

mentation observed is a fragmentation of the cell leading to dissolution. He places in this category the early experiments of Dewitz (1887), who found that frogs' eggs treated with corrosive sublimate would undergo segmentation. Similarly Tichomiroff (1886) was able to induce the development of unfertilized eggs of the silk-moth by treating them for a few minutes with sulphuric acid, but this is a species in which occasional parthenogenesis is known to occur.

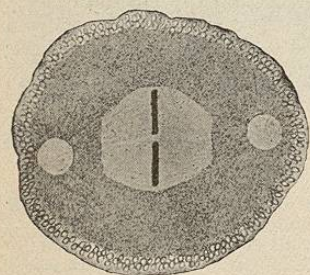


Fig. 3750.—Cleavage Spindle of the Second Type. $\times 490$. (After Brauer.)

In 1899, however, Loeb made the remarkable discovery that by the use of a solution of magnesium chloride of a certain strength (a mixture of $\frac{2}{3}$ n MgCl₂ and sea-water in equal parts for two hours) he could induce development in the unfertilized eggs of a sea-urchin (Arbacea), a group in which normal parthenogenesis is unknown, so that the egg not only divided but continued through the blastula and gastrula stages, and eventually formed normal pluteus larvæ (Fig. 3751). At first he attributed this result to the specific effect of the magnesium ions. But later researches showed (1900) that other salts and such organic substances as urea and cane-sugar could produce the same result. Loeb then concluded that the cause of development was not the specific effect of certain ions, but that it was due to an increase of osmotic pressure. Especially he noted that the reagents used seemed to cause a liquefaction of the nuclear membrane, and he regarded that as a prerequisite for cell division.

This idea was taken up by Mathews (1900), and he found that various agents that caused the liquefaction of protoplasm, such as lack of oxygen, slight increase of temperature (from 32° to 33° C. for two to four minutes), ether, chloroform, and alcohol would all induce segmentation in sea-urchin eggs. Later Mathews (1901) found that the eggs of a starfish, *Asterias forbesii*, could be caused to develop by shaking or by simple removal from one dish to another by means of a pipette, provided the eggs are taken at the right time, namely, from two to four hours after they have been shed, when "both polar globules have been extruded and the female pronucleus has re-formed and reached a considerable size." From eggs treated in this way he was able to rear some larvæ to the late gastrula and early bipinnarian stages. Loeb (1901) has been able to obtain artificial parthenogenesis also in an annelid, *Chaetopterus*. By treating the unfertilized eggs with solutions of sodium, magnesium, and calcium chlorides and with cane sugar he obtained development into swimming trochophore larvæ. Fischer (1902) has obtained swimming larvæ from unfertilized eggs of two other annelids, *Amphitrite* and *Nereis*. From the former by treatment with calcium nitrate, and from the latter by using solutions of potassium chloride having considerably higher osmotic pressure than the sea-water.

By extracting the spermatozoa of sea-urchins Gies (1901) tried to obtain an enzyme that would cause the eggs to develop. But his results were negative. And he was led to criticise the positive results previously obtained by Piéri, which he attributes to carelessness in the non-removal of spermatozoa; and the results of Winkler, which he regards as due to osmosis.

After all, the physiologists have done little more than to establish the fact of artificial parthenogenesis. So far they have been unable to formulate any clear general statement as to the cause of the phenomenon, and they have told us next to nothing in regard to the internal conditions of the egg during this process.

The first one to approach this problem from the inside, as it were, was R. Hertwig (1896), who found that in unfertilized eggs of sea-urchins, *Echinus* and *Sphærechinus*,

treated with dilute solutions of strychnine, the nucleus might give rise to a bipolar mitotic figure. Sometimes the chromosomes would divide, and sometimes two complete nuclei would be formed, and in a few cases irregular or incomplete cleavage stages were observed. Using mainly unfertilized eggs of Arbacea, T. H. Morgan has made a series of studies (1896, 1899, 1900) upon the effects of solutions of sodium and magnesium chlorides and also dilute strychnine upon the cytoplasm, his "principal discovery being that the eggs become filled with 'artificial astrospheres' (asters) containing deeply staining centrosome-like bodies, which may become connected with the nucleus and 'seem to act as anchors for the chromosomes and move out into the egg with the chromosomes attached to them.'"

Our principal knowledge of the internal phenomena of artificial parthenogenesis is due to the beautiful work of E. B. Wilson (1901), begun soon after the publication of Loeb's first paper. He completely confirmed Loeb's general result, finding that "unfertilized eggs of *Toxopneustes* (a sea-urchin), when treated with a mixture of equal volumes of sea-water and twelve per cent. MgCl₂ and then replaced in pure sea-water, may segment, give rise to actively swimming blastulae and gastrulae, and in many cases to plutei." The different stages, however, showed a large number of abnormalities and monstrous forms, and even the most perfect specimens were not exactly like those produced from fertilized eggs.

As to the internal changes observed in these eggs, we have space here for only the briefest possible summary of the most important results. The first change noticed in the eggs was the appearance of a vague primary radiation centering in the nucleus. In many eggs a varying number of secondary centres of radiation (cytasters) were formed at various points in the cytoplasm. Then after a reduction of the rays almost to the vanishing point and their reappearance nuclear division proceeds as in fertilized eggs; but the division of the cytoplasm may be delayed until several nuclei are formed. Serial sections showed that no sperm nuclei were present. The internal changes, while showing an interesting parallel to those occurring in fertilized eggs, were unmistakably different from the latter. During cleavage many of these eggs show but *one-half* the normal number of chromosomes, namely, eighteen instead of thirty-six, and most of the

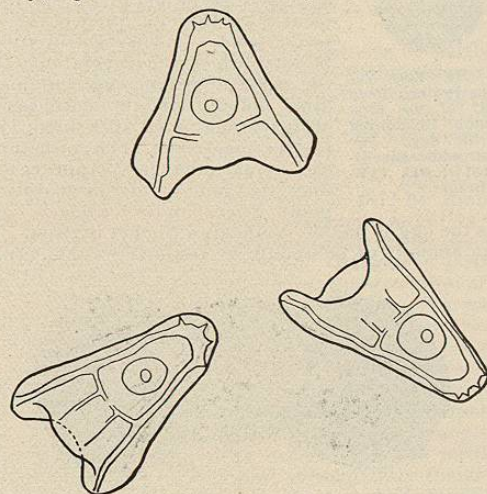


Fig. 3751.—Normal Plutei Reared from Unfertilized Eggs; treated with equal parts of a $\frac{2}{3}$ n MgCl₂ solution and sea water. Magnified. (After Loeb.)

eggs failed to form any trace of a vitelline membrane, which in fertilized eggs is formed after the entrance of the spermatozoon. Both the primary and secondary asters are formed *de novo* and subsequently multiply by division; and both may act as centres of cytoplasmic division. But, as a rule, complete division does not take

place except when the asters are connected with chromosomes. Even in enucleated fragments of eggs, produced by shaking, asters may be formed in the magnesium solution, and these, like the others, may contain at their centres deeply staining bodies resembling centrosomes.

Delage (1901) has also investigated the internal phenomena of artificial parthenogenesis, using eggs of species of sea-urchins and starfish. He obtained development in the former after both polar bodies had been formed, and in the latter after only one polar body had been formed as is the case in normal parthenogenesis. He claims also that the number of chromosomes present is the same as in fertilized eggs. But Boveri (1902) has shown this to be an error, the number of chromosomes found by Delage in the sea-urchin being really half the normal number, thus confirming Wilson.

Robert Payne Bigelow.

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PARTURITION. See *Labor and Gestation*.

PASSION FLOWER.—*Passiflora*. The rhizome of *Passiflora incarnata* L. or of *P. lutea* L. (fam. *Passifloraceæ*).

The herbage is also sometimes employed. These are soft woody vines, climbing high over shrubbery and trees in the Southeastern United States, where the edible fruit of the first-named is considerably used under the name May-pop.

The elongated rhizome, usually known commercially as "Passion flower root," quite closely resembles menispermum in appearance, being elongated and cylindrical. It rarely reaches a fourth of an inch in thickness and the nodes are rather obscure. It is yellowish or light brown, often with a greenish tinge, and finely striated. It has a small hollow centre surrounded by a greenish or yellowish, finely radiated wood zone, and a moderately thick, purplish bark section. Both odor and taste are slight and indefinite, the latter somewhat fatty and disagreeable. The constituents have not been examined with any care. A trace of alkaloid has been reported.

Passion flower has been exploited by commercial interests, and most of its literature has been compiled with a view of creating a demand for it. *P. incarnata* has been

considerably employed in eclectic and homœopathic practice. These authorities attribute to it mild sedative and even hypnotic powers, while larger doses are said to be emetic. Its use by these practitioners in numerous grave conditions, as well as their minute doses, involve obvious absurdities. Whatever benefit may be derived from its use may result from the administration of from 2 to 4 c.c. (fl. 3 ss.-i.) of the fluid extract. *Henry H. Rusby.*

PATCHOULI, OIL OF.—*Oleum Foliarum Patchouli*.—A volatile oil distilled from either the fresh or the dried leaves of *Pogostemon Heyneanus* Benth. (*P. Patchouli* Pell.; *P. suavis* Tenore. Fam. *Labiatae*).

The Patchouli plant is native and cultivated in the East Indies, especially in the Straits Settlements, and the drug or the oil distilled from it is mostly exported from Singapore. The oil ranges from pale yellow to brownish, usually with a greenish tinge, and is occasionally of a deep brown color. Its specific gravity varies from 0.97 to 0.99, even when pure. With ninety-per-cent. alcohol, it yields a clear solution which usually remains clear upon the addition of more alcohol (Gildemeister and Hoffman). The oil has a characteristic and very intense and persistent odor. Its composition is not well known, though it yields a peculiar camphor known as Patchouli camphor. This oil is little, if at all, used medicinally, though it has the ordinary aromatic stimulant properties of its class. It has very important uses in perfumery. *Henry H. Rusby.*

PATELLA, AFFECTIONS AND INJURIES OF.—The patella is a sesamoid bone developed in the quadriceps tendon, and is therefore a part of the extensor apparatus of the knee. Some anatomists have considered the patella homologous with the olecranon process of the ulna; but there are serious objections to this view, and it is not indorsed by Poirier and Charpy in their recent work.

The first rudiments of the patella appear about the tenth week of fetal life, and ossification usually begins from one centre about three years after birth; but the α -ray often fails to cast a shadow until the sixth year. The principal functions of the patella are to increase the leverage of the quadriceps muscle and to protect the knee-joint anteriorly. It seems to be, however, a luxury rather than a necessity, since its congenital absence may produce little or no disturbance of function. The kangaroo, which has no bony patella, is noted for its powerful posterior limbs.

Fractures and traumatic dislocations of the patella, and prepatellar bursitis are discussed in other sections of this work; there remain the congenital and developmental anomalies, and certain diseases, deformities, and painful affections which follow.

Absence and Retarded Development of the Patella is a not unfrequent accompaniment of congenital deformities involving the knee, especially of absence or imperfect development of one or more bones of the leg, and of congenital flexion, hyperextension, and ankylosis of the knee. Of these conditions the one which has attracted most attention is the so-called congenital dislocation of the knee, where the child is born with one or both knees in hyperextension, and the tibia luxated forward. In a large proportion of these cases no patella is discoverable in infancy; but in many, if not most, it develops later, and may reach normal proportions. Such a case, observed by the writer, had no patellæ at seven months of age; but they could be felt as very small nodules six months later, and at three years of age were well developed. At thirteen years this boy was active, and had good functional use of the knees and perfectly developed patellæ.

Many of the cases in the literature are reported too young to determine the fact of permanent absence. Rectification of the deformity and orthopedic treatment seem to exert a favorable effect on the development of the patella in these young cases. Potel² has collected 78 cases of congenital knee luxation, of which about half were bilateral; in 50 of these cases the condition of the

patella is noted, of which 18 were normal; in 16 the patella was absent, in 10 atrophied, and in 2 anomalous. Potel reports in addition 20 cases of absent or rudimentary patella accompanying other deformities of the knee. Little³ reports 42 cases of absent or rudimentary patella, not including a remarkable group of 18 cases in four generations of one family, who had no patella and no thumb nails. Other family groups have been reported by Wirth⁴ and Wolf. Many of Little's cases are on Potel's list and on the later list of Thorndike.⁵ Some of the individuals in whom the patella never develops are nevertheless active and even athletic, and unconscious of any defect. While extremely rare, cases of complete absence of the patella, due to developmental defect, and uncomplicated by other anomalies, do exist. Joachimsthal⁶ proved by x-ray examination that Wirth's case was indisputable. As absence of the patella is usually a syndrome rather than a pathological entity, the treatment is that of the primary affection, and in the case of congenital luxation and some other deformities it is usually effectual. The following advice, given in a recent work of reference,⁷ is erroneous: "When the patella is absent it is usually necessary to produce an artificial ankylosis between the femur and tibia." On the contrary, it is rarely if ever necessary to have recourse to this operation for this reason.

Split Patella.—Very rare are the cases of congenital split patella. Grüber⁸ reports a case in which both patellæ were divided into a small superior external and a large inferior internal segment separated by a groove. Joachimsthal⁹ reports a case of horizontal and another of vertical fissure in which fracture was excluded.

Congenital Dislocations of the Patella.—While this condition is uncommon there is a considerable literature on the subject. Steindler⁹ reports sixty-one cases of outward and two of upward dislocation. This deformity is frequently combined with genu valgum, but such combinations are not always congenital; moreover, there are many cases of congenital dislocation in which no genu valgum is present. The affection seems to be usually due to imperfect development of the anterior part of the external condyle. Alsberg¹⁰ reports three cases in one family, father, son, and daughter, in which the displacement was outward and bilateral. In two of these cases there was practically no disability.

Cases of congenital dislocation are also reported by Potel,⁷ Bergmann,¹¹ Elliott,¹² Drehmann,¹³ Gallet,¹⁴ Cayre,¹⁵ and McLaren.¹⁶ The so-called congenital dislocation upward is rather an elevation than a luxation of the patella, as has been pointed out by Blencke.¹⁷

Pathological Displacements of the Patella.—The commonest of these is displacement upward from elongation of the ligamentum patellæ; this is rarely congenital, though a certain congenital laxity of the ligaments may predispose to this affection. Shaffer¹⁸ has pointed out that elongation of the patellar ligament and displacement of the patella upward may be an important factor in the production of certain knee disabilities, and has recently¹⁹ indicated its connection with slipping patella and displacement of the semilunar cartilages. Shaffer states that with the knee flexed at ninety degrees and the quadriceps tense, the distance from the apex of the tibial tubercle to the lower edge of the patella in an adult is normally not over two inches, and is often less. In his cases of upward displacement the patellar ligament was often three inches or more long.

In rupture of the ligament the patella is drawn upward by the quadriceps, and in rupture of the quadriceps at its insertion the patella drops downward. Schulthess²⁰ has shown that in congenital spastic paraplegia the ligamentum patellæ is elongated, and the patella displaced upward, probably from the continued traction of the spastic quadriceps. With the knee flexed at ninety degrees, the inferior border of the patella makes a sharp projection in front of the knee in these cases.

According to a recent investigation of Peltesohn²¹ the patella was elevated in eleven out of fourteen congenital spastic cases.

The posterior surface of the patella is concave owing to its abnormal relation to the end of the femur.

Slipping Patella; Intermittent Dislocation of the Patella.—In this affection, either from congenital defect, laxity of the ligaments, trauma or genu valgum, the patella becomes displaced outward, and the malposition tends to recur more and more frequently in spite of reduction; it finally may become permanent. Shaffer believes that this condition is often associated with elongation of the ligamentum patellæ, and that this is an important factor in the affection. In several cases he found an exostosis in the intercondylar groove, due, as he supposes, to the absence of the patella from its normal position. Wiemuth²² reports 66 cases, of which 32 were of congenital origin, 14 traumatic, and 20 pathological. Schanz,²³ Friedländer,²⁴ and others report cases.

In the milder cases various knee-caps and appliances may be used to hold the patella in place, or to prevent abnormal movement at the knee, but in inveterate cases one or more of the following operative procedures may be necessary:

1. Genu valgum, if present, should be corrected, though this will not always prevent the displacement.
2. The tibial tubercle with the ligamentum patellæ may be detached with a chisel, and sutured or nailed at a point farther inward on the tibia.
3. The intercondylar groove may be deepened, and an exostosis, if present, removed.
4. The capsular ligament on the inner side of the patella may be folded and sutured (Le Dentu).
5. Artificial bow leg may be produced after a supracondylar osteotomy (Chiene).
6. The patella may be excised (R. Fowler).

Ankylosis of the Patella.—After inflammation of the knee-joint involving the contiguous articular surfaces of the patella and femur, the patella may become adherent. This of course prevents voluntary motion at the knee. Where the joint surfaces between the femur and tibia are good, or where it is necessary to do so in order to correct the position of the knee, the patella may be separated by the fingers, mallet, or chisel (see papers by Hübscher²⁵ and Cramer²⁶).

Atrophy of the Patella.—The patella follows the usual law of bone growth, increasing in size and density according to the work put upon it; active muscular individuals have large and strong patellæ. The patella also adjusts itself to the shape and pressure of adjacent structures; hence its size and shape are altered in various pathological conditions. If the function of the leg is interfered with, the development of the patella is retarded or checked, and later atrophy may set in. Individuals with clubfoot, congenital dislocation of the hip, and other affections which limit the use of the limb, show less development of bone as well as of muscle on the affected side. In infantile paralysis the effect on function and on bone growth is much more marked, and has been thought to be largely due to interference with trophic centres in the cord. It is well known that chronic joint disease has a profound effect on bone growth. In osteitis of the knee and hip all the bones of the affected limb are shortened, thinned, and narrowed, and this is due to atrophy as well as to retardation of growth. In a series of hip and knee cases measured by the writer,²⁷ the patella was found to be from one-eighth to one-half inch narrower on the affected side within two years of the onset of the affection. The bone was markedly diminished in bulk, in many instances being less than half the size of its mate.

Riders' Painful Patella.—Rosenberger²⁸ has recently described a painful affection of the patella observed in cavalry and mounted officers, who have worn tight, stiff breeches and have been continuously in the saddle. The inner border of the patella, which has little adipose padding, and which is most exposed to pressure in riding, is the most painful part. There is at first more or less disability, which together with the pain soon passes off on rest and relief of the pressure. No other symptoms were observed by him, but according to Düms²⁹ there

may be inflammatory swelling of the quadriceps tendon with crepitus.

Diseases of the Patella: Primary Tuberculosis.—Fibrous, fatty, sarcomatous, and other tumors of the patella or of parts adjacent to it have been reported, and syphilitic and staphylococcal infections may occur, but the most common and important disease of the patella is tuberculosis. Secondary infections, especially of the articular surface proceeding from tuberculous or other inflammation of the knee-joint, are not infrequent, and are a common cause of adherent or ankylosed patella. Infection may also occur from disease of the prepatellar bursa. Primary tuberculosis of the patella has been described by Volkman and others, and has lately attracted considerable attention.

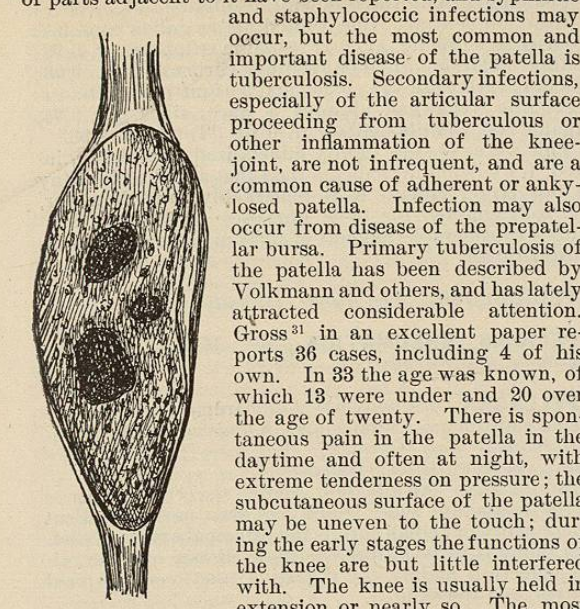


FIG. 3752.—Tuberculous Cavity in Patella. (From Volkman.)

Gross³¹ in an excellent paper reports 36 cases, including 4 of his own. In 33 the age was known, of which 13 were under and 20 over the age of twenty. There is spontaneous pain in the patella in the daytime and often at night, with extreme tenderness on pressure; the subcutaneous surface of the patella may be uneven to the touch; during the early stages the functions of the knee are but little interfered with. The knee is usually held in extension or nearly so. The most significant symptom is cold, prepatellar abscess of slow formation. Such an abscess is much less movable than a bursal swelling, and puncture or exploration should clear up doubtful cases. Later on, sinuses may form, leading to cavities in the cancellous tissue. Volkman³² depicts (Fig. 3752) such a case in section. If it is overlooked or neglected extensive disease of the knee-joint usually results. The treatment consists in the removal of diseased tissue, by *évidement* of the focus, and when necessary by excision of diseased synovial membrane. In the late cases, in which the joint is seriously infected, the latter will require appropriate treatment.

Gross' conclusions are that primary tuberculosis of the patella is more frequent than is usually supposed; that treatment is usually too long postponed; that it is a serious affection rapidly perforating into the joint; that with an early diagnosis a relatively simple operation will cure it; the procedures ordinarily employed are *évidement* of the focus, and in the later cases subperiosteal or total ablation of the patella, with synovectomy or arthrectomy when necessary. Absence of the patella interferes but little with function, and it may be reproduced after total subperiosteal ablation. He remarks that: "If one bears the possibility of tuberculosis of the patella in mind many knees will be saved."

Other papers on primary tuberculosis of the patella by François,³³ Forget,³⁴ Ménard,³⁵ Ribas,³⁶ Schlüter,³⁷ Kummer,³⁸ and Kocher³⁹ may be consulted.

Henry Ling Taylor.

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PAU.—The city of Pau, chief town of the Department of the Basses-Pyrénées, France, stands upon the north or right bank of the river called the Gave de Pau, at the height of 130 feet above the river-bed, and 620 feet above sea level. The latitude of Pau is 43° 17' N.; its longitude is 0° 23' W. The population of the town is about thirty-three thousand. Its situation, on the edge of a plateau immediately above the river-bed, and the location, at the brink, as it were, of this plateau, of the old castle with its terrace, of the Place Royale, the Boulevard du Midi, and the Parc (containing thirty acres of ground and beautifully planted with shade trees) render the town a decidedly picturesque place in appearance, while the view of the Pyrenees Mountains, which may be had from all the points just mentioned, is remarkably fine, and is said by Murray to be similar to, although inferior to, the famous distant view of the Alps which is obtained from the platform at Berne.

The reputation of Pau as a winter health resort is notoriously great, and its hotels are excellent, especially such as lie in that part of the city which is nearest the edge of the plateau, and from which the view just mentioned is obtained. This portion of the city, at least, is well drained; of the rest I cannot speak positively. The soil at Pau is sandy.

The mean temperature of each of the five months, November to March, is given by Dr. Julius Hann as follows: November, 47.84° F.; December, 43.34° F.; January, 42.26° F.; February, 44.42° F.; March, 48.20° F. I have no data at hand to illustrate either the extreme or the average daily maximum and minimum temperatures; but the average monthly range during the season in question is 36.5° F. (Hann's "Handbuch der Klimatologie.")

Dr. Yeo tells us that "frost and snow and cold nights are not uncommon in winter"; and it is evident that the climate of Pau at this season cannot be pronounced a very warm one. In "Murray's Guide-book" we read that "though the climate is mild the variations in temperature are often sudden." On the other hand, Dr. A. Rotureau (in the "Dictionnaire Encyclopédique des Sciences Médicales"), although giving for the monthly means of November, December, and January figures which are lower than those of Dr. Hann, and although admitting that the temperature quite frequently falls below the freezing point, nevertheless appears to regard the winter climate of Pau as one characterized rather by equability than by variability of temperature, and Dr. Weber tells us that the nycthemeral range of temperature seldom exceeds 16° F.

The mean annual rainfall is 42.7 inches, of which 11.8 inches falls in winter (Rotureau), and during the six months from November to April the average number of

days on which rain falls is between eighty and ninety (Weber). As to the manner in which rain habitually falls, we are told by Dr. Rotureau that, although falls of rain are frequent, they are not usually of long duration, and commonly occur in the early part or toward the close of the day. The relative humidity of the atmosphere at Pau is considerable; according to Dr. Weber, it is on the average from 80 to 85 per cent. Dr. Hann's figures for the five months, November to March, derived from observations taken only twice a day (viz., at 7 A.M. and at 3 P.M.), are as follows: November, 75 per cent.; December, 76 per cent.; January, 74 per cent.; February, 72 per cent.; March, 70 per cent.

The leading characteristic in the climate of Pau, and the feature to which it largely, and no doubt deservedly, owes its popularity as a winter resort, is the prevailing stillness of the atmosphere. The great chain of the Pyrenees Mountains, distant only fifteen or twenty miles, acts as a barrier to protect the region about Pau against southerly winds; while we are told by Dr. Yeo that "a series of plateaux rising behind the town" afford a good degree of protection from northerly winds. The west and the east are the quarters in which least protection against wind is afforded; but Dr. Rotureau claims that the hills known as the Coteaux de Jurançon and the trees of the Parc serve in some degree to break the force of the westerly winds, and that the easterly winds are modified in character by being obliged to pass over a district of relatively considerable elevation before reaching the town (sont mitigés par les hauteurs du terrain sur lesquelles ils doivent passer avant d'atteindre la ville). He also tells us that the east wind at Pau is a fair-weather wind and a dry one. The "mistral" of Provence and the Riviera does not exist at Pau, although the northwest wind is a bringer of cold and dry weather. The westerly wind is damp and warm. In Dr. Rotureau's article will be found other interesting facts concerning the winds of Pau, and concerning the comparative windlessness of its climate. Suffice it to say, in this place, that, while occasional wind-storms of considerable severity are there experienced, the climate is nevertheless one properly to be regarded as exceptionally free from winds.

Huntington Richards.

[The diseases for which the climate of Pau is regarded as beneficial are the various catarrhal conditions of the respiratory passages: dry bronchitis with irritable cough, emphysema, and nervous complaints of an erethistic nature. Formerly Pau enjoyed a wide reputation as a winter resort for cases of pulmonary tuberculosis, but at the present time it is considered too moist for the successful climatic treatment of this disease. There is, however, in the neighborhood of Pau a small sanatorium (The Trespoey Sanatorium) six hundred and ninety-five feet high, for the treatment of pulmonary tuberculosis; it is open from the middle of October to the middle of May. One can find at Pau good facilities for golf, polo, tennis, and cross-country racing. There are four English churches and a Scotch one. There has recently been opened a winter palace of much magnificence, where operas, etc., are given. English physicians are also to be found here.—E. O. O.]

PAVILION SPRING.—Berks County, Pennsylvania. POST-OFFICE.—Wernersville, Sanatorium.

ACCESS.—Via Bound Brook route, Central Railroad of New Jersey, Lebanon Valley Railroad, or Philadelphia and Reading Railroad to Wernersville; thence one and three-quarter miles by private conveyance to spring.

The Pavilion Spring is not itself a resort, but its waters are used commercially, and locally it is used to supply the Grand View Sanatorium. It is located on the grounds of the sanatorium, near Wernersville, and nine miles from the city of Reading. The situation of the sanatorium is on the South Mountains, about one thousand feet above tide water, in the midst of charming and picturesque surroundings. This institution is an old and well-known health resort, having been established in

1847. The buildings have been greatly enlarged and improved recently, and the resort is now fitted up with all kinds of appliances and conveniences for combating morbid conditions. The Pavilion Spring was analyzed in 1885 by Prof. Otto Luthy, analytical chemist, of Philadelphia, with the following results:

Reaction neutral. One United States gallon contains: Potassium sulphate, gr. 0.18; sodium sulphate, gr. 0.02; sodium chloride, gr. 0.06; sodium carbonate, gr. 0.33; calcium carbonate, gr. 0.23; magnesium carbonate, gr. 0.12; iron oxide and alumina, a trace; silica, gr. 0.94; organic and volatile matter, gr. 0.10. Total, gr. 1.98.

This water is very lightly mineralized, containing, indeed, fewer solid ingredients than that supplied to many of our larger cities. It is remarkably pure, however, and well adapted for table purposes. The water contains a considerable amount of carbonic acid gas and atmospheric air.

James K. Crook.

PEDICULOSIS. See *Insects, Parasitic.*

PELIOSIS RHEUMATICA. See *Morbus Maculosus Werlhofii, and Purpura.*

PELLAGRA.—(Synonyms: Lombardian leprosy; erythema endemicum; Mardismus; *Mal de misère* [French]; *Malländische Rose* [German]; *Mal roxo* [Spanish]; *Mal rosso*; *Scorbuto Alpino* [Italian]).

DEFINITION.—An affection, limited to certain countries of the temperate zone, which has been most prevalent where maize or Indian corn is the principal article of diet. It is thought to be a trophoneurotic disease of toxic origin, affecting mainly the digestive tract, cerebrospinal centres, and the skin.

The disease was first observed in Spain in 1735, and it still exists to a limited extent in that country, although it is mainly encountered in Northern Italy, in the country about Rome, in Southern Austria, in the Tyrol, and in Roumania, while Manson reports the disease as prevalent in Egypt. No cases have appeared in this country, although it is sometimes imported with immigrants coming from countries where the disease prevails.¹

SYMPTOMS.—The disease occurs in both men and women, and it has usually been observed in adults, although children are by no means exempt. It first makes its appearance in the spring or early summer; continues during the summer months, and then subsides as winter approaches. The first symptoms refer to the digestive tract and consist mainly of loss of appetite, thirst, vomiting, together with intestinal disturbances which give rise to diarrhoea; or, more rarely, constipation may be at first complained of, but this is usually followed by obstinate diarrhoea. As might be expected in this condition the tongue is furred, and epigastric pain is not infrequently complained of. In addition, there are lassitude, sometimes dizziness, noises in the ears, headache, and sleeplessness. These symptoms are soon followed by anæmia, palpitation on slight exertion, and sometimes œdema. Pains occurring either in the joints or in the lower part of the spine may likewise be complained of. In the course of a few months, or it may be not until the summer following, the skin shows signs of being implicated in the disease. At first there may be a general pallor, or even jaundice, which is soon followed by an erythema. The erythema often develops somewhat suddenly, although less abruptly than is usually the case with simple erythema, and its duration is more prolonged. The parts exposed to the sun's rays are at first, and throughout the whole course of the disease, the regions mainly involved. The changes consist of an erythematous blush which may be uniformly distributed over the area involved, or the eruption may appear in the form of patches of various shapes and sizes. These are generally first noticed on the backs of the hands, the face, neck, and forearms in laborers who are accustomed to go in the sun bare-armed. The same may be observed on the feet and legs of children who are wont to go barefooted; and it has been observed by Raymond² to recur in parts once af-

fect, although subsequently protected from the direct rays of the sun. The eruption at first bears some resemblance to an ordinary sunburn. In unusually severe cases the cutaneous eruption is often of a livid red color which disappears on pressure, and in some instances hemorrhagic petechiæ are encountered; bulliæ have likewise been observed, and marked œdema of the parts affected is not an uncommon symptom. The subjective symptoms complained of in the skin are slight burning or itching, although the latter symptom is usually described by the patient as merely prickling or tingling, rather than the well-defined itching experienced in eczema. These constitute what may be called the first stage in the cutaneous manifestations.

Toward the last of the summer, however, the skin assumes a dark, sometimes muddy, color; it becomes rough, the epidermis being thickened and slightly scaly, and not infrequently excoriated patches are encountered. These are occasioned by the rubbing and scratching indulged in by the patient. The duration of the eruption is variable.

Usually the active cutaneous symptoms begin to subside within a few weeks, or soon after midsummer, when the patient apparently recovers, and as cold weather approaches no vestige of the disease may be apparent. In this case the patient remains free from the disease until the following spring when the symptoms return usually with greater severity than characterized those of the preceding year. More frequently, however, the symptoms do not wholly subside upon the approach of winter. With the recurrence in the severity of the eruption the skin soon becomes thickened and fissures occur about the small joints; this is accompanied by marked exfoliation and constitutes the second stage of the eruption. The severity of the disease varies in different seasons and in different individuals, but it is usually commensurate with the privations to which the patient is exposed. Year after year the erythema returns and finally there takes place marked atrophy of the derma, the skin becomes shrivelled, and the fingers assume a semiflexed position, constituting the third stage of the cutaneous lesions.

During the second year the nervous system shows more unmistakable signs of implication. At this time changes in the reflexes are seldom wholly absent. In 165 cases examined by Sandwith,³ the knee jerk was found to be normal in only 3, in 45 it was slightly exaggerated, in 70 very brisk, in 15 feeble, and absent in 23. In addition to this the patient complains of pain and tenderness in the dorsal region, the pain sometimes radiating to the extremities. According to Crocker⁴ the third nerve is frequently paralyzed, and changes have been observed in the fundus oculi. These symptoms are followed by delirium, and after many years by melancholia, mania, and a tendency to suicide, while insanity is not infrequently the final sequence. It is estimated that about ten per cent. of the patients finally drift into the lunatic asylums of Italy (Billod). In young people bodily defects are sometimes attributed to this disease, especially defective development of the organs of generation, while it is said that the mental powers may be unnaturally precocious. Other symptoms noted late in the course of the disease are paralysis of various parts of the body, those most frequently reported involving the legs and arms; while atrophy of various internal organs is often observed post mortem.

PATHOLOGY.—According to Lombroso⁵ the principal factor in the causation of pellagra is undoubtedly some toxic effect on the sympathetic system and the vagus nerve. The first change observed in the skin is hyperæmia, which goes on to exudation and consequent hypertrophy. Similar changes have been best observed in the meninges of the brain, as well as in the liver, spleen, kidneys, and lungs. When, as is usually the case, death occurs late in the course of the disease, atrophic changes have been for the most part observed. The most constant post-mortem changes are, therefore, general emaciation, atrophy of the skin, which presents a shrivelled,

sometimes furrowed appearance, together with marked atrophy of the liver and spleen. In some instances these changes have been noted in the kidneys. Symmetrical sclerosis has been observed by Tuczek in the posterior columns of the cord and in the pyramidal tract; while in some cases fatty degeneration of various internal viscera is the most conspicuous feature. In one hundred and thirteen autopsies Lombroso found exudation into the liver, kidneys, spleen, and the meninges of the cord. He likewise found atrophy of viscera supplied by the vagus, fatty degeneration of the liver and kidneys, and pigment changes in the cells of the brain and cord.

ETIOLOGY.—It was formerly supposed that the exclusive use of unwholesome maize as an article of diet was the cause of pellagra. There can be no question, however, that bad hygienic surroundings together with exposure to the sun are the most important factors in the etiology of the disease. According to Lombroso (*loc. cit.*), the immediate cause of pellagra is a toxic influence analogous to ergotism, and further that maize when decomposed gives rise to a fatty oil or extractive which has been denominated pellagrozein. In experiments made with this oil on both men and animals it has been shown that symptoms somewhat analogous to pellagra have followed its administration. On the other hand, many cases of pellagra are reported in which the ingestion of maize has played no part. Thus Hardy,⁶ Schreiber,⁷ and others have reported cases of pellagra in which maize had not entered into the dietary. Alcohol and syphilis have likewise been looked upon as etiological factors. While it must be acknowledged that they may be contributory in producing the debilitated state essential in its causation, there is no positive ground for believing that they ever give rise to the disease *per se*. It is well known that maize as an article of diet is perfectly wholesome when sound and properly cured; but, like rye, maize may become affected, giving rise to a potent toxic poison analogous to ergot. Dr. Zampa,⁸ medical officer of health in the province of Rome, claims to have traced a direct connection between the disease and certain topographical conditions, although malaria seems to have no part in its causation. The disease is most commonly met with among the agricultural class, although in rural districts it does not spare the artisan or those engaged in other pursuits. According to Zampa, damp, dirty, ill-ventilated habitations, scarcity of pure drinking-water, and a large consumption of "polenta" (a porridge made of maize seasoned with a little salt) as the chief article of diet, are the chief causes of pellagra. Crocker very aptly summarizes the cause of pellagra into "peasant life, poverty, and polenta." The disease is not contagious nor is it inherited. The age at which the disease is most commonly met with ranges between thirty and fifty years.

DIAGNOSIS.—Like many infectious diseases the diagnosis of pellagra is not difficult when it is encountered in connection with other cases of the same nature, in communities where pellagra is known to be endemic, or in those known to have suffered from previous attacks of the disease. On the other hand, in sporadic cases or in countries where the disease is seldom encountered, its recognition may be somewhat difficult. The first point to be considered is the nutrition of the patient, for malnutrition is essential to the development of the affection. Gastro-intestinal disturbances, together with erythema appearing on the backs of the hands, on the face, more rarely on the forearms and dorsal surfaces of the feet as warm weather comes on, might be mistaken for ordinary sunburn. The association of gastro-intestinal disturbances, however, should put one on guard, while the persistence of the eruption would soon lead to a more thorough investigation, when the association of other symptoms or the history of previous attacks would enable the physician to make a positive diagnosis. Later in the course of the disease the occurrence of nervous symptoms would be conclusive to one familiar with the salient features of pellagra. Finally, with the continuation of the eruption year after year, together with great debility,

despondency, an inclination to melancholia, and aberration of reflexes, an error in diagnosis need not occur.

PROGNOSIS.—The prognosis will depend upon the severity of the disease and the extent to which it has advanced. During the first attack the prognosis may be said to be favorable, provided the patient can obtain suitable nourishment, and provided the impairment of the digestive functions be not sufficiently grave to interfere with normal nutrition. On the other hand, after the disease has existed one or more years and general impairment of nutrition becomes more marked, together with involvement of the nerve centres, the prognosis is always extremely grave. When the disease goes unchecked the final fatal termination may be expected in from three to twelve years, the average being about five. In all cases the prognosis will depend upon the ability of the patient to place himself under the most favorable conditions for recovery.

TREATMENT.—There are no drug specifics in the treatment of pellagra, and regulation of the diet should be the first consideration. In conjunction with this, proper attention should be paid to the digestive tract, which may require sedatives or soothing medicines, such as olive oil or albolene, together with opium, bismuth, etc. The food selected should be light and easy of digestion, and it should be given in small quantities at frequent intervals according to the strength and general condition of the patient. Milk, eggs, and meat broth are usually indicated in severe cases, and as the strength increases a meat diet with vegetables and bread obtained from well-ripened grain should be given. Next in importance to the diet are the hygienic surroundings of the patient. As has been shown, most cases occur among those who have been subjected to the vilest hygienic conditions; therefore it should be seen that the room occupied by the patient be sufficiently large to insure pure air together with free ventilation; dampness should be avoided by selecting a room to which the sun gains access at least during some portion of the day. Massage and rubbing with salt may be of benefit. By way of further medication, after the more pressing symptoms have been allayed, tonics and vegetable bitters, such as quinine and iron, together with cod-liver oil, should be prescribed. In some cases the administration of arsenic is followed by marked improvement. The cases in which this remedy is most liable to prove beneficial are those which have extended over several years and in which the disease has assumed a chronic stage. To quiet the apprehension of the patient, especially when the nervous manifestations assume a serious aspect, opium may be given.

William Thomas Corlett.

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PELLITORY.—*Pyrethrum*, U. S. P.; *Pyrethri radix*, Br. P.; *Spanish Pellitory*; *Spanish Chamomile*. The dried root of *Anacyclus Pyrethrum* (L.) DC. (*Anthemis P.* [L.] fam. *Compositae*.)

The pellitory plant is a pretty little perennial herb, which somewhat resembles the chamomile, whence one of its common names. It is a native of the Mediterranean basin, where it is cultivated not only as a drug, but also as a garden flower.

From 5 to 12 cm. (2 to 5 in.) long and 1 to 2 cm. ($\frac{3}{8}$ – $\frac{1}{2}$ in.) thick, nearly straight and unbranched, cylindraceous, tapering or slightly fusiform, bearing a few tough, hair-like, yellowish rootlets and in the centre of the crown usually a tuft of cottony or silky, whitish, fibrous tissue; externally deep brown, or slightly grayish-brown, inconspicuously annular near the crown, very roughly wrinkled and pitted, harsh to the touch; fracture short and sharp; bark thick, the inner layer brown, containing about three

circles of dark red resin cells, the outer layer dark brown; wood yellow-brown, finely radiate, containing four or more circles of resin cells; inodorous, pungent, and acrid, producing a prompt and strong sialagogue effect.

The acidity of pellitory is due to a number of constituents, or possibly to some one which is carried in the former. These are a resin and two fixed oils, all present in large amount, as well as the alkaloid *pyrethrine*. The latter is readily decomposed into a derivative alkaloid, believed to be piperidine, and piperic acid. The resin contains a small amount of the alcohol-soluble body, *pellitorin*. The substance which has been sold as "pyrethrin" is merely a fatty and resinous extract. Tannin and volatile oil are present in small, and inulin in large amount.

ACTION AND USE.—These have been but little investigated, notwithstanding that the powerfully active properties of the drug warrant a thorough experimental study. It is one of the most powerful of sialagogues, a property which we have not yet learned to utilize, in spite of the important digestive functions of the saliva. It is at least possible that so powerful an action upon the salivary glands is associated with a similar action upon the pancreas, but no observations are recorded upon this point. The most general application of the drug is as a dental anesthetic and counter-irritant, and it enters into numerous "toothache drops" which have themselves largely gone out of use. There is a twenty-per-cent. official tincture, made with alcohol, the dose of which is a fluidrachm.

ALLIED DRUG.—*German pellitory* or *pyrethrum* is the root of *A. officinarum* Hayne, the nativity of which is not certainly known, but which is a product of cultivation. The root is very much more slender and elongated than the other, and usually comes to market with long portions of the stem attached. It has a circle of large resin cells in the bark, but there are none in the medullary rays. Its constituents and action are practically identical with those of the official variety.

Henry H. Rusby.

PELVES, DEFORMED.—Any marked deviation in size or symmetry from the normal pelvis may be regarded as constituting a deformity of the pelvis, whether the effect on the course of labor be serious or not.

A deformed pelvis may be due to an error in development, to local disease, injury, or new growth, or indirectly to injury, disease, or maldevelopment of the adjoining skeleton. Thus from errors in development there are the abnormally large pelvis, called *justo-major*; the *justo-minor*, or disproportionately small, sometimes of a persisting infantile type; and the pelvis of the masculine type, large and thick-boned, but with a narrowed pubic arch and pelvic outlet.

From local errors in development there are the rare varieties, where one or both of the sacral ala are lacking, giving the *Naegle* (oblique) or *Robert* (transversely contracted) pelvis. The split pelvis is one in which there is failure of meeting of the pubic bones at the symphysis.

From constitutional disease or errors of nutrition causing softening of the bones, there result the pelvis deformed by rachitis and osteomalacia. From local disease there may be caries of some of the pelvic joints, with arrest of development and later ankylosis. The sacro-iliac joints, if diseased in early life, may cause extreme deformity. Following injuries there may be pelvic fracture with formation of callus. New growths may limit or obliterate the pelvic cavity—a primary sarcoma or secondary carcinoma, or some form of enchondroma or exostosis.

Any injury or maldevelopment of parts of the skeleton adjoining the pelvis, especially during early life, may have an important bearing upon the subsequent developments of the pelvis, and leave indirectly its stamp on the general contour of the latter. Thus, for example, poliomyelitis, causing a paralysis and subsequent atrophy of one limb, leaves the pelvis on that side comparatively

undeveloped. As a further result of the shortening of the limb there must be compensatory scoliosis, with its effect upon pelvic growth.

Other forms of paralysis of the lower extremities, or joint diseases of hip, knee, or ankle, may affect the pelvis in the same way. A congenital hip-joint dislocation may

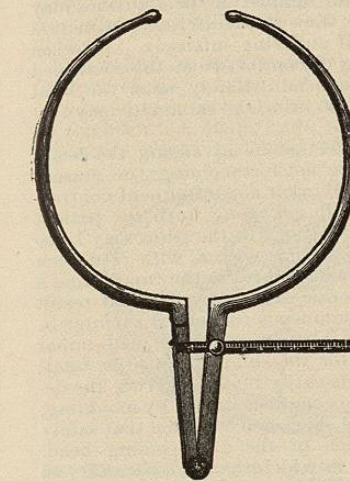


FIG. 3753.—Baudelocque's Pelvimeter.

seriously affect the normal growth of the pelvis. Other results of skeletal deformity upon the pelvis are not infrequently seen from defects in the spinal column, such as simple, compensatory, or rachitic scoliosis, caries of the vertebrae, and, rarely, the anterior dislocation of the bodies of the lumbar vertebrae, known as *spondylolisthesis*. Senile changes in the pelvis before the end of the child-bearing period sometimes cause obstruction by ankylosis of the coccyx with the sacrum.

Habits of living must always be counted upon as etiological factors. The poorly nourished and poorly housed are the ones who present pelvis deformed from rachitis and tuberculous. For this reason the percentage of deformities is small among our native country classes, large among the dwellers in cities, especially of the slums, and greatest among the immigrant population. Abroad, where the sanitary conditions of life are worse, still higher proportions of deformity are found, and osteomalacia is occasionally met with.

There are racial peculiarities in the shapes of the pelvic brim. The Caucasian normal type is one which is wide transversely; the outline of the Australian pelvic brim is almost circular; while the African pelvic brim is one which is relatively constricted transversely, and has a long antero-posterior diameter. This type of pelvis, if affected by the unsanitary conditions in which the negroes commonly live in this country in cities, supplies a large proportion of bad pelvic deformities. Thus one author has reported seven per cent. of deformed pelvis in whites in a city hospital service, as against twenty-one per cent. in blacks.

The recognition of the deformity is important. One "must learn pelvimetry if he is to do intelligent obstetrics." Much can be ascertained by inspection of the patient. The facial appearance, form, carriage, height, gait, or obvious deformities of spine or lower extremities may lead to suspicions and put one on the track of a pelvic defect. A careful questioning may elicit a history of diseases such as rachitis or tuberculous bone disease, or bring out information concerning previous difficult labors.

But the history may be lacking, and all external appearance of deformity absent. Moreover, in all cases, no matter how obvious the deformity, its true extent and its obstetric significance can be ascertained only by careful pelvimetry, through palpation, vaginal examination, and instrumental pelvic measurements. External measurements, except in some cases of great obesity, are of a certain value in determining the types of deviation from the normal. Of greater importance is the exploration by vaginal examination of the pelvic cavity.

For external measurements there have been chosen certain easily recognized bony landmarks. The distance between these points is taken by a form of caliper called the pelvimeter. Of the commoner types perhaps those of

Baudelocque and Breisky are best known. The essentials of a good pelvimeter are compact size and an accurate and legible scale, preferably in centimetres.

The first measurement usually taken is the distance between the anterior superior spines. For this measurement the patient should be flat on the back, with all but the thinnest clothing removed from about the hips and lower abdomen. The thumb and forefinger should steady each tip of the pelvimeter. The thumb should now be allowed to rest in the notch below the spines and the tips of the pelvimeter be lightly pressed against their outer side and the reading made. Taken in this way the measurements will be fairly constant when made by different individuals. The average interspinal diameter is 24 cm.

The next measurement should be the distance between the crests of the ilia, this measurement being made between the points which are most widely separated. The patient lying in the same position, the tips of the pelvimeter are slipped back along the outside edge of the crests, and the widest points of divergence noted and measured. This is called the *intercrystal* measurement. It should average about 28 cm. These two distances furnish an indication of the transverse diameter of the pelvic brim, especially if taken in consideration with the so-called external oblique measurements.

The ratio of the interspinal measurements to the intercrystal has a distinct value in the study of certain types of deformity, especially the rachitic.

The external oblique measurements are those taken from one posterior superior spine to the opposite anterior superior spine. To take the left oblique measurement the doctor stands on the right of the patient, who lies on her left side. The distance from the left posterior superior spine to the tip of the right anterior superior spine is measured. The posterior spines are not very prominent, but are usually indicated by the presence of a dimple on either side of the sacrum from one and one-half to two inches from the median line. The patient now lies on the right side, and the right oblique measurement is taken. The average length of these measurements is 22 cm. The right oblique is commonly 0.5 cm. larger than the left. The obliques furnish a fair idea of the oblique diameters of the pelvic brim. Any marked deviation of their normal relation to each other is a good index to oblique pelvic contraction.

For estimation of the antero-posterior diameter, or so-called conjugate of the pelvic brim, a measurement is taken which is called the *external conjugate*. This is the distance from the tip of the last lumbar spine to a point about one-quarter of an inch below the upper edge of the pubic symphysis in the median line. Some authorities give the depression just below the last lumbar spine as the posterior landmark, but this gives less constant and exact measurements. The last lumbar spine is usually the most prominent spine in that region. It is found about 2 cm. above the level of a line drawn through the two posterior superior spines. This measurement calls attention to contractions in the antero-posterior diameter of the pelvis. In the normal pelvis it measures from 20 to 21 cm. Any pelvis measuring less than 18 cm., even if *justo-minor*, should be regarded as flat. There are, however, possibilities of error in this measurement. Occasionally a

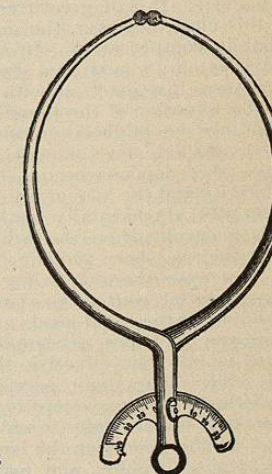


FIG. 3754.—Breisky's Pelvimeter.

For external measurements there have been chosen certain easily recognized bony landmarks. The distance between these points is taken by a form of caliper called the pelvimeter. Of the commoner types perhaps those of