hot sand, a method used by Haygarth. None of these methods can be relied upon, however, unless they are thoroughly carried out; half-way measures are more likely to do harm than good.

The hot-air treatment has been much resorted to of late and has yielded excellent results in some cases. It is applied by means of an apparatus devised for the purpose. This consists of an asbestos-lined cylinder which is provided with a lamp to heat the air and a thermometer. The joint to be treated is loosely but closely wrapped in a Turkish towel and thrust into the cylinder, where it rests on a hammock-like support. A canvas sleeve attached to the cylinder is drawn close around the limb to prevent the escape of heat. The lamp is then lighted and allowed to burn until the thermometer registers from 250° to 300° F., when it is regulated to maintain the temperature for from a half-hour to an hour. This should be followed by passive motion of the joint and massage of the muscles. The treatment is to be repeated at intervals varying from a half-day to several days, according to the condition of the patient and the effects produced. Lindemann [52] has recently invented an apparatus for this treatment, which he calls an "Elektrotherm." The heat is produced by electricity and may be applied to the entire body or to any part of it. From its use he reports excellent results in deformative arthritis of long standing.

Whatever benefit is obtained from the hot-air treatment is doubtless due to its effect upon the circulation of the part, the chief element of which is probably a persistent dilatation of the blood-vessels. On account of the possible disturbance of the general circulation and the elevation of the general temperature, the duration of the treatment should be carefully regulated to suit the physical condition of the patient. All local measures should be employed with caution in the presence of acute symptoms; they may be applied with more vigor in advanced cases.

The application of electricity is considered beneficial by some authorities but useless by others. The faradic current may be used for its action on the muscles and the galvanic for its effects on the nervous system. When the latter is applied, a mild current with slow interruption should be passed through the affected nerve trunks, through the nape of the neck, and through the dorsal region. Static electricity has also been employed in various ways Morton [53] claims that the high potential high frequency current will arrest the progress of the disease at any stage, the result being secured more slowly in proportion as the disease is more advanced. He recently exhibited skiagraphs to demonstrate the benefits of treatment by what he calls the "electric wave" current.

Internal medication is of little benefit except in the early stage of the disease or during acute exacerbations. Anodynes are then sometimes necessary, opiates should be avoided if possible. Chloral, highly recommended by some writers for the relief of pain, is also objectionable on account of the possible development of a habit. The salicylate of soda is effective in the relief of acute symptoms in some cases, but it is liable to do harm if too continuously administered. It is the custom of many physicians to administer iodine or one of its compounds, and by many authors this is regarded as the most beneficial of all remedies, but the results obtained by others have not been uniformly satisfactory. The syrup of the iodide of iron is probably the best means of administering it, since the iron exerts an influence upon the anæmia that is usually present. It is of especial value in the arthritis of children. It may be advantageously combined with arsenic in the form of liquor sodii arseniatis. The tincture of iodine is preferred by some authorities and many instances of marked benefit have been reported from the use of arsenic alone.

Other remedies have been vaunted for a time or by individual observers, but they have failed to stand the test of time. Even Brown-Séquard's elixir was resorted to with supposed benefit, and it is not surprising that the ovarian extract has recently been recommended.

Whatever the treatment adopted in a given case, one fact should be borne in mind, namely, that not days nor weeks, but months, must elapse before a verdict can be pronounced upon its results. *James M. French.*

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ARTHROLOGY.—That part of anatomy which treats of the joints or connections between the denser parts of the skeleton. By means of these joints, or articulations, the skeleton, originally an apparatus for support, becomes an apparatus for locomotion. In its primitive condition the human skeleton is without joints, being represented, in the human fœtus before the fifteenth day, by a simple non-jointed rod of condensed embryonic tissue called the notochord, a form permanent in the lowest vertebrate (amphioxus). This becomes ensheathed with tissue, which is the matrix of the more complex skeleton (Fig. 329). The substance of this sheath changes to cartilage at regular intervals, thus becoming segmented (Fig. 330). Vestiges of the notochord are found in the adult as pulpy masses within the discs

which unite the vertebræ. Elsewhere in the human body joints are formed in a similar way. Rods are laid down and then segmented by the differentiation of certain portions into cartilage, which may afterward ossify. The structures by which union is effected at the joints may, therefore, be considered as the altered remains of the original skeletal matrix. Around the segments this matrix remains as fibrous tissue, termed the perichondrium, becoming periosteum when ossification ensues,

FIGS. 329 and 330.—Formation of Primitive Joints.

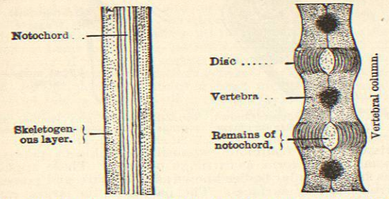


FIG. 329.—Notochord without Joints. (Fœtus fifteen days.)
FIG. 330.—Joints Derived from It. (Child at birth.)

and between the segments it occurs as similar fibrous tissue, changing to fibro-cartilage in certain cases. When in the form of bands, straps, or membranous sheets, these transegmental structures are termed ligaments. They may unite not only the apposed ends of segments, but also the related sides. Sheets of this sort passing laterally from one bone to another in the same plane are known as interosseous membranes. Examples are seen between the radius and ulna, and between the tibia and fibula. The entire ligamentous system is closely connected with the fasciæ, of which it may be considered a specialization (see *Fascia*).

The prime characteristic of joints is, therefore, the movements which become possible by reason of segmentation. These movements vary according to the varying functions of the segmented members, and thus pro-

FIGS. 331 and 332.—Synarthrodial Joints.

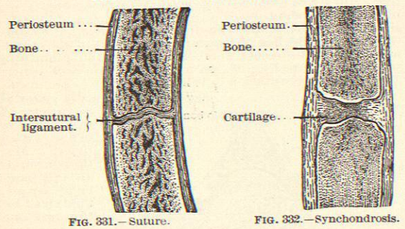


FIG. 331.—Suture.
FIG. 332.—Synchondrosis.

duce corresponding modifications of structure in the parts composing the joint. Upon these modifications the classification of joints depends. In all joints there is originally sufficient intersegmental tissue to permit slight and limited motion. Such are called primitive or amphiarthrodial joints. Examples occur in the adult between the bodies of the vertebræ (Fig. 330). In the course of development the osseous or cartilaginous tissue of the segments usually tends to encroach more and more upon the intersegmental structure. If no alteration occurs in this, the joint becomes less and less movable until complete fixation ensues. It is then termed synarthrodial or immovable. Examples are seen in the adult skull. The process may be carried so far as wholly to obliterate the joint. When the connecting substance is fibrous, the joint is termed a suture (Fig. 331); when cartilaginous, a synchondrosis (Fig. 332). Strictly speaking, the union of the shaft of a long bone with its epiphysis is a synchondrosis. There being no strain caused by movement in this class of joints, the periosteum passes over the intersegmental tissue without thickening into ligamentous structures.

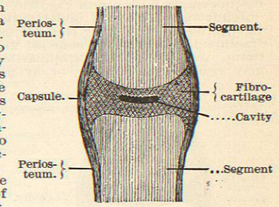


FIG. 333.—Formation of Synovial Cavity.

In by far the greater number of cases the intersegmental tissue becomes altered. Between certain of the cells, vacuoles or small cavities form (probably by the enlargement of the lymph lacunæ of the connective tissue), and these join together, making a larger cavity or cleft. The cells immediately around the cavity form a secreting surface, the synovial membrane, the product of secretion being a glairy fluid called synovia. The membrane resembles the similarly formed serous membranes of the body, as well in structure as in great vascularity, and in liability to sudden and dangerous inflammations. Synovial cavities are formed not only between the apposed segments of a joint (Fig. 333), but also where tendons rub over hard surfaces, or where the skin is closely applied to such surfaces and friction is frequent (see *Bursæ*). Small and imperfect synovial cavities exist in a few amphiarthrodial joints, but usually the joints where they occur are freely movable throughout their extent, and are, therefore, called diarthrodial. The intersegmental tissue may not be wholly obliterated by the cavity. When the movement of the segments is perfectly regular and small in amount, it may remain as a central band with a cavity on each side and ligamentous structures surrounding the whole, forming a capsule or envelope. This is a peculiarity of the articulation of the heads of the ribs with the spine (Fig. 334). When the movement is such that the articular surfaces do not correspond, a synovial cavity is sometimes formed along the surface of each segment, leaving an intervening disc of fibrous tissue, which becomes partly cartilaginous and is then known as an interarticu-

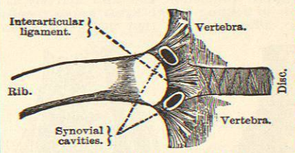


FIG. 334.—Costo-Vertebral Joint.

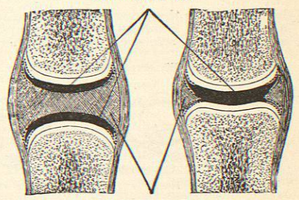


FIG. 335.—Formation of Arthrodial Joints.

lar fibro-cartilage (Fig. 335). Example, lower jaw joint. The disc may become thinned and disappear in the centre, leaving a ring (Fig. 335 shows this in vertical section). This occurs in the knee joint. Its complete disappearance is shown in Fig. 336.

Joints may be formed under pathological conditions, the process being similar to that just described. After fracture the ends of the bone are first united by fibrous tissue, constituting an amphiarthrodial joint, which may remain permanently, or by process of repair be converted into synarthrodial and finally disappear; or, if mobility of the apposed ends be not restrained, there may be developed a false arthrodial joint with synovial membrane and ligaments formed from the surrounding connective tissue.

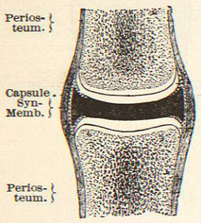


FIG. 336.—Fully Developed Arthrodial Joint.

The action and relations of muscles are important factors in shaping and otherwise modifying joints. By surrounding they afford protection, and also actively assist the ligaments in holding together the apposed ends of the segments; differing in this, that their tension can

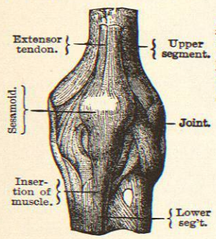


FIG. 337.—A Sesamoid (Knee Joint).

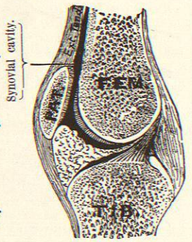


FIG. 338.—Planiform or Gliding Joint (Patello-Femoral). Sliding and coaptative motion only.

be adjusted to the stress placed on the segments. They are invariably attached so as to support the articular surfaces with reference to each other, never pulling

FIGS. 339 and 340.—Pivot Joint (Atlo-Axoid). Rotation only.

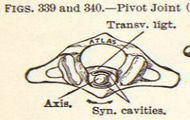


FIG. 339.—Top View.

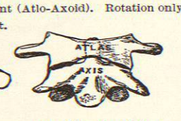


FIG. 340.—Front View.

them apart. Dislocations are therefore more likely to occur if the force is applied suddenly, before the muscles can be put in action, and are rare among professional athletes. Advantage is taken of this peculiarity of the muscles in reducing a dislocation, this being much more easily done when the patient is taken off his guard, or when resolution of muscular force is produced by an anæsthetic. Expansions from the tendons of muscles strengthen and support the joints, uniting with the joint capsule. When the strain put upon these expansions is habitually great, as in case a tendon passes over the angle made by the two segments, the connective

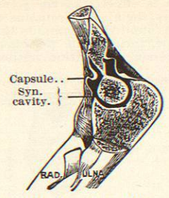


FIG. 341.—Hinge Joint (Elbow). Angular motion in one plane.

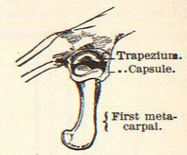


FIG. 342.—Saddle Joint (Thumb). Angular motion freest in two planes.

tissue of the tendinous expansion is liable to take on some denser form, as cartilage or bone. These appear as small nodular bodies known as sesamoids, and possess true articular surfaces. The patella is the largest and most notable example of these (Figs. 337 and 338). The shapes of articular surfaces depend mainly upon the direction and preponderance of the muscular force applied to the segments. The simplest movement possible is the sliding of one nearly plane surface upon another. This is the ordinary movement of the sesamoids. Joints in which this is the prevailing movement are called planiform or arthrodial (Fig. 338). There are, however, no articular surfaces that are perfectly plane, there being no situation where a pulling force is applied in a continuous straight line throughout the extent of the movement. For this reason there is also found in planiform joints a slight rolling of convex surfaces on each other. This is called coaptation. When the surfaces are markedly curved a variety of movements may take place. Motion around an axis passing longitudinally through one of the segments is called rotation. Pivot joints (trochoides) possess only this movement, and are exemplified in the atlo-axoid and superior radio-ulnar articulations (Figs. 339 and 340). Bending the segments so as to alter the angle they make with each other is called angular movement. When lateral,

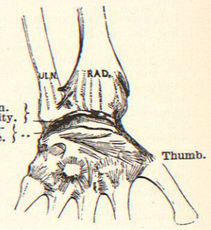


FIG. 343.—Pommel Joint (Wrist). Angular motion in all planes.

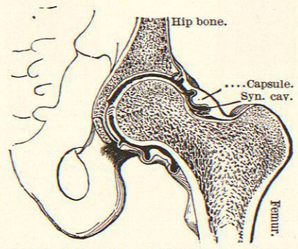
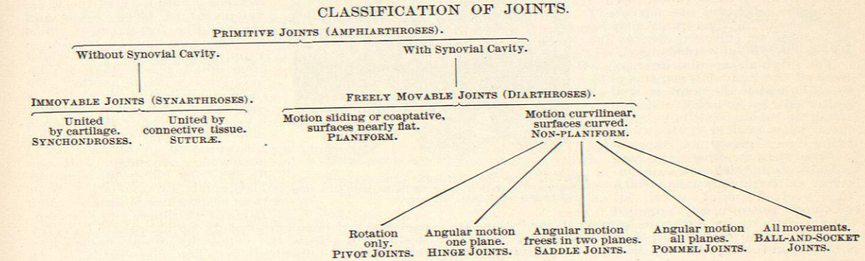


FIG. 344.—Ball-and-Socket Joint (Hip). All movements.

to or from the axis of the body or limb, it is further distinguished as adduction and abduction; when forward or backward, folding or unfolding the segments, as flexion and extension. A hinge joint (ginglymus) is one in which such motion is allowed in a single plane only. The elbow is the best example (Fig. 341). The shape of the surfaces may allow free angular movement in some directions while limiting it to some extent in others. In the saddle joint (Fig. 342), and the pommel joint (Fig. 343), the motion is freest in two planes at right angles to each other. In the former, each surface is convex in one plane and concave in the other; in the latter, the surfaces are reciprocally ellipsoidal. These two classes of joints allow all movements except rotation, it being possible to perform circumduction or such swinging of the distal segment through a series of angular positions as to make it generate a conical surface. When the joint consists of a head nearly spherical received into a closely fitting cavity, it is known as a ball-and-socket joint (Fig. 344), in which great freedom of motion is allowed, all movements being possible.

The following table shows how joints may be classified according to a genetic system:

CLASSIFICATION OF JOINTS.



The following is a list of the joints of the human body arranged upon the foregoing principles of classification. As in all natural classification, perfectly clear and sharp distinctions do not exist, many joints being somewhat mixed, blending the characters of two or more classes.

TABLE OF THE JOINTS.

ORDER I.—PRIMITIVE JOINTS, OR AMPHIARTHROSES.

Class 1.—*Without a Synovial Cavity.*
- Intervertebral—of bodies.
- Lumbo-sacral.
- Sacro-coccygeal.
- Sternal.

Class 2.—*With an Imperfect Synovial Cavity.*
- Sacro-iliac.
- Interpubic (symphysis pubis).

ORDER II.—IMMOVABLE JOINTS, OR SYNARTHROSES.

Class 1.—*Sutures.*
- Joints between the bones of the skull, except occipito-sphenoid and ethmo-vomerine.

Class 2.—*Synchondroses.*
- Occipito-sphenoid.
- Ethmo-vomerine.
- Chondro-sternal of first rib.
- Costo-chrondral.
- Costo-vertebral (costo-central).
- Costo-vertebral (costo transverse).
- Chondro-sternal, second to seventh ribs.
- Interchondral, sixth to ninth costal cartilages.
- Sterno-clavicular.
- Acromio-clavicular.
- Radio-ulnar, inferior.
- Carpal—between single bones.
- Carpo-metacarpal, except thumb.
- Intermetacarpal.
- Patello-femoral.
- Tibio-fibular, superior and inferior.
- Tarsal, except astragalo-scaphoid and calcaneo-cuboid.
- Tarso-metatarsal.
- Intermetatarsal.

Class 2.—*Pivot Joints, or Trochoides.*
- Atlanto-axial.
- Radio-ulnar, superior.

Class 3.—*Hinge Joints, or Ginglymi.*
- Elbow joint (humero-cubital).
- Phalangeal, of hand.
- Knee joint (femoro-tibial).
- Ankle joint (tibia and fibula with astragalus).
- Phalangeal, of foot.

Class 4.—*Saddle Joints.*
- Carpo-metacarpal, of thumb.
- Calcaneo-cuboid, of ankle.

Class 5.—*Pommel Joints* (*Condyloid*).
- Temporo-maxillary.
- Occipito-atlantal.
- Radio-carpal.
- Intracarpal (os magnum with semilunar and scaphoid).

Class 6.—*Ball-and-Socket Joints* (*Enarthrodia*).
- Shoulder joint (scapulo-humeral).
- Metacarpo-phalangeal.
- Hip joint (coxo-femoral).
- Tarsal, astragalo-scaphoid.
- Metatarso-phalangeal.

An examination of the intimate structure of adult joints involves, (1) the ends of the segments (usually bones); (2) the articular cartilages which protect them; (3) the fibro-cartilages which, when present, adapt the surfaces to each other; (4) the ligaments which prevent their separation; (5) the synovial membranes which by their secretion lubricate the joints.

At joint surfaces pressure and movement occasion a modification in the ordinary structure of bone. The ends are enlarged and the surfaces are of extremely compact tissue, protected by a layer of hyaline cartilage, the remains of the original cartilage from which the bone was formed. Acting as a buffer to break shocks

and to prevent wear, it is invariably thickest where the pressure is greatest (see Fig. 336). Under normal conditions it never ossifies, although in old age and in persons of inactive life it becomes thinned and infiltrated with lime salts. Should it slough, the bone becomes rapidly worn smooth (eburnated) and the joint is disabled. The superficial cells of the cartilage are flattened, but in the deeper parts they multiply in the line of the greatest stress, and are therefore arranged in columns perpendicular to the articular surface (Fig. 345), in which direction a sudden shock may cause the cartilage to split. The fibro-cartilages found in joints are composed of white fibrous tissue, with sparse elastic fibres to impart the necessary resiliency. Their usual form is that of discs or rings attached mainly to the more movable segment, either by their edges (knee, jaw) or by the edge and one surface (hip, shoulder). The rings may be incomplete, enlarging the cavity on one side only (phalanges).

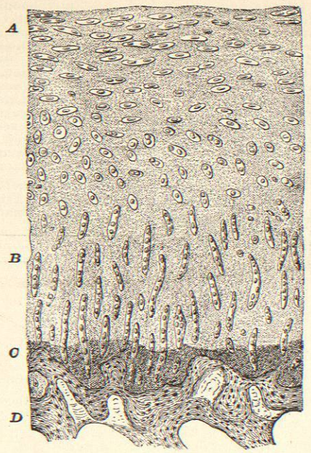


FIG. 345.—Articular Cartilage. (After Sappey.) *A*, Flattened cells; *B*, cells in columns; *C*, region infiltrated with lime; *D*, bone.

The original capsular arrangement of the ligaments remains in cases in which the joint is well protected by muscles and the strain is evenly distributed. In most joints, however, the stress being much greater in some directions than in others, the capsule becomes thickened to counteract it, forming bands which have received special names. Atmospheric pressure, acting against the force of gravity, assists in keeping the articular surfaces applied to each other, thus preventing a constant strain upon the ligaments. An important office of the ligaments is to limit the motion of the segments and prevent the shocks which would otherwise occur from the sudden contact of bony surfaces. In some cases they greatly economize muscular force by holding the joint in a set position. Thus but little force is required to maintain the body erect, as it is supported mainly by the tension of the ligaments of the spinal column, by the ilio-femoral ligament at the hip, and by the posterior, lateral, and crucial ligaments at the knee; these lying always on the convex side of arcs subtended by the line of the centre of gravity (Fig. 346). Owing to their function as limiters of motion, it follows that the position of greatest relaxation for all the ligaments of a joint is one midway between flexion and extension. In case of the distention of a joint cavity by a morbid effusion, the patient involuntarily places the joint is such a position.

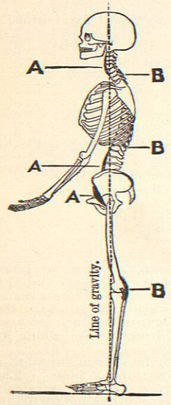


FIG. 346.—Ligaments Supporting Erect Posture. A, Anterior set; B, posterior set.

Synovial membranes originate as continuous and closed sacs, but over the articular surfaces, where pressure occurs, portions of them disappear; so that, at the latter part of fetal life, they merely line the capsule and extend but a short distance upon the cartilages of the joint. In adult age they frequently are further extended by communication with the synovial cavities of neighboring bursæ, and such communications become more frequent and extensive as age advances. They are more lax than the surrounding ligaments, being thrown into folds to increase the blood supply and to pad out intervals, being assisted in this by interstitial deposits of fat. Along the interarticular lines they possess villous processes, or fringes, some of which contain cartilaginous nodules (Fig. 347).

It is at or near the joints that the great vascular trunks divide, an arrangement which is probably connected with the centripetal development of blood-vessels and the bud-like formation of limbs in the embryo. The immediate supply of the joint is obtained from small vessels that anastomose freely with one another. By them the collateral circulation is established when the main trunk is occluded. From these vessels a rich arterial network penetrates the capsule to supply the synovial membrane. Abundant capillaries lie in loops along the synovial folds, and by exudation from them the synovia is formed. The articular cartilages and the compact layer of bone immediately contiguous are normally destitute of vessels, but capillaries rapidly extend into them during inflammation. The fibro-cartilages are stated by Sappey to contain vessels, and may therefore take an active part in inflammatory processes. Lymphatics are numerous near joints. Klein considers the joint cavity itself as a lymph space communicating directly with the lymphatics, and Arnold and Heitzmann claim to have demonstrated a system of lymph canaliculi even in articular cartilage.


FIG. 347.—Synovial Fringes. (× 200.) (Modified from Henle.)

The nerves of joints are distributed mainly to the synovial membrane and the ligamentous structures. It is probable that in these situations special nerve endings exist, as described by Krause and Nicoladoni, for it is difficult otherwise to account for the peculiar sensibility of the structures. A ligament or a synovial membrane may be touched, cut, or pinched without giving much

pain, but if it be stretched beyond its physiological limit, threatening the integrity of the joint, the suffering is excruciating, as is well known to those who have suffered from a sprain or a dislocation. Articular cartilage has no nerves, and the gnawing pain which occurs during its ulceration is probably caused by inflammatory products affecting the nerves of contiguous tissues. A remarkable law of correlation has been noted by Hilton with reference to the nerves of joints, viz.: that they also supply the muscles which move the joint and the skin over the insertion of such muscles; the whole apparatus being thus under the control of associated central influences. There is besides strong clinical evidence of this. Remak and Benedikt have pointed out the strong probability that many diseased conditions of the joints originate in irritable states of the spinal cord and of the sympathetic, and Charcot has published some cases showing remarkable atrophy of the muscles of a joint after an injury to the articular surfaces comparatively slight and inadequate to such a result. Locomotor ataxia is usually accompanied by joint lesions. A few years ago (Ord: Belfast Address, July, 1884) it was shown that many cases of joint disease (rheumatoid arthritis, gonorrhœal rheumatism) are so associated with disturbances of the genito-urinary tract as to make it probable that there is a reflex element of causation in these disorders.

For the anatomy of special joints see the following heads: *Ankle Joint; Elbow Joint; Foot, Joints of; Hand, Joints of; Hip Joint; Knee Joint; Pelvis, Joints of; Shoulder Joint; Skull; Thorax; Wrist.*

Besides the systematic works on anatomy by Quain, Gray, Allen, Sappey, Cruveilhier, Henle, Hyrtl, and Gegenbaur, the following authorities have been consulted in preparing this article:

Morris, William: The Anatomy of the Joints, London, 1879.
Turner: An Introduction to Human Anatomy, Edinburgh, 1867.
Marshall: Anatomy for Artists, London, 1883.
Humphry: The Human Skeleton, including the Joints, London, 1858.
Henke und Reyher: Ueber die Entwickelung der Gelenke, Sitzungsber. der Wiener Acad. der Wissensch., Bd. lx.
Aeby: Der Bau des menschlichen Körpers, Leipzig, 1871.
Martin: Ueber die Gelenkmuskeln beim Menschen, Erlangen, 1874.
Meyer: Die Statik und Mechanik des menschl. Knochengerüstes, Leipzig, 1873.

Frank Baker.

ARTHROPATHIES OF NEUROTIC ORIGIN.—As far back as 1831 the elder Mitchell[1] first described peculiar joint troubles that affected individuals who had suffered from cerebral disease; and in 1846 Scott Alison,[2] of London, more fully described these sequelæ, presenting several cases in which the joints of the paralyzed side only were affected. This arthritis he believed to be due to a condition of the articular surface which results from the diminished vitality of the paralyzed parts and the presence of uric acid, which under such circumstances acted as an irritative agent.

Later, Brown-Séquard[3] and Charcot[4] directed attention to the really important nature of such complications of organic paralysis, and the early researches of Alison, Durand-Fardel, Valleix, Grisolle, and others have been collected and carefully considered by them. Buzzard later investigated these *arthropathies*, especially in connection with locomotor ataxia.

It would appear that such morbid changes are usually associated with those forms of cerebral and spinal disease in which the sensory tracts are most extensively invaded, though this is by no means the invariable rule. They are common in posterior spinal sclerosis and rare in essential spinal paralysis, an affection in which disorders of sensibility are the exception. They are rare in cerebral disease without some ascending degeneration symptomatized by *pain*, and the observations of Charcot regarding the central lesion would bear this out. Arthropathies may be either cerebral or spinal, and the former are much more rare than the latter. They have been observed in connection with coarse brain disease, such as softening, with hemorrhage, tumor, or sclerosis; and are usually early symptoms of established cerebral mischief; especially is this true in the matter of hemorrhage. After a period of from fifteen days to several months after the acute central trouble we find that the joints of the paralyzed hand or foot become affected—the former more often (Charcot)—coincidently with the contractions which mark the advent of rigidity and secondary degeneration. In Alison's cases the knee and ankle were affected.

The joint disturbances begin in one of two ways: (1) Suddenly, the large joints being affected; (2) slowly, the joints of the hand and foot being the parts attacked. In the first form there develops rather suddenly, within a few weeks, a swelling which is unattended by any marked rise of temperature—at least by any such rise as we would expect to find in an acute arthritis of purely rheumatic origin. There are but little local heat and pain, but a great deal of *soreness* when the limb is moved. Jarring produces only inconsiderable suffering. I have never met with the degree of pain described by Brown-Séquard. There is more or less pain produced by pressure over the tendons, the sheaths of which seem to be involved. The joint is greatly swollen, the enlargement being made much more prominent in old cases by reason of the atrophy of muscular masses in the vicinity. There seems to be a deep involvement of the joints and of adjacent parts, and though there may be a synovitis, it is of a low grade, and, as Buzzard[5] has pointed out, there is really great tumefaction, which characterizes the familiar form of chronic synovitis, in which there are three points of swelling, viz.: above the patella, and on either side of the ligamentum patellæ.


FIG. 348.—Arthropathy of Right Knee Joint. (Buzzard.)

The appearance of the affected joint is peculiar. The swollen limb shows a duskiness and hardness in the beginning, and a cold, "white hardness" in the old cases. In some cases there is, after a few days or weeks, a subsidence of the swelling, and then certain osseous changes, to be presently described, take place.

The occurrence of *spinal arthropathy* may follow a variety of conditions. As has been pointed out by Mitchell, it may be connected with Pott's disease, with myelitis (Gull), with tumors of the gray substance of the cord (Buzzard), with posterior spinal sclerosis (Charcot), and with traumatic injury of the cord (Vignes and Joffroy).

According to Charcot the condition is often an early complication of posterior spinal sclerosis, but others think that it belongs to the late stages of the disease. It is quite true that in acute myelitis we may have a rapidly developing arthropathy, but in cases in which it is associated with a tumor of the cord or with locomotor ataxia the affection is a much more slow affair. Charcot believes that those arthropathies which affect the upper extremities in the disease under consideration are always secondary to others involving the lower extremities, and come only late in the disease as a result of extension of the morbid process. Buzzard reports a case which contradicts this, and the author has seen others.

The enlargement in the chronic variety is slow, and a point is finally reached when deep destructive processes begin, the articular surface of the bones being worn away or absorbed, so that movement of the joint on manipulation will produce a peculiar creaking or cracking sound; and when the joint has for some time been the seat of the trouble it is common for luxation to occur. The position of the extremity upon the bed is peculiar, and the patient often presents a most strange deformity. Happily the arthropathy need not always go on to this stage, and it occasionally happens that cures are made.