ing the cell, discharge of pus and muco-pus, polypi, and pharyngitis sicca, due to destruction of the epithelium by the pus, which flows constantly over the postpharyngeal wall.

Pathology.—Changes involving the bone substance and the lowering of its vitality occur in those sphenoidal cases in which the mucosa has undergone polypoid degeneration. The bone becomes brittle under these circumstances and loses much of its cohesive quality. In neglected syphilitic cases necrosis of the bone or soft tissues always follows the gummatous process. The chronic suppurative cases with more or less stenosis of the normal opening are usually protracted by the irritating qualities of the degenerating products.

Fig. 3498.—Guarded Trephine for Removing Obstructing Portion of the Septum near Anterior End of Middle Turbinal.

Diagnosis.—Diseases of the sphenoidal cells are usually easily diagnosed. The obstruction in many cases is at the posterior end of the middle turbinal, and its early removal will facilitate matters greatly. Pus under favorable conditions can be seen at the normal opening in the uppermost part of the anterior wall of the sphenoidal cell. An irrigation tube passed through this opening will confirm the provisional diagnosis.

Treatment.—The treatment of sphenoidal disease is more satisfactory in its results than that of the other sinuses. Complete removal of the posterior end of the middle turbinal will usually demonstrate the point from which the pus makes its exit. The upper anterior wall should be penetrated with a guarded awl or trephine and afterward curetted. Extensive removal of the anterior wall with a cutting forceps, gentle curettage, irrigation, insufflations, and repeated excisions of the membrane which forms over the opening will often cure the most obstinate and apparently hopelessly diseased conditions of the sphenoidal sinuses.

I do not favor the procedures of opening the sphenoidal cells through either the antrum or the ethmoidal cells, as I do not think such extensive destruction of tissue is warranted. *Robert C. Myles.*

NASAL CAVITIES, DISEASES OF: SYPHILIS.—Syphilis, either congenital or acquired, may appear in the nose in any of its three stages. The disease is characterized by obstruction of the passages from swelling of the mucous membrane, or by more or less extensive ulceration with destruction of cartilages and bone.

Anatomical and Pathological Characteristics.—The mucous membrane may be found thickened in patches or ulcerated, or obstruction may arise from gummatous thickening of the perichondrium or periosteum. In the latter case the cartilage or bone beneath often suffers necrosis and is finally separated by the process of suppuration. Necrosis occasionally results from extension of the ulcerations from the mucous membrane, and rarely the parts undergo molecular destruction and are gradually absorbed, being replaced by granulation tissue. Primary syphilis is occasionally conveyed to the nose by picking with the finger nail, but the hard chancre is very seldom seen. On the external nose the primary sore usually appears as a flat induration of moderate size; within the nose it commonly occurs on the septum as a red, flat, hard growth covered with purulent secretions, which bleeds easily, the external nose at the same time being swollen and red. Neuralgic pains and fever may coexist and the submaxillary and sublingual glands and those in front of the ear are often indurated. In secondary nasal syphilis the appearances may be simply those of an acute coryza, or mucous patches may be found upon the Schneiderian membrane similar to those so commonly observed in the throat. In this case copper-colored papules or macules with fissures at the junction of the nose and the upper lip or in the sulcus alaris are apt to be present. Gummatous syphilitic infiltrations may involve the mucous membrane, the perichondrium, or the periosteum. These soften after a time and deep, sharp-cut ulcers with undermined borders result, with sooner or later destruction of cartilage or bone. Often this destruction is limited to the septum, especially its bony portion; but in some cases it involves all of the surrounding parts. When the nasal bones are destroyed the bridge falls in, but this does not occur from destruction of the septum alone.

Etiology.—The affection is caused by the specific virus which may infect the fœtus in utero or during birth, or which may be acquired afterward in various ways.

Symptomatology.—Primary syphilis of the nose causes the symptoms of an acute catarrhal rhinitis of a severe grade. The initial lesion is likely to be comparatively large, and various lymph glands may be infected and greatly swollen. In the secondary stage there are much congestion of the mucous membrane and abundant muco-purulent secretion with obstructed respiration. Mucous patches are likely to be found at the edge of the nostrils and upon the anterior portion of the nasal mucous membrane. At the same time secondary manifestations are apt to occur in the throat and upon the skin. The tertiary symptoms commonly come on between the first and third years after infection, but sometimes not until many years later, and they are not infrequently seen at any time between the fifth and the fifteenth years. When the disease attacks the turbinated bodies it sometimes causes an appearance very like that of simple hypertrophic rhinitis and the parts do not retract readily under cocaine; but this condition is frequently associated with yellowish ulcers having a clean-cut border and hard infiltrated base with more or less induration about the ulcer, and is therefore not apt to be confounded with hypertrophic rhinitis. When the disease attacks the periosteum or the perichondrium, a smooth elastic swelling results which is usually apparent upon only one side. Later, breaking down takes place and ulceration results. The denuded cartilage or bone dies and is subsequently separated by an ulcerative process from the surrounding tissue. Commonly the patients do not present themselves for treatment until ulceration has occurred, and then the necrosed cartilage or bone may be found firmly attached or lying partly loose in the nasal cavity. Atrophy of the turbinals may also occur and destruction of the orbital plate of the ethmoid bone and of the hard palate is not uncommon. The dead bone usually presents a blackish, uneven surface, and is the source of an extremely offensive odor.

Diagnosis.—The primary lesion in the nose may be mistaken for a malignant growth. The most valuable points in the diagnosis are its hardness and the great swelling of the lymphatic glands. Frequently the true nature of the disease is not recognized until the secondary symptoms appear. The secondary stage of the disease in the nose causes the symptoms of chronic catarrhal rhinitis, but it comes on much more speedily than the latter, and by careful inspection mucous patches or condylomata may sometimes be detected. The history of the case should be very carefully scrutinized, and any external manifestations may aid in the diagnosis. Tertiary syphilis of the nose is not likely to be recognized when it involves the turbinals alone, as the appearance is that of hypertrophic rhinitis; but when gummata and ulceration occur, a careful weighing of the history of the antecedent symptoms and signs will generally enable one to make a correct diagnosis, although often the patient will deny any specific infection. There is generally no difficulty in distinguishing tertiary nasal syphilis from atrophic rhinitis if the nasal cavities be first thoroughly cleansed. It should be recollected that simple perforation of the cartilaginous septum is seldom syphilitic, whereas perforation of the bony septum is nearly always so.

Lupus is to be distinguished from syphilis, first by the fact that it usually occurs at an earlier age than syphilis, excepting when the latter is hereditary; second, that the

reddish papules or tubercles of lupus are quite distinct from many syphilitic manifestations, and that they are often associated with distinct signs of lupus externally. Lupus also is much more prone to attack the cartilage than the bone, and it is much slower in its progress than syphilitic ulceration.

Prognosis.—The outcome of nasal syphilis is materially affected by early recognition of the disease and efficient antisyphilitic treatment. Although in many cases the destructive process is not extensive, in others not only the septum but the nasal bones, orbital plates, and hard palate are involved in widespread necrosis. In rare cases the disease progresses rapidly in spite of all treatment, and may terminate fatally within three or four months. Death has also resulted from fragments of the necrosed bones falling into the larynx.

Treatment.—Secondary symptoms and those of the tertiary disease, when mild, usually yield rapidly to appropriate internal and local treatment. In syphilitic affections of the nose, prompt and thorough antisyphilitic treatment should be immediately instituted, the nares should be kept clean by mild alkaline sprays or washes, condylomata or mucous patches should be touched with nitrate of silver or tincture of iodine, and the latter or solutions of from ten to twenty grains to the ounce of sulphate of copper should be used in case of tertiary ulceration. Dead bone should be removed as soon as it becomes loosened, and sometimes it is best to cut it away earlier in order to prevent the prolonged offensive odor; but it should be recollected that if the bone be cut away too early, the disease is liable to extend to tissues that would otherwise have escaped. Antiseptic sprays and powders, such as are recommended in the article on atrophic rhinitis, may also be employed advantageously.
E. Fletcher Ingals.

NASAL CAVITIES, DISEASES OF: TUBERCULOSIS.—Though tuberculosis seldom involves the nasal cavities, secondary tuberculous lesions are occasionally met with in this locality and a few cases of the primary disease have been noted. Michelson observed nineteen instances of the primary disease in thirty-eight cases of nasal tuberculosis. It should be remembered, however, that the early symptoms and signs of the pulmonary affection are not always recognizable, so that they may have been present in some of the cases believed to be primary nasal tuberculosis.

Anatomical and Pathological Characteristics.—The disease may be observed as a diffuse infiltration, or as a tuberculous tumor with or without ulceration, or in the form of exuberant granulations. Ulcers may follow the infiltration or the tuberculous tumors, but they sometimes appear to be the primary lesion; however, they are nearly always secondary to pulmonary tuberculosis. The disease commonly attacks the anterior part of the cartilaginous septum, but it may involve any portion of the nose or nasopharynx. The tumors are generally small and of a grayish-white color, but may attain the diameter of 2 or 3 cm. before they finally break down. They are sometimes pedunculated, at other times sessile, and they commonly bleed easily. The tuberculous infiltration is prone to attack the septum, but may also invade the turbinals. It causes a firm, resistant swelling of a pale color having a somewhat granular surface. This, like the tumors, is ultimately followed by ulceration. The tuberculous ulcer is generally round or oval and at first shallow, but ultimately it becomes much deeper. The borders are irregular, having a worm-eaten appearance; they may be level or may be prominently raised by tuberculous infiltration. Miliary tubercles may often be seen on the floor of the ulcer and surrounding it. The floor of the ulcer is of a pale, grayish-red color and is sometimes covered with granulations, while the miliary tubercles which surround the ulcer are translucent or of a yellowish or grayish-white color. On breaking down they cause irregularity of the edge of the ulcer, and by the extension of the process the cartilage or even the bone may be destroyed, leading to perforation. Exuberant granulations may spring up and hide the ulcer or perforation or even a tumor. They are analogous to fungous granulations found in other parts of the body.

Etiology.—The causation is the same as that of other forms of tuberculosis.

Symptomatology.—The disease comes on insidiously, causing the symptoms of an offensive rhinitis with free purulent discharge, which tends to collect and form scabs and crusts that hide the ulcers. Epistaxis is an occasional occurrence. At first the constitutional symptoms are slight. In the majority of cases this affection is secondary, and in nearly all instances it terminates with laryngeal or pulmonary tuberculosis.

Diagnosis.—The disease is to be distinguished from lupus and syphilis. Lupus resembles the infiltrated form of nasal tuberculosis, but commonly begins in the integument and slowly extends, showing a marked tendency to cicatrization, whereas the tuberculous ulcers spread more rapidly and there is little if any tendency to healing; indeed, it is impossible to cure one of these ulcers unless the general condition improve.

Syphilis, especially in the late hereditary form, is sometimes very difficult to distinguish from tuberculosis, but usually its more rapid course, the headaches and neuralgias that are apt to accompany it, and its proneness to attack the bone instead of the cartilage distinguish it from tuberculous disease. The antecedent history may be of great value in the diagnosis, and a microscopical examination of the secretions or the scrapings from the ulcers or granulations is liable to reveal the tubercle bacilli, though the latter can seldom be discovered in the infiltrative form or in the tuberculous tumor. The results of treatment are also important—a syphilitic ulcer usually improves speedily under specific medication, whereas the same treatment is likely to aggravate tuberculosis.

Prognosis.—The course of the disease is slow unless the lungs be already involved, and it may possibly extend over several years; but when the tuberculosis also affects other organs it runs a more rapid course to a fatal termination.

Treatment.—Detergent sprays and washes may be used to keep the nares clean, and tuberculous tumors that interfere with respiration may be removed by the snare or otherwise. The infiltrations are best destroyed by the sharp spoon or by electrolysis; fungous granulations may be scraped away with a curette and the base treated with lactic acid; indolent ulcers may be curetted and then treated with lactic acid. In these cases the parts should be anæsthetized as thoroughly as possible, and lactic acid of a strength from fifty to one hundred per cent. should be carefully applied. It is well to add to it from three to five per cent. of carbolic acid in order to prevent prolonged pain after the effects of the cocaine have disappeared. In some instances excellent results have been obtained by carefully touching the surface of the tuberculous ulcer with the galvanocautery. It is of prime importance to attend to the general health, because until this is improved we cannot hope to obtain much betterment in the nose. Even in primary cases we can scarcely hope to remove all of the tuberculous tissue by curettage or by other surgical measures, and therefore we can seldom, if ever, completely cure the disease.
E. Fletcher Ingals.

NASROL—sodium sulphocaffeate, symphorol sodium—is a bitter crystalline powder slightly soluble in cold water. It is a more powerful diuretic than caffeine, and the caffeine effect on the heart is said to be lessened. Dose 1 gm. (gr. xv.) daily. *W. A. Bastedo.*

NASSAU.—The town of Nassau, capital of the Bahama Islands, lies on the north shore of the island of New Providence, at a distance of about two hundred miles due east from the southern point of the Florida peninsula, and about thirty miles north of the parallel of latitude which passes through Key West. The exact latitude of Nassau is 25° 5′ 36″ N., only two degrees north

of the Tropic of Cancer; its longitude is 77° 21′ 15″ W. It is the largest town in the Bahamas, and has from twelve to sixteen thousand inhabitants. The island of New Providence has an extreme length from east to west of nineteen and three-eighths miles, an extreme width from north to south of about seven miles, and an average width of about five miles. The highest ground in the island is only 120 feet above sea level, and nowhere throughout the whole group of the Bahama Islands, many of which are very much larger than New Providence, does the surface attain an elevation above sea level of more than 230 feet. "The formation of all the islands is the same—calcareous rocks of coral and shell hardened into limestone, honeycombed and perforated into innumerable cavities, without a trace of primitive or volcanic rock; the surface is as hard as flint, but underneath it gradually softens and furnishes an admirable stone for building. . . . The soil, although very thin, is very fertile. . . . Except in the island of Andros, no streams of running water are to be found in the whole group."

The town of Nassau "extends along the water front for about three miles and back to the crest of a slope, on which stand the Government House and many of the finest private residences, at an elevation of ninety feet above the harbor. The streets are laid out at right angles with each other, and are uniformly macadamized, as are also the numerous excellent drives around the island; and the houses are generally built of stone, with the surrounding grounds ornamented with a tropical profusion of flowers and trees." As for the general character and appearance of the country back of the hill just mentioned, we read, in Mr. Charles Ives' work, entitled "The Isles of Summer," that, "with the exception of a very few square miles occupied by Nassau and its suburbs, there is little upon the island, except water and wilderness; the former is brackish and throbbing, and in some places appearing and disappearing with the long pulsations of the sea's diurnal tides, and the latter, to a large extent, a dense low jungle, with stretches of pine forests rising from a thick undergrowth of scrub palmettoes."

Turk's Island, and Dunmore Town, on Harbor Island, are other health stations or winter resorts of the Bahamas, but I possess no detailed information respecting either, and practically it is true, as stated by Mr. Ives, that "Nassau is New Providence and the Bahamas."

The climate of Nassau is tropical, and far warmer than that of the Bermudas; but for the fact that the Bahama Islands lie in the track of the trade winds, and for the fact that they are islands of small size and of rather sparse population, the climate could hardly fail to be an unhealthy one; as it is, the climate may be regarded as a healthy one, at least during the colder months of the year. The following figures, derived from one year's observations, were sent me by the superintendent of the Canadian Meteorological Service, being kindly procured by Mr. H. Beaumont Small, of Ottawa. They show the mean temperature (degrees Fahr.) of each of the twelve months of the year in question.

January, 69°; February, 73°; March, 76°; April, 78°; May, 79°; June, 83°; July, 87°; August, 88°; September, 87°; October, 80°; November, 74°; December, 70°. Yearly mean, 78.7°.

The data of Table A show the "Mean of Daily Observations on week days, for ten years, from 1855 to 1864." This table is quoted from Mr. Ives' book, where it is "copied from the official report of Governor Rawson for 1864, page 14, compiled from the records kept at Nassau's Military Observatory." Governor Rawson's conclusions, based upon this table and upon others given in his report, are also quoted by Mr. Ives, and from them we extract the following statements: "The greatest maximum heat exceeds the average heat by not more than 12°; the greatest minimum falls short of it 10°. . . . From May to October . . . the rainfall amounted to forty-four inches, and during the remaining six months to nineteen inches. . . . Northeasterly and easterly winds are the most prevalent from September to February, during

TABLE A.

Months.	Thermometer at 9 A.M. (Degrees Fahr.)			Wind at 9 A.M.	Rainfall on ground in month.
	Max.	Med.	Min.	Four chief points, in order of prevalence.	Inches.
January.....	75	70	66	N.E., E., S.E., N.	2.4
February.....	76	71	66	N.E., E., S.E., S.	2.4
March.....	78	72	66	E., S.E., N.E., N.	4.5
April.....	81	75	68	N.E., E., S., S.E.	2.4
May.....	84	78	71	N.E., S.E., E., S.	6.9
June.....	88	81	74	S.E., E., N.E., S.	6.4
July.....	88	82	75	E., S.E., S., N.E.	6.5
August.....	88	81	75	E., S.E., S., N.E.	6.7
September...	86	81	75	E., N.E., S.E., N.	5.2
October.....	82	77	73	N.E., E., S.E., N.	7.4
November....	79	74	70	N.E., E., E., S.E.	2.8
December....	77	73	69	N.E., E., S.E.. N.	2.4
Average.....	82	76	71	.....	4.6

which months they blow during one-half or two-thirds of the whole time. Northerly winds seldom blow, except during those months, and then only for three days in a month." As for northwest winds, the bane of the Atlantic coast of North America during the winter season, they occur from November to March, about two days in a month." "The Bahamas," says Mr. Ives, "are slightly but agreeably refreshed by the coldest winds that ever reach them from the north and west." The relative frequency of the winds from the different points of the compass is given by Mr. Ives, in a table quoted from Governor Rawson's report, showing "the percentage proportion of days in a year during which they prevailed at 9 A.M.," as follows:

North.....	7.2 per cent.	South.....	11.0 per cent.
Northeast.....	26.2 "	Southwest.....	5.0 "
East.....	24.4 "	West.....	2.3 "
Southeast.....	18.6 "	Northwest....	5.3 "

In Table B the reader will find data, derived from official reports, and quoted from two tables in Mr. Ives' book, one of which presents data for the year 1878, the other data for 1879.

TABLE B.

(Two Years' Observations.)

	Absolute maximum temperature at 9 A.M.	Absolute minimum temperature at 9 A.M.	Absolute sun maximum in 24 hours.	Average rainfall.	Mean number of rainy days.
	Degrees.	Degrees.	Degrees.	Inches.	
January.....	77.0	61.0	145.0	3.03	11.0
February.....	78.0	62.5	148.0	4.17	9.5
March.....	82.5	65.2	153.5	2.60	6.5
April.....	82.3	70.0	154.0	1.80	6.5
May.....	86.5	70.5	156.5	5.56	10.0
June.....	89.8	71.0	155.0	9.06	16.5
July.....	89.5	71.2	159.0	6.74	19.0
August.....	88.8	77.0	157.9	9.55	15.5
September.....	87.5	70.0	153.5	7.58	22.0
October.....	85.0	74.5	153.0	6.93	15.25
November.....	81.5	66.5	157.5	5.41	8.0
December.....	78.2	65.8	155.0	1.49	9.0

The maximum and minimum temperatures, and the rainfall for each month of the year in the three years, 1880 to 1882, are published in one of the English "Blue-books" for 1884 ("Statistical Abstract for the Several Colonial and Other Possessions of the United Kingdom in Each Year from 1868 to 1882"), which was kindly sent me by Mr. H. B. Small. Without quoting these in full, suffice it to say that the absolute minimum temperature throughout the whole three years of observation was 64° F., occurring in March, 1881; that the absolute maximum was 90° F., occurring in July and in August of the same year; and that the average monthly rainfall for each of the six months, November to April, was as follows: November, 1.5 inches; December, 1.5 inches; January, 2 inches; February, 1.8 inches; March, 1.5 inches; April, 2.1 inches. Mr. Ives' rainfall statistics for 1879 correspond very closely with those just given, and the higher average figures found in Table B are caused by the exceptionally heavy rainfall of 1878.

Despite the high figures for minimum temperatures which have been given in the accompanying tables, I find a writer in the New York *Times*, Mr. William Drysdale, referring to the occurrence of a temperature of 55° F. at Nassau, and speaking of the desirability of securing at the hotel one of the few rooms in which a fire may be had in cold weather. He also complains of the strong wind which prevails at Nassau. The relative humidity in winter is eighty-three per cent. and in spring seventy-six per cent. (Hinsdale).

Excellent sea-bathing may be enjoyed at Nassau throughout the year, the temperature of the sea water being usually in the vicinity of 70° F. throughout the year (Solly). Yachting and boating are favorite pastimes, and the facilities for both are excellent.

Huntington Richards.

[As will be seen from the above, the climate of Nassau is a moist, warm, marine one, agreeable for a winter residence of several months. After some days of acclimatization it is found to be not uncomfortably warm, though it is more or less debilitating. It is warmer than the Azores, Madeira, Teneriffe, or Bermuda (Solly).

There is very little if any rain during the winter, and there is a continuous succession of fine days. The humidity is high and the nights are damp, so that the invalid had best be in doors after 6 P.M., and not venture out too early in the morning.

The water supply is from rain water kept in cisterns, and its purity obviously depends upon the care exercised in keeping the cisterns clean. So far as known to the writer, there is no general sewerage system at Nassau, but the natural drainage is good, as the town lies at an elevation of one hundred feet above the level of the sea. The soft, porous limestone rock absorbs water rapidly, and wells and cisterns in the vicinity of cesspools and vaults may easily become contaminated. The Bahama Islands in general are said to enjoy a reputation for healthfulness, the mortality being under eighteen in one thousand (Hinsdale).

There are two great hotels at Nassau, the "Royal Victoria" and "The Colonial," the latter affording accommodations for a thousand guests; there are also good boarding-houses, and guests can be accommodated in private families.

Nassau can be reached direct from New York by well-equipped and comfortable steamers: or one can go by rail to Miami on the east coast of Florida, and from there by steamer in about twelve hours.

There are many attractions at Nassau, although after a while life becomes rather monotonous. The vegetation is tropical and very varied in fruit and flower. The roads are very good for driving or cycling, both inland and along the shore. Sailing, fishing, and bathing are also a feature of the place. A visit to the Sea Gardens is a delightful excursion in the bay, where, through the clear blue water, coral growths of varied hues and forms and sea sponges are seen. There are a good public library, schools, and churches, and reliable medical service. There are both still-water and surf bathing, and an excellent sandy beach. "Not a beach from Panama to Para, where anything like the comfort and benefit can be found as on this beautiful sweep of sand at Nassau" (Hutchinson). Golf and other outdoor sports are also to be had here.

By chartering a small schooner pleasant excursions for several days can be made to Eleuthera Island, Governor's Harbor, and other neighboring islands.

This climate is essentially the same as that of the lower coast resorts of Florida, and is suitable for a similar class of cases. It is not favorable for tuberculosis, as no moist, warm marine climate is, as has been elsewhere discussed in this HANDBOOK. Neither is it good for rheumatism or neuralgia, on account of the dampness, especially at night. It is, however, favorable for chronic bronchitis and catarrhal affections of the pharynx and larynx. It is said to be very beneficial for Bright's disease, especially the early cases. Cases of neurasthenia and those suffering from the effects of overwork do well here. Convalescents from various diseases with lowered vitality are favorably influenced by the winter climate here, where "no rain falls at that season, and each day is a repetition of the one just passed, balmy breezes and cloud-flecked skies," and where the usual daily range is from 70° to 73° F. *Edward O. Otis.*]

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NAUHEIM. (**BAD-NAUHEIM.**)—Of the almost innumerable health resorts and watering places that abound in Germany, none is better known than Bad-Nauheim, incorrectly spoken of as Nauheim. I say incorrectly, because not such a great distance away is another town called Nauheim, which is devoid of all interest to sight-seers or invalids. The prefix Bad signifies a bath, and hence designates any place to which it is prefixed as a watering place or spa. This explanation is necessary, since mistakes are sure to occur if letters intended for this famous resort are addressed merely to Nauheim without the distinctive prefix Bad, or if the invalid in quest of health inquire of German railway officials for Nauheim, and not Bad-Nauheim.

The chief interest attaching to this resort lies in the nature and properties of its springs and the diseases to which their waters are applicable, and yet there is much of interest in the history of the place. It is situated about twenty miles north of Frankfort, whence it is reached in forty minutes by the Main-Weser Railway. The location of the town is both healthful and picturesque, since it lies on the eastern slope of the Johannisberg, which forms a spur of the range of mountains known as the Taunus. The slope on which the town is built descends gradually to the bank of the Usa River, and thus provides excellent drainage, so that the soil dries quickly and permits visitors to walk out directly after a shower, which, judging from the summer I spent there, is of comparatively frequent occurrence.

Alighting from the train and walking down Bahnhof Allee (Depot Street), which descends rather sharply toward the west, one obtains a beautiful view of the Johannisberg beyond and of the town with its magnificent park and cluster of springs and bath-houses in the foreground. Emerging from this short Depot Street the traveller comes on to the Ludwig Strasse, which, lined with attractive villas along its eastern side, curves in a semicircular direction toward the west, and joining the river helps form the ovoid space in which are situated the bath-houses and springs that are the pride of the inhabitants and the object of the invalid's long journey.

On the further bank of the Usa spreads out the spacious park, which is said to be the finest of its kind in Germany, and with its shaded walks, covered seats, and Kursaal, offers irresistible attraction, and invites to the out-of-door pleasures of which the Germans are so fond.

The southwestern extremity of Ludwig Strasse leads into Park Strasse, which runs to the west, and is bordered by attractive shops, while the quaint town once enclosed by a wall, of which the remains may still be seen at the south, lies mainly to the south and west of the park on the slope of the Johannisberg. From this brief description it is plain that Bad-Nauheim can justly claim both healthfulness of site and beauty of scenery, which must minister to the comfort and pleasure of the summer visitor.

The semi-invalid or tourist who can enjoy the pleasures of walks and drives is afforded ample opportunity for the indulgence in such pleasures. The more seriously ill, confined to a chair in the garden or to an apartment, can feast his eyes on the beauties of the Taunus range in the distant background, or on the beautiful park with the throngs of pedestrians, carriages, and wheel chairs moving restlessly in and out among its trees and on the shores of its artificial lake.

The hours for recreation are many in Bad-Nauheim, for baths and the morning drinking of its curative waters consume but a small portion of the time; and hence the visitor must have varied pleasures and pastimes if he is not to find his sojourn wearisome and suffer from home-sickness. It was the realization of this fact and of the powerful aid to health derived therefrom which led Dr. Friedrich Bode, one of Bad-Nauheim's early physicians and benefactors, to insist on the necessity of suitable provision for agreeable recreation as well as of desirable homes and means of treatment. He was a far-sighted physician who realized that healthfulness of body requires healthfulness of mind, and that to the latter contentment and diversion are essential.

To-day, therefore, Bad-Nauheim is no longer a meagre little village without an apothecary shop, or even tolerable lodgings for invalids as in Bode's time, but is a beautiful spot where twenty thousand invalids besides other visitors are comfortably, even luxuriously, housed and fed every year between May 1st and October. Besides fine hotels with modern comforts where the wealthy may be amply provided with all they can desire, there are innumerable private homes and boarding-houses for persons of humble means.

Bad-Nauheim is a Mecca for invalids from all over the world, and hence one there meets delightful people whose acquaintance is both a pleasure and a profit.

No lover of music who has passed a summer at this charming resort can fail to recall the delightful band concerts which are given three times a week at the Kursaal, and are enjoyed in the open air after the German custom, with the accompaniments of cigars and beer or other liquid and solid refreshments. These concerts are of high order, and the stirring music is rendered with a spirit and precision that never fail to arouse the most unimpressionable. Of a Sunday afternoon the usual weekly programme of instrumental music is varied by grand vocal performances rendered by well-trained choral societies of male voices from neighboring cities. These concerts are rare treats and are very largely attended by enthusiastic and appreciative audiences. The air of the midsummer afternoon is usually comfortably cool and freed from annoying insects, so that to sit in the open ministers to health as well as to pleasure.

The history of Bad-Nauheim goes back to the days of the Romans when those stern warriors contended with the fierce Teutons for the possession of this part of Germany. Even in that early day it was a highly prized possession, not, however, for its baths, but for the salt contained in its waters. By the uncivilized Teuton the salt was procured by sprinkling the water on to a fire and then obtaining the saline precipitate from the ashes. The Romans, on the contrary, as shown by modern excavations, evaporated the water in large pans supported above the fire by foundations of brick.

Saline springs were considered so precious by the Romans that they were regarded as holy. It was the custom to cast coins into the springs as votive offerings, and to this day it is stated that pieces of copper money, bearing the impression of Hadrian, Domitian, and Trajan are often found upon cleaning out the basin of the Schwalheimer Brunnen. There are to be seen in the vicinity remains of old Roman villas and of that wonderful wall of defence which extended through Southwest Germany for a distance of five hundred and fifty kilometres, and enclosed that portion of the land which had been conquered from the native inhabitants. One of the best preserved remains, probably of a Roman temple, was disentombed near Homburg, another frequented spa, to which visitors at Bad-Nauheim may drive comfortably in two hours or less. It is thus seen that the subject of this sketch lies in a part of the Fatherland which is full of historic interest.

According to tradition it was Bonifacius who came to the heathenish inhabitants of this Wetterau district and converted them to Christianity. He is said to have built the chapel still standing on the Johannisberg, which mountain had for ages been consecrated to the worship of Baldur, the god of the sun. For two thousand years the Germans had annually assembled on the Johannisberg and celebrated the feast of the midsummer solstice, July 24th, now known as Johannistag or St. John the Baptist day.

It is also interesting to note that for many years the holy chapel dedicated to Christ by Bonifacius and the temple at which worshipped the still unconverted Germans stood not far apart, and on each 24th day of July could be heard the sacred music of the two congregations, the one in praise of our Blessed Redeemer, the other in praise of Baldur the sun god.

The subsequent history of Bad-Nauheim is eventful. It was twice ravaged by war in the Thirty Years' War, at the close of which the Wetterau country was desolated and almost depopulated, and again in the succeeding century during the Seven Years' War.

During all these centuries Bad-Nauheim remained still only a source for salt. Baths were not given as a therapeutic agency, nor were its waters drunk by invalids as were those of not far distant Homburg and Wiesbaden. In the fore part of the last century we read that the officials of the salt works used the saline water for bathing, not however therapeutically but merely for the purpose of cleanliness, since other water was not convenient.

In 1833 Salt Inspector K. Weiss persuaded Internal Revenue Commissioner Meisterlin to try a bath in this salt water, which he found so agreeable and invigorating that he determined to propose to the Kurfürst the erection of a bath-house. This establishment was first opened to the public in July, 1835. Thus was instituted this world-renowned resort which, from receiving ninety-five patients that first year, is said now to accommodate about twenty thousand invalids annually, to whom are given an average of three hundred thousand baths.

Of all the various springs that have been bored from time to time only five are now in use, namely: Kurbrunnen and Karlsbrunnen, which are saline purgative waters; Ludwigquelle, which is alkaline in consequence of its containing sodium bicarbonate; the Great Sprudel or No. 7, in use since 1839, and at that time the largest and strongest of all; and last but not least the Friedrich Wilhelmsquelle or No. 12, now the spring furnishing the greatest flow and extremely rich in CO_2. No. 14 (Ernst-Ludwig) was completed in 1900, having a depth of two hundred and nine metres.

There are six bath-houses of which No. 4 receives water, after having been freed from gas and impurities, from Spring No. 7. In this house only simple brine baths are given. Houses Nos. 1 and 6 receive water direct from the two springs at a temperature of 87° to 92° F., and very rich in acid and salts so that it can be employed in the "Sprudelstrombad" or flowing effervescing bath. The other houses also obtain waters from the two great springs, but only after they have flowed into their respective basins, so that the temperature of the water is somewhat lower (85° to 90.5° F.) and not quite so rich in CO_2.

The baths in use may be simple saline or warm saline, and the flowing saline or flowing effervescing bath, as the case may require. In addition, of course, douches, hip baths, etc., found at all watering places, are given. The analyses of the various springs will be found appended. At first the waters of Bad-Nauheim were recommended for the treatment of gout, rheumatism, anæmia, and disorders of the female pelvic organs, but their scope has been widened and now embraces diseases of the heart and nervous system.

For the first-mentioned affection patients are advised to

ANALYSIS OF THE NAUHEIM MINERAL WATERS. THE AMOUNTS OF SOLIDS ARE GIVEN IN GRAMS AS CONTAINED IN 1,000 GRAMS OF WATER.

Constituents.	Springs for the Baths. No. 7. Grosser Sprudel.	Springs for the Baths. No. 12. Friedrich Wilhelms-Quelle.	Drinking Springs. Kurbrunnen.	Drinking Springs. Karlsbrunnen.	Drinking Springs. Ludwig-Quelle.
Chloride of sodium	21.8245	29.2940	15.4215	9.8600	0.3411
Chloride of lithium	.0492	.0536	.0267	Traces.	.0012
Chloride of potassium	.4974	1.1194	.5270	.0731	Traces.
Chloride of ammonium	.0550	.0712	.0371	.0113	
Chloride of calcium	1.7000	2.3249	1.0349	1.0578	
Chloride of magnesium	.4402	.5255	.7387	.2040	
Bromide of magnesium	.0060	.0083	.0063	.0014	
Sulphate of calcium	.0347	.0352	.0288	.0277	.0288
Sulphate of strontium	.0390	.0499	.0324	.0087	Traces.
Bicarbonate of calcium	2.3541	2.6012	1.1461	.9515	.9202
Bicarbonate of magnesium	.....	.....	.....	.....	.1928
Bicarbonate of sodium	.....	.....	.....	.....	.0928
Bicarbonate of iron	.0383	.0484	.0262	.0152	.0098
Bicarbonate of manganese	.0065	.0069	.0080	Traces.	Traces.
Bicarbonate of zinc	.0104	.0089	.0070	Traces.	
Silicic acid	.0325	.0213	.0186	.0087	.0121
Arseniate of iron	.00036	.0002	.00016	Traces.	
Phosphate of iron	.00046	.0007	.00034	.0002	
Oxide of copper, chloride of thallium, oxide of lead, nitric acid, organic substances	Traces.	Traces.	Traces.	Traces.	Traces.
Amount of solid constituents	27.0886	36.1695	19.0549	12.4196	1.0478
Absolutely free carbonic acid gas	2.3764 = 1216.6 c.c.	1.9777 = 1039.9 c.c.			
Semi-free carbonic acid gas contained in the bicarbonates	.7343 = 375.7 c.c.	.8123 = 416.2 c.c.			
The active carbonic acid, *i.e.*, the free and semi-free together	3.1106 = 1592.3 c.c.	2.7900 = 1456.1 c.c.			
Temperature (Celsius)	31.6°	35.3°	21.4°	15°	18.8°
Temperature (Fahrenheit)	88.88°	95.54°	70.55°	59°	65.84°

drink freely of the water of the Kurbrunnen, which is rich in chlorides of lithium, potassium, and the bicarbonate of lime, and, when a more strongly alkaline water is indicated, of that found in the Ludwigbrunnen. These springs are thought to be of special virtue in the removal of deposits about the joints. For the stiffness and swelling of the articulations occasioned by gout, baths are ordered which, beginning with thermal brine baths of a temperature of 93° to 95° F., are gradually changed to more stimulating ones, the effervescing water of Spring 12 being considered especially suitable. Finally, resort is had to the flowing effervescing bath, which is powerfully stimulating to the circulation, and is a specialty of Bad-Nauheim owing to the unequalled richness of Spring 12 in carbonic acid with its temperature of 92° F.

Patients suffering from anæmia and chlorosis are said to be much benefited by bathing in the waters of these springs on account of their containing iron as well as stimulating salts and CO_2, while at the same time they drink the purgative waters of the Kurbrunnen and Karlsbrunnen.

Disorders of the female pelvic viscera, particularly pelvic exudates, are said to be favorably influenced by the warm brine baths, either with or without the addition of carbonic acid.

Diseases of the spinal cord, as well as neurasthenia and other disorders of the nervous system, also receive treatment at Bad-Nauheim, and Medicinalrath J. Groedel, in his little work, "Bad-Nauheim: Its Springs and Their Uses," cites cases of the kind which have been remarkably helped. Professor Erb, of Heidelberg, sends numerous patients thither and highly praises the virtues of its waters in this class of cases.

As already stated, the waters of Bad-Nauheim are reputed to be of special efficacy in the treatment of both acute and chronic articular rheumatism, being employed in the form of baths, as has been the plan of management at other health resorts for centuries. Cases of comparatively recent development are subjected to the influence of the simple warm saline bath, but in protracted and chronic forms of the affection the stronger and carbonated waters are employed. The design of the bath is to promote healthy circulation in the affected joint, and it is believed that the comparatively cool (92° to 95° F.), strongly saline, effervescing, and hence powerfully stimulating baths of this spa accomplish this result more certainly than do the hot weaker baths given at other resorts.

The treatment of cardiac diseases, for which Bad-Nauheim has justly attained so great a renown, is an outgrowth of the treatment of articular rheumatism. It was Dr. Beneke, one of the earlier physicians at this resort, to whom credit is mainly due for the development of this use of Bad-Nauheim waters, although the Schott brothers, Groedel, Heineman, and others have brought the treatment to its state of perfection. Beneke contributed reports wherein he showed that this means of therapy is beneficial in four ways: (1) by preventing collapses of acute rheumatism, which would increase an existing valvular defect; (2) by promoting absorption of endocarditic products in the same way that these waters favor the absorption of inflammatory deposits in the joints; (3) by exerting a soothing effect on the heart's action; (4) by improving compensation in old-standing valvular disease. It was this last-mentioned effect which led Groedel to affirm in a paper contributed to the *Berliner klinische medicinische Wochenschrift* in 1878 that these baths improve cardiac energy and are a powerful heart tonic in other diseases besides valvular.

Carbonated thermal brine baths tend to quiet and regulate the action of the heart, improve its innervation, and increase its muscular tone. It is this effect which, in the experience of all physicians who have employed the treatment, makes it applicable to all forms of circulatory disorder, whether depending upon endocardial or myocardial disease, or merely upon nervous derangements. It is generally taught that severe degrees of arteriosclerosis and aortic aneurism are injuriously affected by such baths, but Groedel has shown that if they are given in such a way as not to augment blood pressure, even these two diseases may be materially benefited.

The methods of employing balneology in the management of cardiac diseases is simple and yet requires an intelligent conception of the principles concerned, and of

the effects produced by baths of different strengths and temperatures. The warmer, less strongly saline ones serve to soothe and relieve the weak, irritable heart, whereas those that are strong in mineral ingredients and charged with CO_2, and at the same time of low temperatures (86° to 83° F.), stimulate the organ to increased work. It is clear, therefore, that these last are permissible only after compensation has been re-established, or in cases that have never displayed very obvious weakness. It is not claimed that the balneological treatment of cardiac disease can be given only in Bad-Nauheim, but that here the advantages for this form of management are especially good. This is particularly true of the flowing effervescent bath, which, it is said, can nowhere else be given; and as it is powerfully stimulating, this kind of bath is highly beneficial in suitable cases.

Very briefly stated, the following is the method of ordering the treatment. At first, baths are prescribed which are weak in salts (about one per cent. of sodium chloride and one-tenth per cent. of calcium chloride) at a temperature of 95° to 92° F., and for a duration of from five to eight minutes. Carbonic acid is not added in the beginning of treatment, or at most in a very weak percentage of CO_2. As time proceeds and cardiac energy grows, the strength of the baths is increased until the salts mentioned approximate three per cent. of the sodium and one per cent. of the calcium chloride. Carbonic acid is added in the course of time, as determined by the judgment of the physician, and *pari passu* the temperature of the water is reduced and the length of each bath is increased, until at last the patient remains in the tub about twenty minutes.

In the fore part of the treatment the baths are interrupted by an occasional day of rest (one out of every three or four), but toward the end of the course such interruptions come at longer intervals. Patients are also required to lie down and rest after each treatment for an hour or so, in order that the effect of the bath may be retained and opportunity be given for a nap if inclination thereto be felt.

In addition to balneology patients are usually instructed to take exercise either in the form of massage, the so-called resistance exercises, or, as the heart becomes equal to it, by walking on the level or up the gentle inclines prepared for the carrying out of Oertel's terrain-kur. The diet and intake of fluids are also supposed to be carefully regulated.

As has been stated in numerous medical journals, this balneological treatment can be very well given at home by means of artificial waters, and, as my experience has abundantly proved, with excellent results. It is not possible, however, successfully to imitate the current bath, and in addition it is difficult to get patients to make treatment the sole aim of existence as at Bad-Nauheim.

In concluding this brief sketch, which by reason of the limitation of space allotted is necessarily cursory and incomplete, I desire to express my sincere thanks to Dr. H. N. Heineman and to Dr. Groedel for valuable assistance rendered by them. I am also indebted to numerous papers by Dr. Schott and others. *Robert H. Babcock.*

NAVAL HYGIENE.—Introduction.—Naval hygiene may be briefly defined as being that branch of hygiene which applies the principles of sanitation to the conditions peculiar to life at sea, and especially as existing in ships of war. Although, in actual practice, appearing more or less modified to make them meet the peculiar conditions prevalent on board sea-going ships, the laws of general hygiene must remain essentially and fundamentally the same. Adaptation may at times necessitate and require a modification in the practice, but can never be allowed to go so far as to alter the principles of what is known as good hygiene, and so recognized by the best sanitarians the world over.

The importance of the study of hygiene to the naval surgeon cannot be exaggerated. Unless he possesses a profound theoretical as well as a practical knowledge of the essential and fundamental principles and purposes of hygiene, the naval surgeon of to-day can hardly be called "up-to-date," for without that knowledge he is barely able to perform but half his duties as sanitary officer on board a war-vessel. Since these duties must be confined, in form at least, to recommendations, made to his commanding officer, it is hardly to be expected that his recommendations will meet with the approval, required by regulations, unless the medical officer at the same time is able to prove to his captain that he possesses the necessary and requisite knowledge to entitle him and his recommendations to that attention and consideration which alone can make them effective.

To the naval architect the careful and conscientious study of hygiene is likewise of very great importance. At least one of the essential conditions implied in the construction of a warship is that it shall be so designed as to afford a given number of men a wholesome shelter during the performance of their duties; that the conditions on board be such as to preserve the life and health of the men, aiding them in, instead of interfering with, their most effective duties and excluding outside influences that are detrimental to these ends. The naval constructor owes it to himself, to the naval service, and to the people of his country that the best possible arrangements be made, that the best methods be adopted, and that the best work be done to advance the interests of hygienic living on board the ships which he designs and builds, as far that may be within the range of his power. The ventilating system for a ship of modern construction, for instance, must be considered to be so essential that without it the ship would be of little value and its use limited.

Since the type and details of a ventilating system must be adapted to the type of the ship, it should from the beginning form a part in the design and structure of the ship and not be left to an afterthought. The constructor, realizing the difficulties, may commit them to an expert; but even then it is necessary that he have enough knowledge of the subject and of the results to be aimed at that he can readily and conscientiously accede to the demands of the expert, instead of regarding them as unreasonable; he should, moreover, possess enough knowledge on the subject to enable him to pass a just and proper estimate upon the value of the services of the employed expert himself. Thus, in giving out contracts, he is usually besieged by competitors. Competition leads to low bids and these lead to poor work and material. The result must be prejudicial to the interests of the naval service and to the constructor as well.

Scientific facts are stubborn things: they will not and cannot remain long ignored; mere opinions, whether official or unofficial, cannot sidetrack them, and thus the inevitable conclusion remains that we must bravely face these facts. In so far as the life of the sailor is influenced by the training which he must and can receive only on board a warship in commission and at sea, it is perfectly evident that that life is either increased or impaired in value to the service in direct proportion to the improvements in the hygiene of his immediate environments. These are intimately connected with the improvements in the construction of the ships on which he has his being.

Fortunately, there is abundant proof of the fact that within recent years, at least, a deeper recognition of the importance and of the profound significance of ships' hygiene on the part of all the officers of the naval service has become manifest. It has become clearly recognized that the strength, the power, the health, and the endurance of a ship of war, in action or out of it, whether on a mission of peace or one of war, can be but those of all its inmates combined, and, consequently, every man individually either adds or detracts from the sum total of the ship's power and endurance in direct proportion to the standard of his physical health. But the highest aims and objects of hygiene are not merely to preserve, but to raise the average standard of the health of our men to its maximum capacity. All training is more or less useless unless done on that basis.

Having once recognized these things, it becomes our

next duty to examine into the conditions, to consider some of the facts, upon which the successful solution of so high a problem depends. The three mainstays of all living things that people this earth are air, water, and food. An efficient ventilation, a good water supply, and an abundance of good and wholesome food must ever remain the principal subjects of our study and claim our first care and consideration. But before entering upon a more detailed study of these, we are impelled at least to call attention to what seems a most necessary preliminary to the successful administration of all hygienic laws in every organized body of men such as constitutes the navy. By that we mean the instruction of the men under training in the laws of the hygiene of our daily lives.

It has been found repeatedly and constitutes an almost daily lesson of the sanitarian that one of the greatest and ever-present dangers from disease, on the part of the men in both the army and navy, is the ignorance of the most simple and elementary laws of health that must govern the every-day conduct of their lives. Examples of this might be cited *ad infinitum*, but we need go no further than merely call attention to the lessons that have been taught us, during our short war with Spain, by some of our volunteer regiments. Many of our bravest sons, because untrained and uninstructed in these things, died within a few weeks of going into their first encampment. Hence the warning finger, fortified and supported by an experience that should never again be allowed to lapse into forgottenness, points directly and unwaveringly to the necessity for instructing the men in the simple and elementary laws of health. This is clearly and distinctly the duty of the medical officers of the navy, the only officers in the service who, by the very nature of their training and education, should and can be held responsible for initiating reforms and improvements in this direction.

> "Nous sommes si zélés partisans de la ventilation que nous n'hésitons pas à la considérer comme le premier facteur de l'hygiène des navires, plus important à lui seul que tous les autres réunis."—Rochard et Bodet.

I. Ventilation.

To supply a ship's complement of men with a pure, good, and wholesome atmosphere at all times and under the most varying conditions of activity, rest, and climate, is a problem which as yet has not been completely solved. The different climates through which men-of-war have to pass within a short space of time, and the conditions which these impose upon our problem, would alone be sufficient to demand the greatest possible elasticity in the range of adaptability from any ventilating system that is known, while the large number of small water-tight compartments into which the interior of a modern warship has been systematically reduced would make it seem almost next to impossible to keep the air inside all of these in a desirable state of purity and in constant and measured circulation. While, therefore, we agree with the distinguished French hygienists whom we have quoted above as regards the very great importance, to the hygiene of war-vessels, of an efficient ventilating system, we must also recognize and acknowledge that in no other department of naval hygiene do we find ourselves confronted with as great and perplexing difficulties as we do in the ventilation of warships of recent construction. We may accordingly be pardoned for devoting to this subject more time and space than to any of the others.

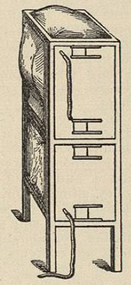

Fig. 3499.—Recknagel's Model Paper Box. (From Karl Schmidt.)

Ventilation means to produce currents in the air. Currents are produced (1) by rarefying a column of air at some place, through heat or suction, and (2) by condensing at some other place, through either cold or compression. An excellent illustration of the effects of heat and cold upon the creation of aërial currents is furnished, in nature, by our regular winds. Along the equator we have a belt of calms, several degrees in width, over which the air is rarefied and expanded, rendered specifically lighter under the influence of a vertical sun, and consequently a constant current ascends into the higher regions of the atmosphere; then this current flows north as well as south from the equator, passing over the cooler trade-winds which flow in beneath them from either hemisphere. The warm equatorial currents descend toward the surface of the earth in about the thirtieth degree of latitude. The same currents cross the winds coming from the poles and proceed converging toward them as surface winds, whence they again ascend and, now, proceeding in a direction toward the equator, they descend through the calms of Cancer and Capricorn, become surface winds, and form the trade-winds already alluded to, thus completing their figure-of-eight form of circulation.

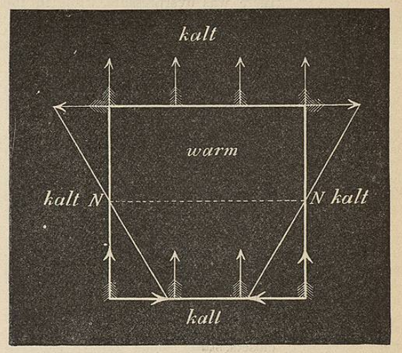

Fig. 3500.—Illustrating Distribution of Pressure in Heated Rooms. (From Rubner.)

A similar process, though on a much smaller scale, may be seen daily in the large chimneys of some of our great manufacturing establishments. Through the fires, the column of air contained inside of them is heated and rarefied. The rarefied column of air, consequently, rises very much as a stick of wood forced lengthwise under water will rise, and the specifically heavier air, outside the chimney, will press inward from below. The cause of this movement is the difference in temperature between the inside and outside columns of air, for if this difference disappears equilibrium is re-established and the movement ceases.

In houses and dwellings of all kinds, these same physical forces are constantly at work, tending to bring about a change of air within them. The porous nature of our building materials, the winds, and the differences in temperature between inside and outside air are the efficient causes of this natural ventilation. In an experiment by von Pettenkofer it was found that in a room of 75 cubic metres' capacity one complete change of air was produced in one hour through a difference in temperature between inside and outside, of 20° C.

In order to illustrate the working of the principles of this natural ventilation, Recknagel made a box of thin paper (see Fig. 3499) perfectly cubical in shape, leaving the bottom side uncovered. Through this uncovered lower side he heated the air by means of an alcohol lamp,