

either with lithotomy or lithotrity; judging, however, from what I have already experienced in the female urethra, and; on the dead subject, in the male, I am not the least afraid of the result. I shall only add further, that if the operation of lithoplastomy does come up to my expectations, and that of many judicious and talented surgeons here, to whom I have mentioned it, how much will suffering humanity be relieved, and the labours of the surgeon facilitated.

But lest it should be said that the operation of lithoplastomy which I have above described, and so strongly recommended, is nothing more than the apparatus major, the Marian method, that of Le Cat, Le Dran, or Pajola, let any one take a glance at these methods of operating, and the difference must at once strike him. It would extend this communication too much to enter at large on this interesting subject, which, at some future opportunity, I intend to resume; but I must be allowed to say, that, in investigating the writings of a vast number of lithotomists, both ancient and modern, I can find nothing which, in the smallest degree, approaches to the operation I have above described. It is the principle, I once more repeat, of *slow and continued dilatation*, by the *instrument* which I have recommended, applied to the *whole*, or a *small part*, of the *male urethra*, for the extraction of calculi, which alone constitutes my improvement of this part of surgery.

In stricture of the urethra could a very slender lithoplastome, introduced through the constriction, not be made to overcome this more safely and speedily than either the simple or armed bougie, or conical sound? If the instrument cannot be passed through the spasmodic, or organic contraction of this canal, could it not, by its introduction as far as the stricture, and kept steadily in its place, be made, by gentle dilatation, to overcome this disease? or at least allow of armed bougies, or sounds, being more safely made to act in accomplishing their object?

VI. *On the Classification and Structure of the Articulations of the Human Body.* By ROBERT HUNTER, M.D., Professor of Anatomy and Physiology, Andersonian University.

PART II.

Of the Moveable Articulations. The scholastic divisions of the articulations referred to above,* and the barbarous epithets by which they have usually been distinguished, should

* See page 174 of this vol. of the Journal.

for ever be discarded from anatomical science. Such classifications are complex and unnatural, and the repulsive nomenclature so long in use, is only calculated to mystify what is clear, and to render complex what is naturally simple. The eleven kinds of moveable articulations described by anatomists, may be reduced to two—*capsular* and *non-capsular*; or, in other words, into those in which the parts entering into the articulation, are connected by a synovial capsule, and those in which a capsular apparatus is wanting. Betwixt these two classes, there is a broad line of demarcation. Their structure is different, and the motions of which they are susceptible, are executed upon different principles. The one is complex in structure, and the other comparatively simple. In the former, motion is performed by the gliding of smooth and free surfaces upon each other; while in the latter, motion is referrible to the elasticity of a connecting intermedium. The osseous junctions of the upper and lower limbs, are exemplifications of the first, and those of the pelvis and vertebral column, of the second.

I think we are not warranted in making a farther general subdivision. All the non-capsular articulations vary little in their internal conformation; and the capsular, however varied and dissimilar they may appear to be, are formed on two principles only. I shall confine myself at present to the examination of the capsular articulations.

Of the Capsular Articulations. The textures that enter into the formation of the capsular joints, are numerous and diversified, and some difference of opinion respecting them exists among anatomists. Some of those textures are of primary, and others of secondary importance. I would call those primary, which are found in all the joints; and those secondary, which are confined to a few of them. The primary textures I conceive to be bone, cartilage, synovial membrane, and ligament; the secondary textures being confined to the fibro-cartilages.

I consider *bone* as a primary part of a joint in the human subject, for it constitutes the essential part of the skeleton, and the joints are formed by the union of the osseous pieces. The articulating surfaces of the osseous pieces are beautifully adapted to each other, and all the other textures which enter into the joints are arranged to suit the osseous conformation.* As the articulating surfaces of the bones give the form and

* I am aware that joints exist in the larynx, but I do not consider this circumstance as affecting materially the view supported in the text: for these joints are few, and in old age, the skeleton of the larynx is frequently of an osseous character.

character to the joints, a careful examination of these surfaces will lead to a correct classification of these parts. These surfaces present less variety than might at first view be supposed. They are all formed in one of two ways, either by surfaces, one of which is simply convex, and the other concave, thus constituting a species of ball and socket; or of surfaces which form a kind of hinge-joint, and which, though concave, and convex like the other, are more complicated; the convex surface being traversed by a groove, and the concave by a ridge. The greatest number of the joints are formed on the principle of the ball and socket, or of two smooth surfaces, the one convex, and the other concave, and susceptible of motion in various directions; and the others on the principle of the hinge-joint, or what is probably more correct, of the rope and pulley; the one bone being grooved like the pulley, and the other convex like the rope; and from this conformation, susceptible only of motion in two directions.

That these *two* kinds of articulation exist in the human body, has been admitted by all anatomists, and it will not be difficult to shew that among the capsular articulations, there are no others. No dispute can arise regarding the existence of the hinge-joints. Their form is so peculiar that they cannot be mistaken. But it may not be so easy to demonstrate that all the other joints, varied so much as they appear to be in form, and possessing such different degrees of mobility, should be of the same conformation. Their form, however, is essentially alike. They are never formed of surfaces perfectly flat. One of the surfaces is uniformly convex, and the other concave. They are thus balls and sockets. The mere difference in degree of convexity and concavity cannot alter essentially the nature of the articulation, any more than the various sizes and proportions which may be given to the segments of a circle, can affect the unalterable properties of the circle itself.

The limited degrees of mobility possessed by many of these joints, is not dependent on any peculiarity of internal conformation, but on something seated exteriorly, as bone, ligament, or muscle. In many of these articulations, all the motions of which the ball and socket joint is susceptible, are not required; barriers are therefore thrown up to restrain and regulate their motions:—to permit those motions only that are necessary to the functions of the part.

The articulating surfaces of the bones are covered with *cartilage*, the obvious use of which is to facilitate motion. This is effected in two ways: 1st, By the greater smoothness which it imparts to the articulating surfaces; and, 2dly, By

its elasticity. The first of these properties permits the bones to glide freely on each other; and the second obviates the grating, and jarring, and consequently the local and constitutional injuries which would arise, if no such intermedium existed.

I cannot agree with Bichat, that the articular cartilages are unossified pieces of bone.* I consider them to be distinct organs, holding the same relationship to the bones to which they are attached, as the enamel does to the osseous part of the teeth. I do not mean, however, to insinuate by this comparison, that they are inorganic substances. Various phenomena in the living subject, disprove such an opinion.† The arrangement of its fibres, besides, has long ago been pointed out by Lassone,‡ and a very little examination will convince the most sceptical that Lassone's description is correct.

The articular cartilages are rendered still smoother by the synovial fluid with which they are constantly lubricated. This fluid is secreted by the *synovial apparatus*, which consists of a thin semitransparent membrane presenting a smooth surface which is turned to the interior of the joint, and a flocculent one which is connected to cellular membrane, ligament, or muscle. Whether this membrane covers the articular cartilages, is a point still disputed by anatomists—Gordon and Magendie, maintaining that it reaches no farther than the margin of the cartilages; while many others describe it as continued over the cartilaginous surfaces, and forming a shut sac containing only the synovia. I have examined the subject with some care, and have no hesitation in stating, that the opinion of the eminent physiologists now mentioned, is ill-founded. I draw this conclusion from the following facts and observations:

1st, The smooth and polished surfaces of these cartilages indicate the existence of a membrane. Wherever such a smoothness is to be found in the internal parts of an organ, we trace it to the existence of a membrane, as in the pericardium, heart, brain, &c. and that the smoothness in the joints is attributable to the same cause, is apparent from the fact, that any section of the cartilage cannot be made so smooth as its natural free surface.

2dly, The bursæ mucosæ are incontestably synovial membranes; yet, when enlarged and thickened by disease, they can be removed as distinct bags.

3dly, If a joint be macerated for three weeks or a month

* Anatomie Gen. tom. ii. p. 137. † Craigie's General Anatomy, p. 587.

‡ Mem. l'Acad. Roy. 1752.

in water, and then examined, the synovial membrane will be clearly seen passing for some way over the surface of the cartilages.

4thly, If a joint be laid open, and then immersed for a moment in boiling water, the synovial membrane now rendered opaque, can be seen extending over the whole of the more transparent cartilage.

5thly, From inflammation, the synovial membrane becomes thickened, and, in such cases, can easily be traced over the cartilages. A few days ago, I dissected, in presence of my class, a knee-joint of this kind, and demonstrated the synovial membrane, thickened to the extent of two lines passing over the cartilaginous surfaces of the tibia.

From these facts, I think we come irresistibly to the conclusion, that the synovial membranes do not merely surround the osseous junctions, but cover also the articular cartilages, and consequently form shut sacs similar to the serous membranes, which in many other particulars they resemble.

Although the synovial membranes connect the bones, as well as secrete and contain the synovia, still the principal connecting parts are the *ligaments*. These important parts are formed of whitish inelastic fibres, which cross and intermix in various ways, and thus form a texture of great strength, and well adapted both for retaining the bones in apposition, and counteracting the forces that tend to their displacement. The varied forms of the ligaments render a classification of them somewhat difficult, yet they may be reduced to three kinds: 1st, the round or cord-like; 2dly, the flat or ribbon-like, and, 3dly, the capsular or purse-like. The first kind, form species of ropes which bind the bones firmly together. The second are more membranous-like, and, besides connecting the bones, protect and strengthen a *part* of the capsular apparatus. And the third in form of bags incase certain joints, and thus not only unite the bones to which they are attached, but likewise envelope and protect all the other textures of the articulation.

Though the principal use of the ligaments be to unite the bones, still they serve the important purposes likewise of regulating and moderating their motion. By their great strength they are well adapted for binding the parts together, and their moderating power arises generally from their attachments and relative position to the other parts of the joints.

Besides the textures now described, as entering into the structure of the articulations, the intervening *fibro-cartilages* cannot be overlooked, as they enter into the formation of some of the joints. These are bodies that possess a structure

intermediate between cartilage and ligament. They are formed of concentric laminae, and are uniformly thickest at that part which is turned to the circumference of the articulation. Some of these bodies separate completely the bones between which they are placed, and others only partially. Hence a simple classification could be made. But these bodies are so few, and otherwise so like each other in internal and external conformation, that any such classification is uncalled for.

It is difficult to assign a satisfactory use to the articular fibro-cartilages. They have been supposed to facilitate motion by acting like friction-wheels in machinery; but they are not peculiar to joints susceptible of the greatest motion, or subjected to the greatest pressure. We find them only in the temporo-maxillary, the sterno-clavicular, the acromio-clavicular, the ulno-carpal, and the femoro-tibial articulations. But none of these joints possesses the latitude of motion of the humero-scapular, or pressure of the tibio-tarsal articulation. They appear to me to serve three purposes. 1st, They deepen the articulating sockets; 2dly, they facilitate motion by their mobility and elasticity; and, 3dly, they increase considerably the extent of the synovial surface of the joints.

VII. *Remarks on Hydrophobia, in connexion with Hysteria, and other Convulsive Affections.* By JOHN DALZIEL, M.D.

IT was from observing the phenomena which present themselves, in cases of hysteria, that I was first led to take the general views I am about to explain, of the nature of nervous diseases. I was particularly struck with a case which occurred to me about the beginning of June, 1829. The patient, a country woman, about 35 or 40 years of age, of Herculean strength, and robust constitution, had a hysterical paroxysm of dreadful severity. It lasted from a quarter of an hour to twenty minutes, and agitated, in succession, the various groups of muscles by which the different voluntary movements of the body are effected. During the paroxysm, there were evident symptoms of determination of blood to the head, heaving of the shoulders, and a loud wheezing noise attendant on respiration. There were, however, momentary intervals of comparative quiescence, while the morbid action was shifting from one group of muscles to another; the wheezing and heaving of the shoulders suffering a very considerable abatement, almost to extinction; and during these intervals the patient was able, faintly, to articulate a syllable or two, as if the paroxysm had