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A REFERENCE HANDBOOK

OF

THE MEDICAL SCIENCES.

Aachen.  
Aachen.

**AACHEN** (Aix-la-Chapelle, Fr.), renowned for its hot sulphur springs, is an ancient Prussian town of 100,000 inhabitants, easily reached from Paris, Brussels, or Cologne, being only forty-four miles distant from the latter city. In its ancient and renowned cathedral "are the famous relics of Charles the Great, who has been honored as the discoverer of the springs and founder of the town; but thermal waters at Aachen were certainly known to the Romans," whose predilection for baths and hot springs is well known, as their elaborate remains at Bath, England, and elsewhere testify. The springs of Aachen were also visited in A.D. 756 by King Pepin the Short. The town is at an elevation of about 565 feet above sea level, is built on sandy soil, and is fairly sheltered by hills. Although the town itself has become entirely modern, its surroundings are very attractive. The climate is moderately moist. The average temperature is 54° F., and the number of rainy days 110.

The entire city is underlaid with hot springs, and within a distance of 1,316 metres the water issues from ten springs. The principal ones are the Kaiserquelle (the strongest), with a temperature of 131° F.; the Quirinaquelle, 122° F.; the Rosenquelle, 117.5° F.; and the Corneliaquelle, 114° F. The waters of the various springs are very similar in mineral constituents, differing in temperature and the amount of sulphur they contain. The Elisenbrunnen, the one most used for drinking purposes, derives its water from the Kaiserquelle.

At the larger bath establishments, which are elegantly fitted up and arranged, there are vapor baths, inhalation chambers for bronchial and laryngeal affections, and other rooms set apart for the various hydrotherapeutic processes. "The great advantage of Aix-la-Chapelle," says Dr. Baruch, "is the fact that nearly all the baths are situated in five hotels, and there is no necessity, as at Aix-les-Bains, for the patients to be carried in sedan chairs from the springs to the hotels." In the town is a Zander Institute, with Dr. Zander's medico-mechanical appliances for Swedish gymnastics. Although one can be treated at Aachen at all times, the two seasons are the summer, from April 15 to October 15, and the winter, from November to April. The accommodations are very good, and one can live in the bath establishments themselves, as has been said.

In 10,000 parts of water, the Kaiserquelle, according to the analysis of J. von Liebig, contains:

Sodium chloride . . . . .	26.161
Sodium bromide . . . . .	0.036
Sodium iodide . . . . .	0.005
Sodium sulphide . . . . .	0.095
Sodium sulphate . . . . .	2.836
Potassium sulphate . . . . .	1.527
Sodium carbonate . . . . .	6.449
Lithium carbonate . . . . .	0.029
Magnesium carbonate . . . . .	0.506
Calcium carbonate . . . . .	1.579
Strontium carbonate . . . . .	0.002
Ferrous carbonate . . . . .	0.005
Silica hydrate . . . . .	0.661
Organic matter . . . . .	0.769
Total . . . . .	40.750
Carbonic oxide (free and partially free) . . . . .	5.000
Traces of fluorine, boron, and arsenic. There is probably an organic sulphide (allyl) present in minute quantity.	

VOL. I.—1.

The action of the Aachen thermal waters, as indeed of all thermal waters, is to increase tissue metamorphosis and thus to promote absorption of chronic inflammatory products, as in chronic rheumatism and gout; but, as Weber wisely remarks, "hot baths and hot-water drinking are likewise beneficial in these conditions, and it is not certain that the presence of small quantities of sulphur adds much to the effect of hot water"; "the same," he adds, "may be said with regard to some chronic skin diseases." In another place the same writer remarks that in other cases besides those of syphilis the reputation of the Spa is due not so much to the water as to the energetic hydrotherapeutic measures, special exercises, massage, etc., which are employed there.

On account of the chloride of sodium which they contain the waters are used in catarrhal conditions of the stomach and alimentary canal and of the bronchi. There are inhalation chambers, as has been stated above, for bronchial and laryngeal affections. The waters are also used in various affections of the abdominal viscera: in sluggish action of the bowels and stagnation in branches of the portal vein, with the resulting dyspeptic troubles; in congestion of the pelvic organs and hemorrhoidal vessels; and in enlargement of the liver. Chronic skin diseases, such as eczema and psoriasis, are treated at Aachen with more or less success, "the results obtained," as one author remarks, "doubtless partly due to the medicinal treatment." Besides chronic skin diseases, the following affections constitute the major part of those treated at Aachen: chronic rheumatism, gout, and the stiffness of joints resulting from these affections; metallic poisoning; and syphilis. Cases of the latter disease by far outnumber all the rest, for out of the 20,000 annual visitors at the Spa, 14,000 are said to come there for syphilitic treatment. "The value of these baths in this disease," says Baruch, "has produced such an afflux of syphilitics that the town has obtained quite an unenviable reputation, which prevents, it is said, purely gouty, rheumatic, and other patients from frequenting it." Weber thinks that the reputation of Aix-la-Chapelle in syphilis has been due in great part to the ordinary medicinal treatment employed there and to the attention paid to the subject by the local doctors.

Be this as it may, the success of the Aix method of treating syphilis is undoubted, and it will be of interest to repeat here the detailed account of that method which Dr. E. C. Wendt gave in the first edition of this **HANDBOOK**. It is, in all essential respects, as follows:—

Dr. Brandis, one of the experienced physicians of the Spa, insists on three points:

1. The body must always be adequately prepared for the absorption of the mercury, and the gray ointment must always be used carefully and in sufficient quantity. The patient is directed to take a warm bath of half an hour's duration, at a temperature of 95° F., so as to be prepared for the subsequent inunction. From this rule it may be necessary to deviate for various reasons. A very frequent cause which compels us to adopt other measures first is the fact that mercurialism, the result of previous incautiously applied mercurial treatment, is

present. After the bath the patient must be most carefully dried, and immediately, in the bathroom, rubbed with gray ointment.

During the entire treatment it is advisable to allow the patient to drink the warm waters; two or three glasses should be drunk in the morning, and a similar quantity in the evening also. In winter and cold weather the waters should be taken in bed; during the summer and on warm days, while walking about. Nevertheless, we must carefully notice whether the internal employment of the waters disturbs the digestion, whether it takes away the appetite and thus interferes with the fulfilment of a very weighty indication, namely, the nourishment of the body.

For removing debility Dr. Brandis relies not on the use of the waters, but on the abundant drinking of warm milk, a measure the merits of which have not been sufficiently appreciated.

Vapor baths, followed by copious sweating, are indicated when the mercury no longer exercises a beneficial effect upon the healing process. As a rule, patients are directed, possibly after the twentieth inunction, to take a vapor bath on three consecutive days, and then subsequently after each tenth inunction.

As to the method of performing the inunctions, Sigmund's instructions are observed. It is essential that competent rubbers do the work.

Both hands must be employed in rubbing in the ointment. The use of gloves and pads is prohibited, as they absorb too much of the ointment. Mercurial poisoning in the rubbers has not been observed. Every rubbing is to last fully twenty minutes, ten minutes for each half of the dose.

The further instructions of Sigmund are as follows: On the first day rub both legs; on the second, both thighs; on the third, the abdomen and the breast; on the fourth, the back; and on the fifth, both arms.

Many patients, however, cannot endure the rubbing of the abdomen and breast; in such persons the rubbing is applied to the sides of the body and the nates. The daily dose varies with the body-weight and the susceptibility of the patient—between four and five grammes for adults, and from one to two grammes for children.

2. During a course of treatment the body must be maintained in good condition; the patient must take exercise in the open air, he must occupy a spacious bedroom, and he must have good food in plenty.

The treatment of the mucous membrane of the mouth is of great importance, for it is in this way that much can be done to prevent mercurial stomatitis.

Dr. Brandis employs as a mouth wash a preparation made according to the following recipe:

R Pulveris aluminis,  
Plumbi acetatis . . . . . 30.0  
Aque destillate . . . . . 300.0  
Misce et filtra.

This solution may be used by diluting it either with pure water or with some aromatic water, in the proportion of about two dessertspoonfuls to the glass of water. The mouth must be regularly rinsed, from the beginning of treatment, ten or twelve times a day, or even oftener. Even when taking walks the patient must carry a small bottle of the liquid; and in urgent cases he must use it repeatedly, even at night. After each meal the teeth must be brushed with a mixture of prepared chalk and camphor.

Dr. Brandis states that by carrying out these measures very carefully the patient will, as a rule, escape salivation; but occasionally it happens that the physician is obliged to order a temporary suspension of the inunctions. One thing more is to be observed—namely, we may accustom even highly sensitive patients to tolerate mercury. If we know beforehand that we have to deal with such, we should begin with small doses of the mercurial ointment, and gradually increase to larger. Or if

we have the misfortune to induce stomatitis, and are obliged to suspend treatment, we must postpone resuming it until all these symptoms have disappeared; we then begin again with small doses, and gradually rise to larger. A practical suggestion relates to ulcerative processes, so frequently observed in the course of syphilis. It is not always an easy matter to distinguish mercurial from syphilitic ulcerations; they both occur in the most various parts of the mucous membrane of the mouth, and may look very like each other. Above all, this holds good of those mercurial ulcerations which occasionally appear on the tonsils and on the soft palate. Here frequently only long-continued observation can decide the matter; if, however, we remain in doubt, the inunctions must be suspended; the mercurial ulcers will then heal, whereas the syphilitic ulcers will be aggravated. They also behave differently when cauterized with nitrate of silver. The mercurial sore stands an energetic cauterization very well; in fact, its healing is furthered by it; whereas the contrary is generally the case with the venereal ulcer. Increased secretion of saliva may also occasion doubt, for at times syphilitic disorders which affect the cavity of the mouth directly produce salivation. Another disagreeable result of the inunction treatment is mercurial diarrhoea. This symptom sets in suddenly; the evacuations follow one another rapidly, there is pain and tenesmus, and the stools are scanty and show mucus and blood. Treatment by opiates is indicated, while the inunctions must at once be interrupted.

Healthy persons lose in weight if subjected to mercurialization. In contradistinction to this, syphilitic patients gain in weight as soon as they enter the stage of convalescence. This applies to recent cases as well as to those of long standing.

The inunctions must be employed for a sufficiently long time. As our task consists in healing the symptoms of the disease, and as much as possible in averting relapses, the earlier the syphilitically infected person is brought under mercurial treatment, the milder will be the course of the disease.

3. Above all things, Brandis insists that we must not too soon dismiss the patient from treatment—indeed, not until all symptoms have disappeared, to the last vestige; and also, that even the slightest attacks must be energetically treated from the outset. If experience shows us, on the one hand, that inadequate treatment fails to remove completely the existing symptoms, or, after apparently curing them, is not competent to prevent later relapses, it also, on the other hand, demonstrates the fact that a long and energetic mercurial treatment will generally accomplish the desired object.

In all ordinary cases the inunctions are prolonged eight or ten days beyond the time of healing of visible lesions; the thermal baths need not be given for a longer period.

In this country the Hot Springs of Arkansas is perhaps the most renowned place for the treatment of syphilis, and so far as the waters are concerned, it offers essentially the same advantages as Aachen.

Edward O. Otis.

**ABDOMEN. (ANATOMICAL.)**—The abdomen is the region of the body lying between the thorax and the pelvis. It includes the abdominal wall, the abdominal cavity, and its contents, the latter comprising almost the whole of the digestive apparatus and a part of the urinary. Above, the abdominal wall is separated from the thorax by the costal arch. Below, it is continued into the pelvis and thighs, the lines of separation being the iliac crests laterally and Poupart's ligaments mesially. These superficial boundaries of the wall are not coextensive with those of the cavity, for it extends above into the vault of the diaphragm, corresponding superficially to the fourth intercostal space on the right side and the fifth on the left. Below, it passes into the pelvic cavity, the line of separation between abdomen and pelvis being the linea ilio-pectinea. Here the lower limit

is the upper surface of the levator ani and coccygeus muscles.

The form and external appearance of the abdomen vary with sex, age, and the condition of the abdominal wall and underlying organs. In infancy, as the pelvis is undeveloped and the organs in the upper part of the cavity are relatively large, the abdomen is cone-shaped, the apex of the cone being directed downward. In adult males the region is cylindrical and slightly flattened from before backward. In females it is again cone-shaped, but the apex of the cone is above, as the diameter of the lower circumference of the thorax is always less than that of the pelvis.

The ABDOMINAL WALL presents antero-lateral and posterior aspects. It differs from the walls of other cavities in being, for the most part, devoid of skeleton, which, with the elastic character of the tissues composing it, allows the cavity to vary in capacity according to the size of the contained viscera. At all times it exerts upon them a gentle pressure, supporting them, and causing the more solid to impress the softer. This pressure may be appreciated in any laparotomy wound, when the omentum and more movable intestines are retained with difficulty. The antero-lateral wall is composed of the following layers of tissue, which must be considered in detail:—

Skin,  
Superficial fascia } superficial layer  
                          } deep layer,  
External oblique muscle,  
Internal oblique muscle,  
Transversalis muscle,  
Rectus muscle,  
Transversalis fascia,  
Properitoneal tissue,  
Parietal peritoneum.

In addition to this general description, certain regions which are commonly the seat of hernia must receive especial study. These are:—

The inguinal region,  
The inguino-femoral region.

The *Skin* of the abdominal wall is thin and movable except in the region of the navel, where it is attached to the underlying tissue. Corresponding to the linea alba is a furrow which indicates the space between the recti muscles. Two transverse flexion folds are usually present, one at the level of the umbilicus, a second, one inch above the pubis. This latter marks the summit of the moderately distended bladder. In pregnancy, or during the growth of large intra-abdominal tumors, the stretching of the skin may give rise to a series of longitudinal lines, called striae gravidarum.

**Superficial Fascia.**—Of this there are two layers. The superficial layer varies in thickness according to the amount of fat deposited in it. Both above and below it is continuous with the corresponding layer of tissue in adjacent regions. In the pubic region it passes into the scrotum, losing the fat, and, joining the deep layer, it assists in the formation of the dartos. At the posterior border of the scrotum it becomes continuous with the same layer of the perineum. The amount of fat deposited in this layer, together with that in the omentum and mesenteries, is the principal factor in determining the external appearance of the abdomen. Accordingly, all gradations occur, from the thin concave abdomen of the emaciated to the thick pendulous one of the obese. These variations become of importance in examinations of abdominal organs or in operations upon them. The thick wall renders the task more difficult.

The deep layer is thin and more fibrous in structure. It can be separated distinctly only in the lower half of the wall; above, it is lost in the superficial layer. Below, externally, it is connected with the iliac crests; anteriorly, it passes over Poupart's ligaments, to be attached to the fascia lata half an inch below them. In the pubic region,

together with the superficial layer it passes into the scrotum to form the dartos. At the posterior border of the scrotum the layers again separate, the deeper one forming the corresponding fascia of the perineum. This latter fascia is attached on each side to the rami of the pubis and ischium, and turning around the posterior border of the transverse perineal muscles, it becomes continuous with the deep perineal fascia. It is beneath this layer of tissue that urine or an infection is guided from the perineum through the scrotum upon the abdomen. The attachment of the fascia to the bony margin of the pelvis prevents the spread into the thighs on their inner sides, while the attachment to the fascia lata prevents a similar spread from in front. The deep superficial fascia is separated from the aponeurosis of the external oblique by loose areolar tissue except along the linea alba, where the attachment is more intimate.

**External Oblique Muscle** (Figs. 1 and 2).—This, the strongest and most superficial of the abdominal muscles, arises by fleshy digitations from the eight lower ribs, interdigitating in the upper half with the serratus magnus, in the lower with the latissimus dorsi. The fibres are directed downward, forward, and inward, those from the last two ribs almost vertically downward to their insertion in the anterior two-thirds of the external lip of the iliac crest. The remaining fibres, more oblique in direction, terminate in a broad aponeurosis, which at the mid-line joins with the aponeurosis of the remaining muscles in the linea alba. The following structures in the aponeurosis of the external oblique require especial mention:—

**Poupart's Ligament**, formed by the thickened lower border of the aponeurosis, stretched between the anterior superior iliac spine and the pubic spine. Attached to it below is the fascia lata, which gives to the ligament an outline, convex downward. The flexor muscles of the thigh, the femoral vessels, and the anterior crural nerve pass behind the ligament in their course downward.

**Gimbernat's Ligament** (Fig. 5).—Reflected from the pubic end of Poupart's ligament to the linea ilio-pectinea for about three-quarters of an inch, is a triangular layer of fibrous tissue termed Gimbernat's ligament. It has upper and lower free surfaces, and a concave external border, bounding the femoral ring internally.

**External Abdominal or Inguinal Ring** (Fig. 2).—Situated in the lower and inner part of the aponeurosis is an oval opening, formed by the separation of the fibres composing this part of the aponeurosis from the fibres of Poupart's ligament. The long axis of the ring corresponds in direction to that of the fibres of the aponeurosis. Its base is formed by the pubic crest, its sides by the diverging fibres, which are called the pillars of the ring. The superior or internal pillar, thin and flat, is attached to the anterior surface of the symphysis pubis, while the inferior or external, thick and prismatic, essentially the inner end of Poupart's ligament, curves inward to terminate at the pubic spine. Further facts concerning the external ring will be mentioned in the special description of the inguinal region.

**Intercolumnar Fascia.**—Binding together the fibres of the aponeurosis above the inguinal opening is a set of fibres which arch transversely inward from the outer half of Poupart's ligament, thus closing the angular interval left between the diverging pillars. At the margins of the opening these fibres are continued over the spermatic cord and testicle as a fine fascia, the intercolumnar or spermatic fascia.

**Internal Oblique Muscle** (Fig. 1).—The general direction of the fibres composing this muscle is the opposite of that of the external oblique. It arises below, from the outer half or two-thirds of Poupart's ligament, from the anterior two-thirds of the middle lip of the crest of the ilium, and from the lumbar fascia in the angle between the crest of the ilium and the outer border of the erector spinae muscle. From this origin the fibres ascend over the side of the abdomen to be disposed of as follows: the most posterior fibres pass upward to be inserted into the outer surfaces