

RIVES (W^m C.)

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Treatment of Diseases
of the Heart

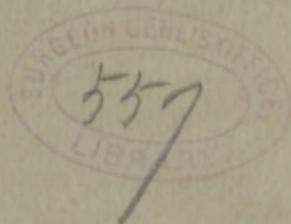
AND THE THERAPEUTIC METHODS
OF THE DOCTORS SCHOTT.

BY

WILLIAM C. RIVES, M. D.,

Lecturer on Diseases of the Chest and on General Medicine
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THE BATHS OF NAUHEIM IN THE
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By WILLIAM C. RIVES, M. D.,
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THE remarkable and in some respects unique results attained at Nauheim in cases of heart disease have begun recently to excite much interest and attention, and it is highly desirable that the particulars of a treatment which has proved to be an invaluable addition to our resources for the relief of a numerous class of sufferers should become as far as possible widely known.

The baths of Nauheim, with a resident population of three thousand inhabitants, lie at the foot of the eastern end of the Taunus range, at an elevation of four hundred and fifty-three feet above the sea, on the edge of the level and fertile plain—the Wetterau—which extends thence to the river Main. They are three quarters of an hour distant by rail from Frankfort on the line from that city to Cassel and Hanover, and within easy driving distance of the well-known and more fashionable health resort of Homburg.

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A straight road leading downhill from the station brings the visitor in a few minutes through the newer part of the town, which consists almost exclusively of villas for the accommodation of guests, to a street bordering in a semicircle a spacious and singularly well laid out park adorned with many beautiful trees.

From this point the town proper is quickly reached, presenting in itself few features of interest. It lies immediately to the south of the park, to the west of which is still another district of villas, occupying the lowest slopes of the Johannisberg.

The attention of the stranger is at once arrested by a number of large, unsightly structures in the plain adjoining Nauheim, fifty feet high, and more than a hundred and fifty long—the *Gradirhäuser*, or graduating houses, used in the process of making salt, which is manufactured there in large quantities. The old town of Friedberg, with its ancient walls and towers, only a mile distant, is a most picturesque object in the landscape, and from various points can be seen the Winterstein, the highest elevation in this part of the Taunus range.

In the midst of the park, near the banks of the little river Usa, burst forth the springs supplying the bath houses, on which the fame of Nauheim depends. These come from a great depth (five hundred and twenty-three and five hundred and ninety feet), and were found by means of borings made at different times in the course of this century. The two now in use—No. 7, Grosser Sprudel, and No. 12, the Friedrich Wilhelm's Quelle (the figures being used to designate the number of the boring)—spout forth as white foaming liquids, only thirty-two feet apart, high above the surface of the ground, and are connected with five bath houses, four in the immediate neighborhood and a fifth (bath house No. 4) which provides only simple

saline baths from spring No. 7 outside the park at a little distance from the others.

Bath house No. 5, opened in 1892, is much superior to the rest, and is a handsome building completely furnished with every requisite. At the present time there are in the whole establishment at Nauheim one hundred and ninety-six bathrooms with two hundred and four tubs. The tubs are of wood, painted, which has been found to be the most satisfactory material, and are of large size, so that when a tub is filled the body of the bather is entirely immersed up to the neck, and the pressure of the water on its surface is very considerable. Everything connected with the baths, which are under government control, is admirably systematized, and the attendants are well fitted by long experience for the discharge of their duties.

Drinking the waters plays but a secondary part at Nauheim, but their internal use is of some value in gouty conditions and disorders of the liver, the Kurbrunnen diluted being said to resemble the Ragozy spring of Kissingen, and the Karlsbrunnen, the Elizabeth Brunnen of Homburg. The Ludwigsbrunnen is also used as a table water. The Schwalheim spring, two miles distant, yields a ferruginous water containing carbonic acid.

The first bath house at Nauheim was opened in 1835, and the baths have been used for many years with advantage in gout, rheumatism, rickets, and so-called scrofulous diseases, and have acquired a well-merited repute in the treatment of locomotor ataxia and other diseases of the spinal cord; but F. W. Beneke, professor of general pathology and pathological anatomy at Marburg—a highly picturesque university town an hour by rail north of Nauheim—was the first to show, contrary to then prevailing views, not only that patients with heart disease, more especially those recovering from acute rheumatism, can bear

balneological treatment, but that they are actually benefited by such a course. Beneke, who was physician to the Nauheim baths from 1857 to 1866, and continued to visit them up to his death, in 1883, wrote several articles upon the effects he had observed there, the earliest of which appeared in 1859. After the publication of his more important paper in 1872 (6) patients with heart disease began to frequent Nauheim in greater numbers, and, following the lines of investigation suggested by his observations, the baths began to be studied more closely by other physicians.

In 1880 Dr. August Schott, who had been making independent studies since 1871, published a paper (20) by far the most important and exhaustive of any that had yet appeared, and the first to do full justice to the remarkable effect of the baths upon the heart. Numerous articles relating to the same and allied subjects have since been written by himself and his brother, Dr. Theodor Schott, and to their joint labors the present celebrity of Nauheim is largely due.

Within the last ten years the annual number of visitors during the season, a large proportion of whom are heart patients, has more than doubled, amounting to over twelve thousand in 1895.

The effect of the Nauheim baths, as proved by repeated observations, is to regulate the action and strengthen and improve the nutrition of the diseased heart, whether its inability to properly perform its functions depends upon valvular lesions and their consequences or upon malnutrition or disease of the cardiac muscular substance. These results are chiefly due to the chloride of sodium and the more irritating chloride of calcium, the former of which constitutes about four fifths of the solid constituents, and to the free carbonic acid, which they are said to contain in larger amount than almost any other baths in Ger-

many. They contain, moreover, a considerable percentage of iron, to which may also be attributed a tonic influence. The most powerful though more temporary stimulation, as proved experimentally, is caused by the carbonic acid. By means of the action of these saline and gaseous contents of the bath upon the terminal branches of the sensory nerves of the skin an impression is made upon the cardiac and vaso-motor centres, by which the heart is reflexly stimulated to more powerful and vigorous contraction and the arteries are more completely filled, and at the same time the cutaneous vessels dilate, peripheral resistance is lessened, and the whole circulation is rendered freer and more active, while metabolism is promoted and a marked influence exerted upon the trophic centres, as must be inferred from the striking evidences of improvement in the bodily nutrition in general, and in that of the heart in particular, and the persistence and even increase of the good effects long after the patient has completed the course.

The immediate objective results of the baths are as follows: Examination of the pulse, confirmed by sphygmographic tracings and the sphygmomanometer, shows it to be made slower, stronger, and of increased volume, the cardiac sounds become more distinct, and in cases of dilatation an unmistakable contraction of the heart, demonstrable by percussion and by the change in the position of the apex beat, is observed. This contraction is most noticeable in the transverse diameter of the heart, and takes place to little or no extent when the enlargement is solely compensatory, as in many cases of organic mitral and aortic regurgitation. Dr. Bezly Thorne, however, affirms that there is a diminution in the area of cardiac dullness, as measured in the oblique transverse diameter, of a third to about half an inch even in the healthy heart. The respiration becomes easy, and is slower and deeper, and there is usually

increased action of the kidneys. Subjectively, a sense of weight and oppression on the chest, greater than in an ordinary bath, is at first experienced, which quickly passes off; the skin soon becomes warm, and tingling, accompanied with redness, is felt in its more sensitive parts. Afterward, the patient feels invigorated, and is generally conscious of a sense of drowsiness.

Baths capable of producing these effects are not the monopoly of Nauheim; it has not been denied that analogous results may be obtained from other natural mineral baths of similar composition, and by natural carbonated iron springs, or even by artificially prepared baths; but the peculiar advantages of Nauheim are the following:

1. It possesses an abundant flow of water from two springs, containing different proportions of the needful salts and carbonic acid, either of which can be used singly, or mixed together in every proportion.

2. The natural temperatures of the springs (No. 7, 88.88° F.; No. 12, 95.5° F.)—a feature of great importance—are among those found most applicable to heart patients, so that more or less complex arrangements for heating the baths, which, moreover, would drive off a portion of the carbonic acid, are unnecessary. At Nauheim, when it is desired to raise the temperature, an inappreciable amount of hot water is added; to cool the baths, lumps of ice are employed.

3. The presence of an unusually large amount of carbonic acid in the waters.

4. The possibility of providing a steady flow of the spring water, in and out of the bath (*Strombad*), at a suitable and constant temperature.

5. The Nauheim physicians are specialists in diseases of the heart; the employment of mineral baths for the treatment of heart disease originated at Nauheim, and no-

where else is their proper use as yet so thoroughly understood.

Other baths in Germany where good results are likewise to be obtained, some of which have been reported, are, among the saline, those of Kissingen and Rehme-Oeynhausien, and of the iron waters, Cudowa, Pyrmont, and Schwalbach. In our own country there is every reason to believe that the springs of Ballston and Saratoga are in many respects adapted for successfully conducting the balneological treatment of heart disease, on account of the large quantities of chloride of sodium and carbonic acid which they contain in various proportions, so that as at Nauheim different springs could be used, according to the needs of each case. The only apparent objections are the presence of unnecessarily large amounts of carbonates of the alkaline earths, the absence of chloride of calcium, and the necessity of artificially heating the baths, none of which, however, constitute insurmountable obstacles.

Artificial baths may be prepared by dissolving the requisite percentage of required salts, or, as Dr. John Broadbent points out, by the use of sea water, which contains 2·7 per cent. of chloride of sodium, and by adding for the production of carbonic acid suitable proportions of commercial muriatic acid and bicarbonate of sodium or chalk, or, as has been suggested, a mixture of the bicarbonate and bisulphate of sodium. The gas, however, when thus evolved, escapes more rapidly than it does from the natural baths.

Good results may undoubtedly be obtained in this way, and such baths have been employed by Dr. Bezly Thorne in London and by Dr. Babcock in Chicago, as well as in the Middlesex Hospital, with success; but the greater freedom from counteracting injurious conditions to be had at a spa, and the various advantageous mental and hygienic

influences to which the patient is there subjected, are sufficient reasons, even allowing the artificial baths to be as effective as the natural waters, why the results obtained at Nauheim are more striking than those reported from the cities. Mineral springs in the country, especially when possessing a part of the requirements, offer more promising opportunities, and provision has been or is being made at Harrogate and various places in England for carrying out the treatment.

In administering the Nauheim baths to patients with heart disease several varieties are employed, for when the effect of one kind of bath becomes less and less marked, owing to the nervous system gradually becoming habituated, a fresh stimulus is imparted by changing to a stronger bath, and thus a longer course can be taken than would otherwise be advantageous. The method employed by Dr. Theodor Schott, which is in the main practised by the other Nauheim physicians, is the following: The first bath ordered (*thermal Soolbad*) is supplied by the water taken from the receiving basins, from which by exposure to the air a large part of the carbonic acid has escaped, and a considerable proportion of iron and salts has been precipitated, so that it is of a muddy color and contains few or no bubbles of gas. No. 7 is the spring usually first employed, as it contains the smaller proportion of salts, 2·18 per cent. of chloride of sodium and 0·17 of chloride of calcium. Dr. Schott recommends for some cases, at the beginning of treatment, baths containing only one per cent. of chloride of sodium and 0·1 per cent. of chloride of calcium. The natural temperature is 88·8° F., but this at first is raised to one varying from 92° to 95° F. Temperatures above that of No. 12 spring, 95·5 F., are not suitable for heart patients. The duration of the bath, at first six to eight minutes, is gradually lengthened every few days, one

minute at a time, while at intervals the temperature is lowered about one degree (half a degree centigrade).

At first every second or third day, afterward every fourth or fifth, the bath is omitted. The percentage of salts is now gradually increased, which may be done at first by mixing the waters of Nos. 7 and 12, but is usually accomplished by adding one litre of Nauheim "*Mutterlauge*" (mother-lye)—the uncrystallizable liquid left behind in the manufacture of salt—which is subsequently increased to two and three litres, or occasionally even more. The main ingredient of this is chloride of calcium, which may be raised eventually in the bath to the amount of 0.5 per cent. When the proportion of salts is thus rendered sufficiently large, the temperature by this time having been lowered several degrees, and the duration extended to not more than twenty minutes, the patient is ready to continue treatment by a course of Sprudel baths from either No. 7 or No. 12, the former containing the greater amount of carbonic acid, the latter of salts. These differ from the others in being supplied with water direct from the springs, before it has undergone the action of the air, so that it appears of crystal clearness and filled with sparkling bubbles of carbonic acid, which it retains in undiminished quantity. They are likewise at first taken warm, usually at their natural temperatures, and for a short time—about eight minutes—and as they are continued the temperature is lowered in the same cautious way and the duration similarly prolonged. The saline contents may also be increased by successive additions of "*Mutterlauge*." In consequence of the powerful excitation of the cutaneous circulation by the carbonic acid, which creates an agreeable feeling of warmth, the temperature can be lowered to a degree which could not be otherwise tolerated, but is seldom if ever reduced below 80° F. The final, most powerful form of stimulation

is the Sprudelstrombad, in which the supply and overflow pipes of the bath tub are left open, so that in addition to the fresh supplies of carbonic acid, the shock of the running water against the body is experienced. These are not given to many patients in their first season at Nauheim. During the entire period of the administration of the baths their effect is watched with the utmost care, and the character of the respiration, condition of the pulse, and sounds of the heart carefully noted; if, after half a minute in the bath and the maintenance of a perfectly quiet attitude, a decided sense of cold persists or afterward recurs, the temperature is too low or the bath is in other respects unsuitable. In fact, if improperly administered, especially if too cold or of too long duration, the baths may not only produce no good effect, but may prove positively injurious and even dangerous to the patient by increasing instead of diminishing any existing dilatation, and if the Nauheim treatment ever becomes too popularized, and is conducted by incompetent persons, there is much reason to fear disastrous results.

After each bath the patient, having been well rubbed, is usually directed to lie down for about an hour. The food and mode of life are regulated in accordance with the usual requirements for heart patients and the physician's orders. No cardiac tonics are ordinarily given, except in extreme cases at the beginning of the course. An ordinary course of baths at Nauheim is estimated at about twenty-one or twenty-five, extending over a period of four or five weeks. This period is sometimes much lengthened, and not infrequently two courses, separated by a considerable interval, are taken in one summer. After the completion of the course, the patient is recommended before returning to the cares of ordinary life to take an "after-cure" by a sojourn of a few weeks at some quiet, healthful resort possessing a

moderately stimulating climate, such as places in the Black Forest, the mountains of North Germany, or localities in Switzerland not exceeding three thousand feet in altitude. The beneficial results of the action of the baths are further greatly increased by means of a series of gymnastic exercises, capable also, when used alone, of powerfully affecting the heart and circulation—the so-called resisted movements—the *Widerstandsgymnastik* of P. H. Ling.

The late Dr. August Schott (who died in 1886) deserves the credit of having brought before the profession their peculiar value, and of having by careful study devised the most suitable methods of their application. Together with his brother, Dr. Theodor Schott, he showed that they formed a most important adjuvant to the baths, and the combined systematic employment of these two remarkable agencies is now usually referred to as “the Schott methods.” These exercises are intended to bring into action successively most of the voluntary muscles, and consist of alternate movements of flexion and extension, abduction, adduction, and rotation of the limbs and trunk, such as we are familiar with in ordinary calisthenic exercises or home gymnastics. Against these motions a resistance, graduated in each case to the capacities of the patient, is offered by the physician or a trained attendant. By the interposition of this resistance the muscular contractions are made more complete and energetic, as well as of sufficient slowness and regularity, which last is a matter of prime importance.

The exercises recommended by Dr. A. Schott are as follows:

1. Movements of the extended arms in three directions.

(a) From the ordinary position by the sides of the body forward and upward until they reach the temples, and back again.

(b) From the same position laterally outward and upward to the temples, and back.

(c) From the horizontal position, with the palms of the hands meeting in front of the body, as far apart as possible, and back.

Rotation of the extended arms about their axes as fully as possible, causing pronation and supination.

2. For the elbow, wrist, and finger joints the natural flexions and extensions; radial and ulnar abduction and adduction.

3. (a) Flexion of the trunk forward, from a little beyond the erect position, and back.

(b) Lateral flexions of the trunk to right and left, and back.

(c) Rotations of the trunk on its axis to right and left, and back.

4. Movements of each extended leg forward and upward, outward and upward, backward and upward, and back.

5. The natural flexions and extensions of knee and ankle joints.

A description of these movements and the methods of applying the resistance in full detail, with illustrations, will be found in Dr. Bezly Thorne's larger work (39).

The resistance is always made by the attendant with the palm of the hand in the direction exactly opposite to that of the movement, and in applying it to the wrist and ankle these parts are placed in the fork formed by separating the thumb and fingers; but a limb is never actually grasped, lest support, rather than resistance, should be made.

The degree of force employed should be as much as the patient can overcome without the slightest discomfort, and should be so uniformly applied as to enable him to perform

the movements slowly, evenly, and without jerks. He must be able to breathe quietly, and the mouth and *alæ nasi* must be watched carefully, so that at the slightest indication of loss of breath a pause may be made. Some of the movements may be omitted according to circumstances; the most trying to the patient are the elevation of the arms above the head and the trunk exercises. The limbs are not allowed by the attendant to fall suddenly after the completion of a movement, and a considerable interval of time is always allowed between each one, and is prolonged if the patient seems at all fatigued. The clothing should, of course, be perfectly loose and easy. The exercises are usually given for about half an hour, the series being gone over twice in that time, but they are often employed for shorter or longer periods.

Dr. Schott has also devised a scheme by which the services of the attendant may sometimes be dispensed with.

In carrying out these self resisted exercises (*Selbsthemmungsgymnastik*), as they are called, the patient endeavors, as it were, to resist his own movements by partially contracting at the same time the antagonistic muscles. This demands some intelligence on his part, and it would be often unsafe to allow its employment.

The action of these exercises is to produce an effect similar in many respects to that caused by the baths; the cold extremities become warm, the sense of oppression in the chest is relieved, and the breathing deepened. The pulse usually becomes fuller, stronger, and slower, and an immediate diminution in the area of dullness of the dilated heart, not due to increased overlapping by the lung, with a simultaneous lessening of the dimensions of the passively congested liver, have been frequently demonstrated. The effect is often very speedy and striking; an attack of cardiac asthma, according to Dr. A. Schott, which would other-

wise continue for hours, may in a few minutes be charmed, as it were, away, and an extreme dilatation be temporarily so completely dispelled that hardly a vestige remains.

The physiological explanation of the effects of these exercises is not altogether easy. It has been suggested by Dr. Schott that what the baths effect through the sensory nerves, the exercises produce through the motor nerves. Dr. Bezly Thorne (39) says: "The motor nerves, called into orderly, regulated, and, above all, not exhausting activity, seem to exercise centripetal and reflex influences similar to those which are brought into action by the baths through the nerves of sensation."

Although there is an undoubted relation existing between the activity of a motor nerve and the nutrition of its corresponding centre, we can hardly look upon it as exerting centripetal influences in the sense that a sensory nerve does. It may be admitted, however, that the action of the motor nerves initiates a series of complex processes in muscle, blood, and nerve by which the heart is reflexly stimulated, though the exact details are difficult to trace.

Sir William Broadbent (9), while not denying the possibility of a nervous influence, is of the opinion that the most important factor is the physiological dilatation of the capillaries in the exercised muscles, which is continued into the arterioles and arteries to allow of the additional supply of blood. At the same time, from the character of the exercises, the compression of the veins which drives on the venous blood to the right heart and gives rise to the dyspnoea attending exertion does not take place. There is thus a transfer of blood from the venous to the arterial system, which is the exact reverse of the tendency attending most forms of heart disease, and so peripheral resistance is lessened. He admits that diminished peripheral resistance is not the only factor, as shown by the fact that the action

of the heart is rendered slower instead of being accelerated.

The whole subject is thus tersely summed up by Dr. Theodor Schott: "Unsystematic exercises constitute a heart-weakening, systematic exercises, on the contrary, a heart-strengthening treatment."

The question of the relative value of baths and exercises in each particular case can not be answered with exactness, on account of the varying length of time and degree of force with which the latter are tolerated; but ordinarily the baths which seem to affect the cardiac nutrition more profoundly are more applicable to severe cases, and their beneficial effect at first is decidedly the greater and more lasting, a result attributed by Dr. Schott to the retention in the skin of the salts of the bath, which pass by imbibition through the epidermis to the corium and continue to exert their action for a considerable period. Later in the course, when the heart has gained strength and the exercises can be repeated with greater force, frequency, and duration, the reverse may be the case. Taken together, the two agencies, as Dr. Bezly Thorne remarks, are capable of producing effects which throw the action of drugs completely into the shade.

Other forms of exercise known to benefit a weakened heart, such as the method of Oertel, the so-called *Terrain-kur*, and the movements by the aid of the Zander machines, which are especially advocated by Dr. Groedel, are employed at Nauheim, where a well equipped Zander institute has been in operation for the last three seasons. The *Terrain-kur*, however, is too severe a method for many patients who are yet able to undergo with profit the slow, easy, and systematic motions of the resisted exercises, although it may be used with advantage when the heart has gained sufficient power. By the Zander machines the

force can be adjusted with the utmost exactness, but can not be so readily altered, while the attendant applying manual resistance can instantly vary the amount of force, according to the changing sensations of the patient and the effects produced.

Let us now consider in some detail what is to be expected from the Nauheim treatment. Although the baths have been resorted to by patients with heart disease for many years in steadily and of late rapidly increasing numbers, the effects obtained there have been but slowly and imperfectly recognized even in Germany. The French, for more or less obvious reasons, have hitherto almost totally ignored them. In this country the papers of Dr. Theodor Schott (29) and Dr. Babcock (1), that have appeared in our own journals, have not as yet created the impression they should have done. Moreover, but brief and casual references are to be found in the text-books. It may perhaps be thought, therefore, that the advantages of the Schott treatment are yet somewhat problematical, and that there is still room for differences of opinion. This is by no means the case. The conclusions reached were not arrived at hastily. It had for some years been gradually becoming evident that the influence of the baths was decidedly tonic, even in cases of heart disease, but it was not until after their effect upon a large number of patients had been carefully studied that Dr. A. Schott ventured to affirm that they exerted not merely a general tonic influence, but constituted, like digitalis, "a tonic of the first order for the enfeebled heart." This remarkable statement was received with considerable incredulity—for example, by Leichtenstern (von Ziemssen's *Handbuch der allgem. Therapie*, Bd. ii, Theil 1, p. 262)—but the further observations of the Drs. Schott (now amounting to over five thousand cases), Dr. Groedel, Dr. Bode, and other Nauheim physicians have

proved its absolute accuracy, which has been further corroborated by foreign physicians who have examined into the question on the spot, among whom are such distinguished members of the profession as Professor von Jürgensen, of Tübingen, Dr. Pawinski, of Warsaw, Dr. Moeller, of Brussels, and numerous well-known English medical men. Dr. H. N. Heineman, of New York, made many careful studies during the past summer at Nauheim, which he has repeatedly visited, but beyond a brief notice in a paper published several years ago (*Medical Record*, March, 1890), I am not aware that he has yet published his own observations. Dr. Theodor Schott has frequently demonstrated the immediate alteration in the deep cardiac dullness after both baths and exercises in patients with dilated hearts to the satisfaction of physicians coming from a distance to visit Nauheim and to learn his methods.

In Great Britain, owing chiefly to the exertions of Dr. Bezly Thorne, the Schott methods, first made known there in 1891, have within the last year or two obtained full recognition, and created an increasing interest, so that the approaching summer will see large numbers of English hastening to Nauheim. It is now a mere question of time when their value will be universally admitted.

The effect of the treatment, then, being to powerfully affect the nutrition and increase the strength of the heart, it may be expected to produce the following results: In fresh endocarditis after rheumatism the baths promote to a high degree the absorption of the inflammatory products and offer hopeful prospects of a more or less complete cure. In chronic valvular disease, where there is serious damage to the valve segments, they can not ordinarily produce the slightest effect upon the injured valve itself, those murmurs which disappear during the course being due to relaxation of the orifices or want of tone in the papillary

muscles. Dr. Groedel, of Nauheim, however, states that he has met with a very few remarkable cases presenting evidences of fully developed valvular disease which have been cured at Nauheim, one of which is mentioned in Professor Eichhorst's *Handbuch der speciellen Pathologie und Therapie*, fifth edition, vol. i, p. 56. This patient had all the signs of pronounced mitral insufficiency, and these so entirely disappeared after two seasons at Nauheim that he was accepted as sound by a very strict life-insurance company. At the end of ten years there was still no trace of the disease. Although we can not expect that seriously injured valves should be restored to their normal condition, failure of compensation resulting therefrom is signally benefited, and it is in those cases especially in which digitalis is not tolerated or has not proved useful that the results are so astonishing. It is well known that in aortic regurgitation digitalis is not always beneficial. Good results are secured at Nauheim, however strange it may at first appear, in lack of compensation both from aortic and from mitral disease, as well as in cases of combined disease of both valves and in many instances of patent foramen ovale. The gradual influence exerted upon the nutrition of the heart, without the other accompanying undesirable effects which are often a cause for the failure of medicinal treatment, offers an immense advantage.

In weak hearts without serious organic lesion, from anæmia, chlorosis, and convalescence from acute diseases, and the myocardial affections resulting from influenza, most excellent results are obtained, particularly in young subjects, as well as in cases of heart strain and dilatation due to overexertion. In the chronic sclerotic changes (arterio-sclerosis, chronic myocarditis) of heart and vessels and fatty degeneration, with or without dilatation, so frequent in persons of advancing years, of which the

ordinary treatment is usually palliative, the benefit to be derived is naturally more uncertain and generally requires long and persistent treatment. Some of the most remarkable results of the Schott methods, however, have been attained in apparently otherwise hopeless cases, and even patients suffering from angina pectoris have been practically cured at Nauheim. It is easy to say with Professor Huchard (*Traité clinique des maladies du cœur et des vaisseaux*, second edition, p. 420) that these are cases of pseudo-angina, but there is no doubt that cases presenting all the clinical features of true angina pectoris due to organic disease have been relieved at Nauheim. It would, of course, be absurd to state that such irreparable lesions as calcified coronary arteries or advanced fatty degeneration, which are often associated with the disease, could be affected by the Nauheim treatment, and, while many cases of angina pectoris are hopeless under any circumstances, yet the effect of the Nauheim baths upon the cardiac nutrition is so remarkable that where the lesions are not too far advanced or only commencing the results of the treatment are eminently gratifying. The fact is, as Balfour well points out (*The Senile Heart*, pp. 116 *et seq.*), that the expression pseudo-angina is often misleading, and should not be applied to cases presenting symptoms identical with those of true angina, merely because the heart lesion happens to be curable. Such cases it is often impossible to distinguish from the incurable ones, and Balfour consequently expresses himself in regard to the prognosis that this is often more hopeful than we should at first be led to suppose. In Dr. Th. Schott's paper (27) four striking cases are given as illustrative of his large experience.

The results in cases of heart disease dependent upon or complicated with disease of the kidney are less encouraging and more variable, but albuminuria due merely to sec-

ondary renal congestion may altogether disappear. Cases of functional nervous disturbance of the heart are usually, but not always, benefited.

The contraindications to the Nauheim treatment are advanced arterio-sclerosis and aortic aneurysm. Patients with the latter affection have used the baths with some alleviation of symptoms, but on account of the danger of raising the blood pressure these must be employed with the greatest caution. Many very serious cases of heart disease come to Nauheim, and, as is only to be expected, some deaths occasionally take place during the season; but such is the care taken by the local physicians, who write their orders with exact directions, that fatal accidents directly attributable to the baths are practically unknown. Groedel states that during a practice of many years at Nauheim he has never had a case of sudden death during the bath, although he has known of two cases of apoplexy which occurred during the exertion of dressing.

As to the exact length of time required for a cure, it is, of course, impossible to say; improvement is usually observed after a week or two, and some patients are relieved by a single course, but many others require a much longer period, and there are comparatively few who are ill enough to undertake a long journey to Nauheim in search of relief for whom it is not advisable that they should return for another or several successive seasons, while in some desperate cases the treatment will necessarily fail.

During a stay of a month at Nauheim last summer I was enabled to acquaint myself with the details of the administration of baths and exercises, to note their effect upon the pulse, and to personally test the former, including the *Sprudelstrombad*. I had also time to become familiar with the general life of the place and to learn how universally it was recognized that good results were to be expected in

patients with heart disease, who were undergoing treatment there in large numbers.

The individual cases I had opportunity to examine were few in number, but several were such as to afford convincing illustrations of the value of the treatment, if any such were needed after the carefully reported cases that are already to be found recorded in various publications.

CASE I.—Captain von H., aged forty-six years, seen by the kindness of Dr. Schott. The patient, a large, strongly built, fine-looking man, had suffered repeatedly from rheumatism, his first attack having occurred many years before. He was found to have aortic regurgitation, and, having obtained but little relief from his symptoms, and not being able to bear digitalis well, came to Nauheim in 1892 in very bad condition, as he stated, with intermittent pulse, scarcely able to walk more than a few steps, and entirely incapacitated for the discharge of his duties, but without dropsy. When I saw him, on July 24th, he was just completing his fourth course at Nauheim.

The treatment the first year began with thermal baths of very short duration, and each successive year more powerful ones had been taken, so that the present season he had been taking Sprudel baths entirely. With the baths the exercises had been administered, as he thought, with marked benefit. On examination I found the heart enlarged, with apex beat diffused, but quite devoid of heaving character. No noticeable pulsation in the arteries of the neck. There was a distinct diastolic murmur in the aortic area, with the characteristic pulse of aortic regurgitation, which was, however, quiet and regular. He complained still of slight præcordial pain, but since he had been coming to Nauheim had been relieved of his former symptoms and enabled to take exercise, sometimes of a very vigorous character. He presented a healthful appearance and compensation was practically perfect.

CASE II.—Mr. C., aged fifty-three years, a native of Denmark, and a resident of British India, a sufferer from angina pectoris, for seeing whom I am also indebted to Dr. Schott.

The patient, a stout, rather short man of sallow complexion, had experienced attacks of varying severity, sometimes slight, sometimes very extreme, for two years and a half. The pain extended down the left arm, which it had rendered numb and helpless. Nitroglycerin and nitrite of amyl had been used with good effect, but had proved merely palliative. The patient was also suffering with a congested liver. He had been recommended, I believe, by Dr. T. Lauder Brunton to go to Nauheim. He began treatment on the 31st of May under Dr. Schott, who considered his heart to be affected with incipient fatty degeneration, accompanied with some degree of dilatation. Beginning with a thermal bath of 32.5° C. (90.5° F.) temperature and eight minutes' duration, these were continued until fourteen had been taken, the duration gradually prolonged up to seventeen minutes' and the temperature reduced 1° C. Beginning with the sixth bath, one litre of "*Mutter-lauge*" was added, which was increased up to three litres.

On June 19th Sprudel baths were begun, of at first eight minutes' duration, which were finally prolonged to twenty minutes, and the temperature reduced as low as 28° C. (82.4° F.).

From the 23d of July, for the remainder of the course, the Sprudelstrombad No. 7 (temperature, 88.8° F.) was taken, at first for eight minutes, afterward for gradually lengthened periods. Every fourth or fifth day during the course, or occasionally the third day, the bath was omitted. In all more than forty baths were taken. The patient commenced to take the exercises about two weeks after beginning the baths, and also used one of the drinking springs for its effect upon the liver. After the first week at Nauheim he was able to abandon the use of nitroglycerin, and at the time of my interview with him (July 26th) had had no pain for a couple of weeks. On examination the apex beat could not be felt, but the heart sounds were all normal, though somewhat weak. The heart dullness, as well as could be ascertained in so stout a person, was normal. Pulse regular, rather weak, and easily excited. Superficial arteries not sclerosed. The liver had regained its normal size. The patient left in excellent condi-

tion on August 8th in a cheerful frame of mind, greatly impressed by his personal experience of both baths and exercises.

This remarkable case was also examined with interest by several other physicians stopping in Nauheim at the time.

CASE III.—Mrs X., a patient in middle life, for more than three years suffering from a badly nourished and overstrained heart.

The symptoms in their most extreme form consisted in inability to make the slightest exertion, with occasional dangerous attacks of syncope, necessitating subsequent entire rest for weeks and even for months at a time. Digestive power was very feeble, and medicinal treatment was not well tolerated and was comparatively ineffective. On arriving at Nauheim she was just beginning to improve after a series of alarming attacks of heart failure. Examination showed the left ventricle dilated and the apex beat barely perceptible in the nipple-line or somewhat outside. Cardiac sounds very feeble, but clear (at times a faint systolic murmur had been noted), and pulse excessively weak. Complexion pale. The patient at this time could walk with difficulty for about a hundred yards on a level. Treatment began July 13th with a thermal bath from spring No. 7; temperature, 34° C. (93.2° F.); duration, eight minutes; July 14th, bath of nine minutes; July 15th, no bath; July 16th, bath of ten minutes; July 17th, bath of eleven minutes; July 18th, bath of twelve minutes; July 19th, no bath. On July 18th patient felt distinctly better, and apex beat had receded about half an inch nearer to median line. July 19th: Began the exercises given by a trained operator with very gentle resistance for about half an hour, including pauses. The effect was good, causing slight increase of warmth and deepening the breathing. The course of baths was continued, one litre of "*Mutterlauge*" being added, and the temperature reduced 0.5° C. on July 20th, and by August 7th three litres had been added, the temperature lowered to 32.5° C., and the time extended to twenty minutes. At the beginning of August the patient's progress was unfortunately impeded for a few days

by an acute illness accompanied with moderate fever, so that three baths which would otherwise have been taken were omitted. The effect of the last baths, cooler and of long duration, was not so striking as that of the previous ones, the patient experiencing some sensations of fatigue and chilliness. August 9th: Sprudel baths of No. 12, of natural warmth (95.5° F.), with the full amount of carbonic acid, were commenced, beginning with a length of eight minutes, which had been extended to fifteen when the last was taken. These Sprudel baths seemed to impart to the patient a fresh impulse and improvement was again rapid. After a stay at Nauheim of nearly six weeks, during which about fifteen simple thermal baths and nine Sprudel baths were taken, the patient left, not cured, but in a greatly improved condition, still unable to walk upstairs without support, but able to walk comfortably on a level more than half a mile, as well as to exert herself in ways previously impossible, a striking and satisfactory result considering her wretched condition on arrival.

I was also able to closely watch the treatment and its effects in two patients, over sixty years of age, in whom the symptoms were not very urgent, and, although some improvement was evidently effected, the results, as might have been expected in such cases in so short a time, were not very striking.

The first, in whose somewhat enlarged heart systolic murmurs at base and apex, attributed to sclerotic changes in the valves, were audible, and who suffered with attacks of angina, not of great severity, but sufficient to occasionally necessitate stopping short in the street, shortness of breath, feeble and sometimes intermittent pulse, and functional disorder of the liver, but who was able usually to take moderate walking exercise, took fourteen thermal baths of No. 7 and seven Sprudel, No. 7, beginning with a temperature of 32.5° C. (90.5° F.) and a duration of ten minutes. The gymnastic exercises were also given for half an hour every day, within a day or

two after commencing the baths. They improved the breathing, giving a comfortable sense of relief in the chest, but did not slow the pulse more than a few beats. When lying down immediately afterward, the pulse would sometimes intermit for a short time, but the general effect was evidently beneficial. I examined this patient with a view to ascertaining any immediate diminution in the area of cardiac dullness after a thermal bath and after the exercises, but was unable to satisfy myself that there was any decided alteration. On leaving, the patient had less frequent attacks of pain and had otherwise somewhat improved. The good effects of the treatment seemed to be felt even more after leaving Nauheim. The cardiac murmurs still persisted.

The second of these patients, subject to gout and rheumatism, and possessing a weak and badly nourished heart, was affected with moderate tachycardia without other positive evidences of disease, the pulse-rate reaching 100 even when the patient was quietly resting, and giddiness was complained of on lying down at night. The patient, who was anæmic, was given a preparation of iron, and, beginning with a temperature of 34° C. (93.2° F.) and length of eight minutes, took sixteen thermal baths of No. 7 and six Sprudel baths of No. 12. A few days after beginning the baths the exercises were commenced and given for half an hour daily and were well tolerated, the pulse-rate immediately after either remaining about the same or rendered less rapid. At the completion of the course, though the frequency of the pulse was not materially diminished, its character was improved; the heart was evidently strengthened, the giddiness relieved, and, in the patient's own opinion, good had been accomplished.

The following case, among those reported by Dr. Bezly Thorne (38), is of so much interest that I venture to quote the greater part of his account:

A woman, fifty-two years of age at the present time (1894), and the subject of inveterate lithæmic tendencies, rapidly developed in the winter of 1891-'92 a loud, rasping, basic systolic bruit, which was accompanied by a systolic apex

souffle. Her health rapidly failed, and the cardiac condition, involving as it did loss of sleep and appetite and steadily increasing dyspnoea, threatened to bring her life to a close. All ordinary resources having failed to afford relief, I suggested recourse to the Nauheim baths and treatment by exercises, with the practical details of which I was then unacquainted. The journey, however, appeared to involve such serious risk that I did not venture to authorize it; but as Dr. Hermann Weber came to the conclusion that it probably afforded the only remaining chance of life, it was decided to undertake it. The distance from the English coast to Mainz-on-the-Rhine was covered by steamer. When again seen in the following October the patient was restored to her former measure of health and pursuing her usual avocations.

In May, 1893, she returned to Nauheim for a second course, and on her return I was unable to detect either the basic or apex bruit, and the heart was fully competent.

A few words of general information for the traveler and invalid may be added. The hotels furnish good accommodation, and are most of them provided with lifts, a matter of much importance for heart patients. They are apt to be very full in the height of the season, and it is almost impossible to obtain rooms at the Kaiserhof in particular, which is now being altered and enlarged, without securing them weeks or even months beforehand. The villas, which are very numerous and usually stand in the midst of small grounds, are large, spacious, and well managed, the food and cooking being essentially German in character. Arrangements should be made beforehand as to whether board is to be provided or not, as many will prefer to take one at least of their meals at one of the hotels. Rolling chairs are to be hired by the week at reasonable prices, as well as attendants to push them.

All ordinary articles likely to be needed can be obtained in the town; others can be quickly sent from Frankfort.

The summer climate of Nauheim, like that of the other Taunus resorts, is somewhat changeable, often cold and rainy, but seldom oppressively hot. The soil is good, and the position of the town favorable for health.

The place is furnished with a water supply and a system of drainage said to be good, but the sanitary conditions are probably susceptible of some further improvement. Although the surrounding country is less attractive than at many other resorts, there are walks, drives, and excursions of much interest for those who are able to undertake them. The Kurhaus is large and handsome, and furnishes the usual means of recreation. Subscriptions have been already taken for an English church, and a piece of land secured upon which one will probably soon be built. The official season at Nauheim lasts from the 1st of May to the end of September, but the bath houses are open also in April and October.

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