibrous ankylosis. This may be due to the development of gummata in the perisynovial tissues, with chronic hyperplastic synovitis, and later, cartilage destruction. And secondly, the development of gummata in the bone and a secondary affection of the joint.

(3) Hereditary syphilis is more often attended by bone complications than are the other forms. Chronic serous synovitis, sometimes due to bone lesions, occurs. The type described by Clutton occurs in children from eight to fifteen as a symmetrical swelling of the knees accompanied by considerable thickening but little effusion.

The osteochondritis of Parrot is the most characteristic manifestation of hereditary syphilis. Thickening of the cartilage of the epiphysis occurs with irregularity in the zone of ossification; separation of the epiphysis may occur as the result of this as well as of chronic synovitis, sometimes purulent. This condition may be found in dead-born syphilitic children. The clinical manifestations are thickening of the bone with tenderness and lameness. The condition is sometimes spoken of as the "syphilitic pseudo-paralysis" of infants. Late hereditary syphilis may show a thickened and deformed joint the result of a similar epiphyseal affection spoken of sometimes as "false tumor albus." Here whatever joint inflammation exists is secondary and not characteristic.

(*b*) *Arthritis Deformans.*—A chronic affection of the joints occurs in connection with this disease. The reader is referred to the article on *Arthritis Deformans.*

(*c*) *Rheumatism.*—The affections of the joints are either monarticular or polyarticular. The condition occurs in youths and in middle-aged people; it is infrequent in infancy but it may occur. In infants scurvy closely simulates rheumatism. The synovial membrane of the joints in rheumatism is chiefly attacked, it secretes much fluid, and there is enlargement of the presynovial tufts giving rise to a swelling of the joint without necessarily the presence of much effusion. The capsule becomes thickened and the cartilage is likely to remain intact, although it may show signs of chronic inflammation. The whole tendency is toward connective-tissue formation. The clinical symptoms are pain, enlarged joint, swelling, and stiffness. Antirheumatic treatment has a beneficial effect on the condition.

(*d*) *Gout.*—The joint affection in this disease usually begins as an acute attack and is followed by a chronic inflammatory process increased by constant exacerbations.

The joint affection is dependent upon the constitutional disease. The synovial membrane presents first the appearance of acute inflammation, later that of permanent thickening; the cartilage also shows this tendency, and in the capsule of the joint and periarticular structures there appear localized deposits of urate-of-soda crystals, "tophi." There is little tendency to suppuration. The commonest seat is the metatarso-phalangeal joint of the great toe, then the hands, knee, and elbow. The affected joints are enlarged, reddened, stiff, and painful.

(*e*) *Joint Complications in Acute Infectious Diseases.*—The acute infectious diseases in which joint complications occur are as follows: measles, scarlet fever, smallpox, typhus fever, typhoid fever, cerebro-spinal meningitis, pneumonia, dysentery, diphtheria, erysipelas, epidemic parotitis, pertussis, puerperal fever, pyæmia, septicæmia, after the use of catheters and sounds, and possibly in malaria.

The lesions are now almost universally attributed to the presence in the joints of micro-organisms of infectious character. Micro-organisms are found in the diseased joints. It seems as if the question of whether the synovitis were to be a mild serous one, or a violent destructive purulent form, was determined by the kind of micro-organism that reaches the joint, rather than by the especial infectious disease which may be present. In serous effusions one finds the organisms which characterize the especial disease present, and in greater or less number different forms of pyogenic cocci; whereas in purulent and phlegmonous processes one finds exclusively such organisms as staphylococcus and streptococcus pyogenes in enormous numbers. It is suggested that the synovitis of rheumatism is of the same character, but no evidence in support of the theory has been adduced. The affection may be serous or purulent, mild or severe. It must be mentioned that certain cases of joint tuberculosis seem to have their origin after the acute exanthemata.

(*f*) *Gonorrhœa.*—Inflammation of the joints may occur in the later stages of gonorrhœa and is commoner in men than in women. The condition may be acute or chronic and most often is polyarticular. There may be effusion which, if serous, is thick and may contain clots of fibrin, or it may be sero-purulent or colored with blood, and the gonococcus has been demonstrated in the joints, although it may be absent. The commonest types of inflammation are arthralgia, acute and chronic synovitis, periarticular inflammation, with joint effusion absent or subordinate, and tenosynovitis about the joints. Impairment of motion and ankylosis are liable to result, and the affection is always slow in progress, resistant to medication, and serious. The treatment consists of rest by fixation, counter-irritation, hot-air baths, and massage. If the condition proves obstinate, incision and irrigation of the joint are indicated and suppuration demands incision.

(*g*) *Pathological Conditions of the Nervous System.*—A destructive form of joint disease may be associated with tabes dorsalis, syringomyelia, acute myelitis, cerebral apoplexy, injury of a peripheral nerve, tumors of the cord, crushing of the cord, progressive muscular atrophy, and anterior poliomyelitis. These affections are called Charcot's disease, spinal or neuropathic arthropathy, neural arthropathy, etc. (Fig. 2997). The condition is most often monarticular and usually attacks adults, although patients as young as six years have been reported. The pathology is much like that of arthritis deformans, only the destructive process is more active and the formative one less so. The essential character of the condition is the rapid melting away of cartilage and bones. Swelling, effusion, disability, and sometimes pain are the first symptoms; spontaneous arrest may occur, ankylosis rarely results, and the joint may be disorganized to the point of luxation. Excision in some cases affords relief, but the treatment must be expectant and protective.

(*h*) *Hæmophilia and Other Conditions.*—Hæmophilia is at times characterized by characteristic joint lesions clinically resembling tuberculosis in their general appearance. After repeated acute attacks of hemorrhage into the joint, chronic changes are likely to ensue, which consist of synovial proliferation, degeneration of cartilage, and erosion

Fig. 2997.—Charcot's Disease. (Weigel.)

of the ends of the bones in severe cases with a proliferation at their edges not unlike arthritis deformans.

Pain, swelling, and muscular spasm are the clinical manifestations.

The treatment consists of protection and fixation during the acute stages.

Scurvy.—In scurvy the joint condition simulates closely epiphysitis and rheumatism, especially in young children. There is thickening of bone due to subperiosteal hemorrhage, and the condition responds readily to anti-scorbutic treatment.

Pulmonary Hypertrophic Osteo-arthropathies represent a condition which is manifested by clubbing of the fingers and by stiffened, thickened shafts of bones. The spine is bent forward in kyphosis. The relation to acromegaly and osteomalacia is not clear. The joints are swollen and painful, and there may be synovitis and periostitis.

(*i*) *Functional Affections of the Joints.*—Under the names of hysterical joints, joint neurosis, neuromimesis, etc., is described a condition characterized by pain and often disability for which no objective cause can be found in the joint. The affection resembles in many of its aspects organic joint disease, but it has no pathological basis. It affects most often young women, and sometimes children, and simulates at times rather closely in its symptoms the symptoms accompanying real disease of the same joint.

The diagnosis has to be made with much care. The muscular spasm varies, and is partly voluntary, atrophy is less, joint effusion is not present, and the diagnosis has to be based on a lack of correspondence between the severe subjective symptoms—pain, tenderness, sensitiveness—and the absence of evidence of organic changes—inflammatory destruction of bone, characteristic distortion,