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Glisson as an Orthopædic Surgeon.

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FRANCIS GLISSON, born in Dorsetshire in 1597, entered Caius College, Cambridge; became M.D. in 1634 and F.R.C.P. in the next year. He was Regius Professor of Physic at Cambridge for more than forty years, and as such lectured on Human and Comparative Anatomy. He held the office of Censor in the Royal College of Physicians in 1656 and was elected President in 1667, 1668 and 1669. He stayed in London during the great plague of 1665 when many other physicians fled with their well-to-do patients. He died in 1677 at the age of 80 at his house in New Street, Shoe Lane,[1] and was buried in his parish churchyard of St. Bride, Fleet Street.

Besides the famous treatise on Rickets Glisson's published works are: *Anatomia Hepatis*, London, 1654, in which he described the "capsule" known by his name, the *Tractatus de Naturâ Substantiae energetica, seu de vita naturae ejusque tribus primis facultatibus*, London, 1672, a philosophical treatise, in which is an engraving taken from the portrait of him now in the Royal College of Physicians (fig. 1), and lastly the *Tractatus de Ventriculo et Intestinis*, London, 1676, which appeared shortly before the year of his death. All of his books were reprinted several times.

In the Sloane Collection in the British Museum there are twelve volumes of Glisson's manuscripts. Of these, two small volumes contain various letters to him, and some other papers. The other ten thick volumes contain notes and prefaces of his lectures, written some in Latin and some in English. A cursory survey did not reveal to me anything bearing on my subject, but a thorough study by anyone having youth, perseverance and familiarity with seventeenth century script might bear fruit.

Sir Norman Moore has adequately recorded Glisson's career and the history of the preparation and publication of his *Tractatus de Rachitide sive Morbo Puerile qui vulgo THE RICKETS dicitur*. In Moore's words it "will always remain one of the glories of English Medicine." It was the outcome of discussions among a number of physicians, who at length committed its preparation to a committee of three, namely, Francis Glisson, George Bate and Ahasuerus Regemorter. The two last named, however, soon left the work in Glisson's hands, reserving the right of final criticism and correction. So much is stated in the preface.

The first edition of the work on rickets was published in London in 1650 with the *imprimatur* of the Censors of the College of Physicians. The third edition, published at Leyden in 1671, has a frontispiece, interesting as containing representations of various deformities. In the foreground is a physician massaging or examining a crooked spine. In the middle distance a rachitic child is seated, and in the background is a child suffering from scoliosis or kyphosis playing cup-and-ball. On the wall hang preparations of bow-leg and scoliosis (fig. 2).

The English translation of the work, by one, Philip Armin, is dated 1651, and from this I shall largely quote. I have not been able to find out anything about Armin, whose translation is a very faithful one. A second edition of it is dated 1668, printed by John Streater and sold by George Sawbridge. It professed to be "Enlarged corrected and very much amended" by the notorious Nicholas Culpeper, but as the number and size of the pages are the same and the page on which each chapter begins is also unaltered, there cannot be any enlargement, and I cannot find either amendments or corrections.

[1] There are three New Streets—Great, Little and Middle, as well as New Street Square and New Street Hill in that curious shut-in maze of streets and courts, bounded by Holborn, Fleet Street, Fetter Lane and Shoe Lane. I have not been able to discover in which of them Glisson lived.

[2] *St. Bart. Hosp. Rep.*, 1884, xx, p. 71.

Like many other discoveries, this of rickets was in fact a re-discovery. The disease was prevalent in Rome in the first century of our era and was described, but not given a name, by the physician Soranus of Ephesus.

FIG. 1

The word *Rickets* first appears in a Bill of Mortality of 1634, where it is given as the cause of death in fourteen burials. This number increased year by year until in 1659 it reached the surprising figure of 476 out of less than 15,000 burials, or three per cent. However, as the causes of death were reported by ignorant women

searchers, who probably did not see the patients alive, the figures can only be accepted with grave reservations.[1]

Daniel Whistler in his *Disputatio Medica Inauguralis de Morbo puerili Anglorum quem patrio idiomate indigenae vocant THE RICKETS* published as an inaugural dissertation at Leyden in 1645, made no claim to the discovery of the disease. In 1645 the plan of Glisson's book was made public and Whistler apparently seized

FIG. 2

upon it as matter for his dissertation. The only thing original in it is the suggestion of the terrible word *Pædosplanchnosteccaces* as a name for the disease. Happily the author found no supporters.

[1] (Library of the Corporation of the City of London. Granger 5. 2. 3.) *Bills of Mortality*, 1602-66. Sir Clifford Allbutt (*Encycl. Britan.*, eleventh edition, Art. "*Medicine*") says that rickets was "first made known by Arnold de Boot, a Frisian who practised in Ireland in 1649." In view of the evidence of the Bills of Mortality, however, and of Whistler's inaugural dissertation in 1645, this statement cannot be accepted.

As Sir Norman Moore has said of Glisson: "To his description of the morbid anatomy as observable to the naked eye, subsequent writers, and even so laborious a pathologist as Sir William Jenner, have added little" (*Dictionary of National Biography*). Scarcely one of the usual symptoms of the disease escaped him. He even mentions its association with scurvy. As regards pathological causation he seems, however, to have been a thorough Galenist, and whole chapters of the treatise which deal with the triple constitution of the body, the spirits and the humors, indications and indicants and speculations as to whether it be a moist or a cold disease, are to the modern reader merely wearisome. He maintains that it is not a cold distemper, but a moist, and that "This Diseas consisteth in the stupefaction of the Spirits" (chapter V).

The following account of the love affairs of the Vital and Natural Spirits may be taken as a specimen:—

"For when the vigorous vital spirits do meet together with the Natural spirits no less vigorous, they are united with a kind of curious strife and delightful contention. Whether that we may illustrate this matter by an example, the Natural Spirits as a Bride do here allure and in a manner repel the Vital Spirits who as it were act the part of a Bridegroom. But the Vital Spirits provoked with their heat, and driven on by the vigour of the Pulses do more confidently invade the Natural Spirits and penetrate into their confines and regions, whilst the

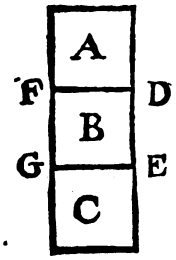

FIG. 3

natural spirits in the mean time (however as it were with modest resistances repulsing the assault) receive them at length not without a certain pleasure. For the very corporal pleasure is established upon and increased by a kind of amorous strife" (chap. XII, p. 101).

It must not be forgotten that the treatise was brought forth by a syndicate of physicians, and one may hope that the accurate clinical observations and sensible advice as to surgical treatment are Glisson's, while the fanciful physiology and pathology and the prescriptions of remedies containing worm-oil, earthworms, woodlice, stone-horsedung in a clyster and such like, are the work of Ahasuerus Regemorter and his fellows. Certainly there is a great contrast between the theoretical and the practical surgical sides of the book, which is probably typical of the state of the two branches of our art at the time. But where Glisson was not in bondage to systems and tradition, his surgical pathology was reasonable enough, even if his conclusions were not all justified by later experience.

He explains the curvature of the long bones by the hypothesis that there is overgrowth on the convex side and illustrates his theory with this diagram (fig. 3).

"We compare the bones therefore," he says, "in which this crookedness useth to happen, to a Pillar and not unaptly."

Then he says if you add material on one side you will make the pillar crooked as shown by the wedges in these diagrams (fig. 4). Further he says:—

" but if you build the pillar of more stones and betwixt every two as has been said, a wedge be interposed on one side, it will not resemble a Pillar, but the proportion of a Bow, as by the following may be perceived ". (fig. 5).

" The Quacks of our Country," says he, " are wont to rub daily the hollow, not the convex sides of Bones, and that " (i.e. the former) " say they, doth very much conduce to the cure, but this " (i.e. the latter) " doth rather hinder it. But it is certain that rubbing doth powerfully summon the nutritive juice out of the Bloody mass into the part so rubbed, therefore if at any time you rub that hollow part which is insufficiently nourished, it is no wonder if it do good, being that thereby the aliment is more plentifully allured, and the heat of the part is also

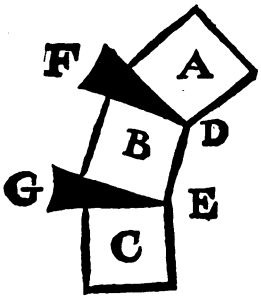

FIG. 4

excited and augmented, neither on the other side is the gibbous part of the bone being hurt by rubbing, to be wondered at, because by that means the aliment is attracted to that part which was before superabundantly nourished."

He thus foreshadows the modern theory of massage.

Speaking of *genu valgum* and *genu varum*, which, however, he does not call by those names, he says :—

" And this bending seemeth to be not unfitly referred to the inequality of nutrition. For if it happen by unequal nutrition, that one side of the Shank-Bone be so lengthened more than the other: Suppose outwardly, that it doth somewhat lift up the outward part of the epiphysis of

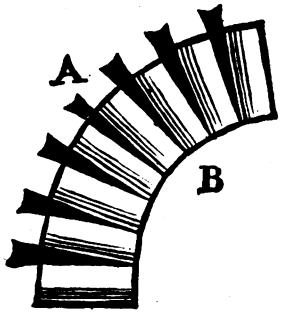

FIG. 5

the Shank-Bone [*Tibia* in original Latin] above the inward part, the joynt in the knee must needs stand outwardly bent; and on the contrary, if the inward part be lifted up, and the outward depressed, the same joynt must needs stand inwardly bent as may easily be perceived by the following figures" (fig. 6).

These figures need no explanation, but it may here be remarked that not until some forty years ago was the fact established that in rachitic knock-knee, deformity of the tibia was the most important condition, and not curvature of the femur as Macewen, differing from Glisson, had previously taught.

Glisson applies a similar pathological argument to deformities of the ankle and the bones of the spine, where it is less obviously correct. He says nothing of the effect of the weight of the body, of muscular contractions and tone, or of posture in causing deformity of too soft bones, probably because one of his very few omissions in symptomatology is this very softening, for he says:

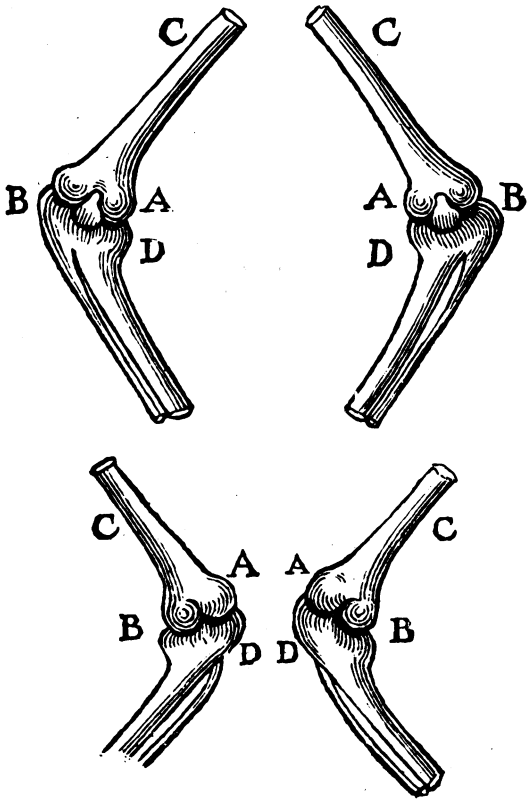

FIG. 6

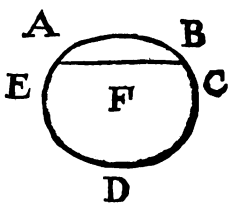

FIG. 7

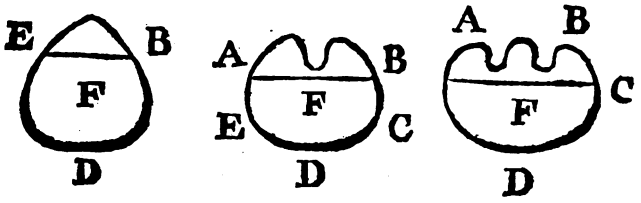

FIG. 8

"and first we flatly deny that the bones of children afflicted with this disease are more flexible, or less stiff and pliable than the bones of others" (chap. XIII). And again: "Some have imagined that the bones in this disease are transfigurable like wax; but we have never seen it."

The mechanism of the production of pigeon-breast Glisson explains with the help of figures. The sternum, he considers, is pushed forward by the enlarged liver and as you cannot push a part of a circular hoop outwards (figs. 7 and 8)

without drawing it in at other parts, the sides of the chest are narrowed. He meets the objection that the lower ribs are not drawn in laterally, but the opposite, by pointing out that they are not attached directly to the sternum, and do not form part of a complete circle. These ribs are kept distended by the large liver and bowels. Then he explains by diagrams (fig. 9), how the oblique muscles put into a state of tension by the bulky abdomen, draw the ribs downwards, and

" then they straighten the Breast on the sides."

Still arguing on his favoured hypothesis of deformity being caused by unequal growth, he says of the chest:—

" The cause of the vitiated Figure aforesaid, is an unequal nutrition of certain parts of the Ribs in respect of others."

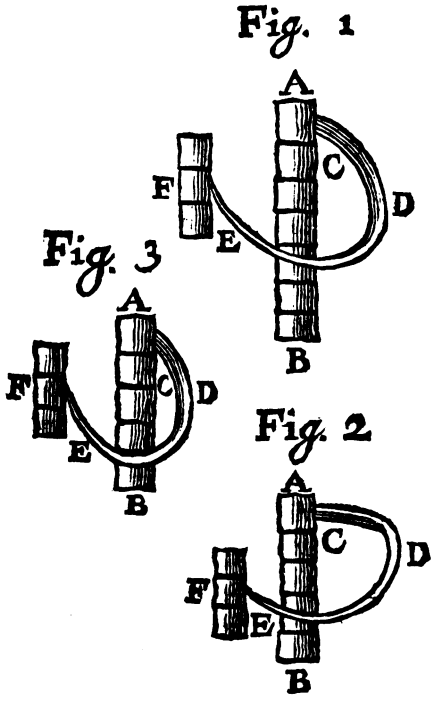

FIG. 9

He attempts to demonstrate this by means of a figure (fig. 10). Assuming that the ribs (the cartilages are not here mentioned) between *C* and *D* and the sternum, *A*, grow too much, compared with the parts *CB* and *DB*, he argues that the line of least resistance is in front, and that therefore they push the sternum forwards. As he was unaware of the softness of the bones and the effect of the contraction of the diaphragm and other muscles on them, his pathology is, however, here at fault.

Chapter XXIX is entitled " The Medical Matter answering to the indications proposed, and first the Chyrurgical." Here a curious surgical proceeding is discussed and recommended, namely scarification of the veins in the hollow of the ear. It is recommended to be performed two or three times a week, and is said to have a good effect on the fifth cranial nerve, and to " drive away the astonishment of the parts." *Astonishment* is used in its old sense of stupefaction, paralysis. Glisson says that the fifth nerve was affirmed by Fabricius Hildanus to be distributed

to the marrow of the back, and he evidently inclined to the belief that through it scarification of the ear might well be beneficial. The idea is an old one, and is to be found in both Greek and Arabian surgery. Issues also are approved.

Ligatures, if sufficiently loose and made of soft wool, are recommended. Glisson says

"this remedy is good to retard the over slippery return of the blood in those parts unto which the ligature is applyed."

Slipperiness is often used in this treatise as a pathological term. In the original Latin it is *lubricatio*. Have we here a dim foreshadowing of the

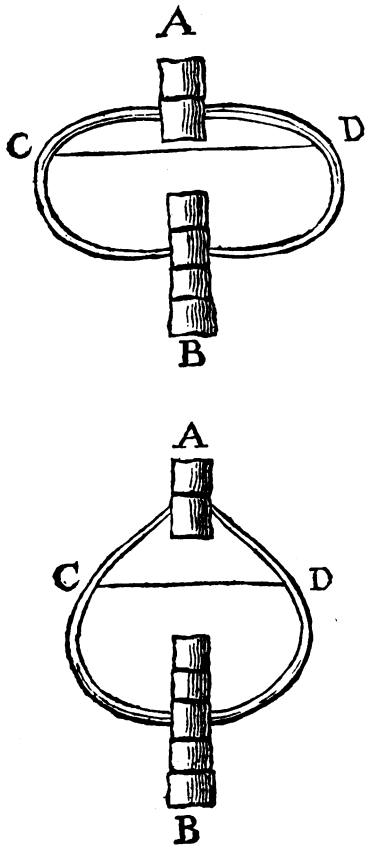

FIG. 10

congestion method of Bier? *Fasciation* or *swaything*, if not too tight, is also approved. He tells us also that

"others instead of swaything use buttoned Boots (ocreas fibulatas), lined with woollen cloth, . . . for strength and heat, but all to correct the crookedness of the bones. Some ad little shingles, or pieces of whalebone (Aliqui fibulas addunt, aut particulas fissi ossis ceti), but there are three things worthy of observation in the making of these:—

"(1) That they may somewhat crush the prominent and convex part of the Bone.

"(2) That they scarce touch the hollow, but rather that they defend it from compression.

"(3) That they be well fitted to the part, and do as little as possible hinder the motion of the joynts," &c.

"In like manner if there be any need that the Shingles upon the knee be extended to sustain and erect the bending thereof, then it is necessary that you fashion them with a double Joynt in the bending place after this manner (figs. 11 and 12).

"THE FORM OF THE ARTICULATION OF THE SPLENTS."
"*A B* Two Iron Rings."
"*C D* The Diameter of the Joynts of the Splents." (He means centres.)
"The Nails wherewith the Rings are fastened."
"*F G* The two Splents."

"Instead of the splents you may more commodiously use thin plates of Iron, and the whole instrument may be made of iron. The two Axel tress or diameters *C D* upon which the shingles or splents are bended *F G* are fastened with two rings or hoops" (i.e., discs.)

"But the hoops themselves, *A B C*, are made of plates of iron of an exquisite thinness, that they may not be burthensom, and withal they ought to be well smoothed and slight that they hinder not the motion of the splents. These rings must be of an equal latitude, suppose about two fingers across, and they must be so fitted, that on every side they may be parallels: only let there be so much difference between them that they may fitly receive the tops of the splents." (*N.B.—If two finger breadths* $1\frac{3}{4}$ *in., then the diagram is half size.*)

"Moreover, those hoops must not only be coupled with a double axel *C* and *D*, but also with five small Iron Nails. Lastly, the whole composition of the instrument must be so made,

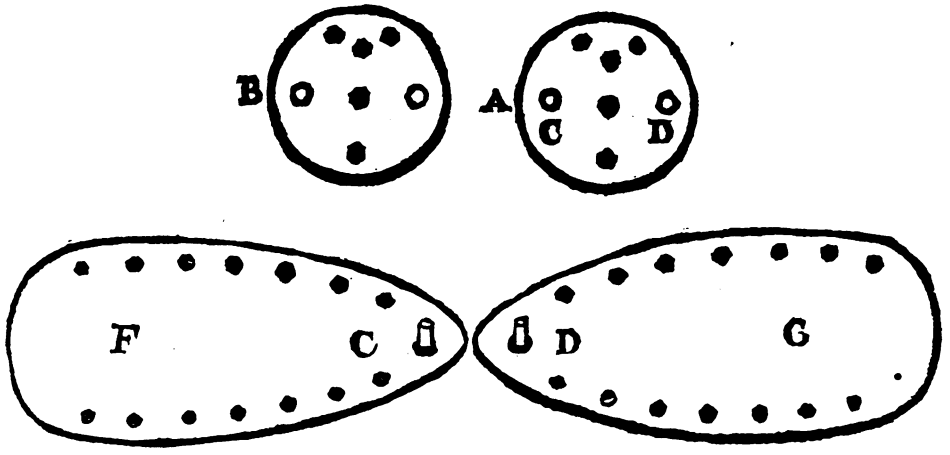

FIG. 11

that it may be fast and fitly tied to the side of the bended knee, sticking out, and withal that it may serve as well for the extension as the ordinary bending of it, but let it restrain the deflection of it to either side, especially to the part sticking out. Which is the caus why the Axels are fastened with a double hoop, namely lest the Joynts should be loos, and yield to the deflexion of the knee. In like manner the torsion and misshapen writhing of the feet is also frequently corrected with swathing bands.[1] If the toes are outwardly distorted, they must every night be bound up, *little balls of cotton* being put between the heels and the ankles. But if the toes bend outwards, then you bind the ankles, and put *a little cotton*[2] between the great toes."

It seems doubtful whether or no the woollen cloth leggings and strips of whalebone could have much effect in correcting bow legs, but there is no doubt that the splints, if well made and fitted, would be efficacious in the gradual correction of *genu valgum* or *varum*.

Taking Glisson's measurement of two finger-breadths as being equal to one and three quarter inches, I have enlarged his drawing so that the discs are of that

[1] This is the first mention of foot deformity.

[2] In the Latin the word *pulvinar* is used, which would be better translated as "cushion" or "pad."

diameter; but, even so enlarged, the leg and thigh pieces are absurdly short for any but young infants. Evidently the diagram is not meant to be a working drawing. However, I have had an appliance constructed according to these directions. Presumably the dots round the sides of the splints represent holes for the attachment of padding. The arrangement of the joints on this splint is peculiar. It was probably adopted

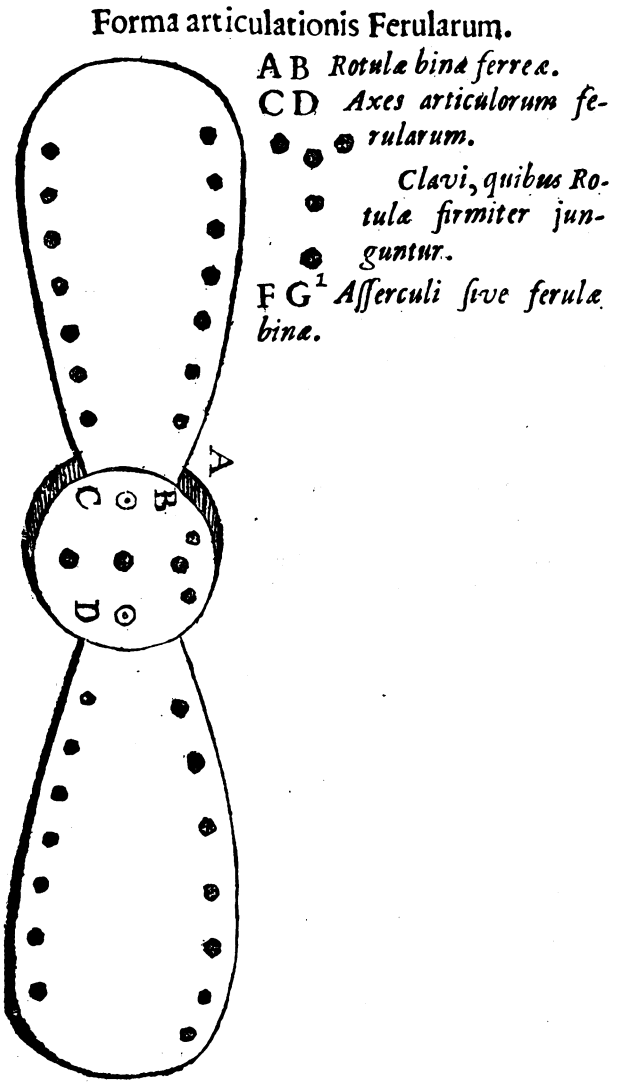

FIG. 12

with the mistaken idea of preventing lateral play, but it is interesting to note that the position of the two pivots would, when the splint was applied, roughly correspond to the two principal centres of movement during the last twenty-five or thirty degrees of extension of the knee, a joint which, as is well known, is a combination of a hinge with a sliding joint. This anatomical fact was not, however, known to Glisson.

[1] See fig. 11.

He says nothing as to the means of fixing the appliance to the limb, but no doubt bandages were used. It is noticeable that Glisson recommends that the splint be fixed on the inner side of a knock-knee, whereas modern surgeons would place it on the outer, thus distributing the pressure over two sites instead of only one. There must have been considerable risk of pressure sores with Glisson's method. He recommends also stays of woollen cloth stiffened with whalebone for the correction and support of curved or weak spines.

Chapter XXXII treats of *remedies electively evacuant*, and here we realize how difficult was the rôle of the conscientious physician, for he had not only

"to consider what remedies will electively expel the peccant humours in particular;" but also—"a due regard must be had to the spirits. . . . Moreover the predominant humours in the Body require proper and peculiar remedies; as Choler, Medicines purging Choler: Flegm, Medicines purging flegm: Melancholy, medicines purging melancholy; and waterish humors such as purge water."

Evidently an extensive pharmacopœia was needed to cope with all the possible or probable combinations of symptoms and indications. Luckily every plant, however humble, had its peculiar therapeutic value, and physicians were not restricted to the vegetable and mineral kingdoms, so that the liver of young ravens or of frogs was available, as well as

Wood-lice washed in white wine, baked in an oven, and beaten to powder, and such like things."

If anybody wants to experiment with the woodlouse treatment for rickets, let him remember that the dose is from half a scruple to a scruple, but perhaps an active principle might be extracted from this humble crustacean and called "oniscine"!

Chapter XXXV is headed "External Remedies," and begins by defining its subject as "every kind of medicament which cannot properly be referred to chyrurgery:" but it goes on to consider the manner or kind of exercises among which are included lying supine, prone or on one side. The use of pillows under the prominence to correct the "crookening" of the back while the child is in bed is recommended.

"The lying on one side towards the belly is laborious and troublesome and not to be continued long by strong and robustious bodies that are not used to it. But the molestation being overcome by custom, it is more easily tolerated: and because it easeth the pains in the head, helpeth the concoction of the Stomach, mitigateth the pains of the Chollick and loosneth a costive body, it may be sometimes useful when nature is thoroughly satisfied with sleep and in this affect it may supply the place of exercise." He cautions the reader against allowing patients to stand or walk too soon "for walking rather confirmeth than cureth the bended joynts."

"Moreover those children which have already contracted such a bending in their joynts, either by the natural weakness and loosness of the Ligaments, or by the bad usage or intelligence of their nurses, must not be trusted to exercise their legs till some splents or other instruments be provided, which may be able to erect the bended joynts and to keep them in an erected posture."

"Secondly, the artificial suspension of the body is performed by the help of an instrument cunningly made with swathing bands, first crossing the breast and coming under the arm-pits, then above the head and under the chin, and then receiving the hands by two handles, so that it is a pleasure to see the child hanging pendulous in the air, and moved to and fro by the spectators. This kind of exercise is thought to be many ways conducible in this affect, for it helpeth to restore the crooked bones, to erect the bended joynts, and to lengthen the short stature of the body. Moreover, it exciteth the vital heat and withal allureth a plentiful distribution of the Nourishment to the external and first affected parts: and in the meantime it is rather a pleasure than a trouble to the child."

I have myself slung up many children with Glisson's sling, but none of them seemed to like it!

" Some that the parts may the more be stretched, hang leaden shoos upon the feet, and fasten weights to the body, that the parts may be the more easily extended to an equal length. But this exercise is only proper for those that are strong."

This is " Glisson's sling," which in a simplified form is well known by that name to orthopædists, especially on the Continent. For instance, there are six references to it as " die Glissonsche Schlinge " in Albert Hoffa's *Lehrbuch der orthopädischen Chirurgie.* It is described, too, without acknowledgment by writers on Orthopædic Surgery of the eighteenth and the early part of the nineteenth century, such as John Shaw. It was subsequently adopted by Sayre, of New York, who probably knew nothing of Glisson's description. It is described in the form now used in a Latin inaugural dissertation by C. S. Braunert, *Historia machinarum ad gibbositatem sanandam,* Halle, 1798. Braunert speaks of

" Machinae extensione agentes. Quem post apparatum Glissonius inventionem primo a se factam et escarpolette nominatam suo in libro (De rachitide, London, 1680) explanavit. Extremitates ligaminis longi lati atque validi, cujus medium sub mento et cervice agroti firmati transeunt cylindrum cubiculi tegumento insertum."[1]

A quack some years ago widely advertised an apparatus which was constructed on the principle embodied in the above description and was guaranteed to increase the height of short people by several inches, or in the words of Glisson:—" ad curtam corporis staturam prolongandam conducit."

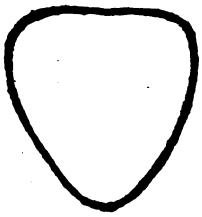

FIG. 13

Besides these physio-therapeutic measures, frictions with the hand, a cloth or brush are recommended and abdominal massage of a quite vigorous sort is advocated, because

" Physicians hope, and not without reason, that by this action they may deliver the liver from any preternatural growing with the peritoneum, if any such should chance to be." . . . " Thus much of exercises, now follow the external Applications."

These are dealt with in Chapter XXXVII. The " things to be externally applied " include liquors, oyls, liniments, oyntments, playsters. Among these, muskadine, Prussian Beer, Oil of Neatsfeet and Foxes, Deers' suet, oyl of Worms and Goos-dung are noteworthy.

The shape of a plaister to be applied to the back seems to have been important. " Practitioners in Physick differ in the Figure and about the application of the Plaisters." Glisson (fig. 13) evidently thought the question important for he gives this figure as the best in some circumstances. " But when the lower parts of the backbone as also the knees and legs, namely those parts which borrow their nerves from the lower part of the spine, are weaker than the superior, we do not judge this latter to be a convenient form." After giving a final prescription for a liniment containing Oyl of Worms or human fat (*Adeps humanus*), he ends " And this much of external remedies."

[1] There is a copy of this Thesis in the library of the Royal College of Surgeons.