

THE MEDICINAL PROPERTIES AND USES OF INDIANA MINERAL WATERS.

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INTRODUCTORY.

The use of mineral waters in the treatment of diseases is an important one, particularly in Europe, where special attention has long been given to the subject. Strictly speaking, even the use of ordinary water comes within the domain of medicine—the amount of water and the time for taking it play an important role in many diseases.

Views on the uses and functions of water, either pure or holding other substances in solution, have been modified from time to time, with the advance of civilization, just as they have been changing on other subjects. Before the days of chemistry, about one hundred years ago, ideas about the ingredients of mineral waters were very vague, and explanations of their actions or the effects on the human body were equally so.

The first book published in this country on the uses of water was in 1725, and it was a reprint of an English work. The first distinctively American work on mineral springs was by Dr. John Bell, in 1831; since then several books relating to mineral waters have appeared. The most exhaustive compilation of the mineral waters of this country is a report which appeared as Bulletin No. 32 of the U. S. Geological Survey, though treating the subject from a nonmedical standpoint.

Water, pure and simple, is one of the essentials of life. All our drinks are water with varying admixtures of other substances; most of our fruits and vegetables are mainly water. The human body itself is three-fourths water.

Whether a sick man needs a water with one or more mineral substances in solution will depend on a variety of conditions. A mineral water may perhaps help him, at any rate an invalid who has been in ill-health for a long time will, probably, at one time or another consider the advisability of going to some health resort, to some mineral spring.

In gathering together all available data, the State Geologist, Mr. Blatchley, has certainly done something that will be fully appreciated by the physicians of the State. Such data can be used in arriving at proper conclusions in regard to the use of the waters of many of our springs and wells, and it will enable them to decide intelligently where to send patients afflicted with different ailments. It is true that the mineral water treatment of diseases is a much neglected subject among our physicians, and this is due chiefly to the fact that until recently there has been comparatively little demand for such methods of treating diseases, partly also to the fact that, with very few exceptions, until quite recently, we have had scarcely an institution worthy of the name of health resort making use of mineral waters, internally, or, in the form of baths, externally.

It should be said that the remarks in this paper are not intended for the physician, but for the ordinary layman, the average citizen of the State, informing him briefly about the properties and uses of our various mineral waters. It will be noticed that certain statements are repeated in different places, as, the use of pure water, of certain salts, the relation of diet, etc. This repetition is made purposely to emphasize their importance.

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WATER.

KINDS AND USES. PURE AND IMPURE.

Water is composed of oxygen and hydrogen chemically combined. As found in nature, it is accompanied with more or less mineral matter and at times with vegetable and animal impurities.

The rainfall furnishes us all our water; it is the moisture of the air condensed and precipitated to the earth.

Different names are applied to the water we use, according to the place from which we take it after it is precipitated. That which is caught from the roof of a house and stored in a cistern is called "cistern water;" that which flows away from the face of the earth is "river" or "stream water;" that which has penetrated into the soil and is collected in wells is known as "well water;" when it flows nat-

urally from a hillside, from an opening in a hilly country, we call it "spring water." Some water gets down deep into the geological strata of the earth, and when tapped by a deep bore is known as "underground" or "deep-well water;" if the water flows naturally out at the surface or mouth of the well it is known as "artesian water." Any water, whether from a spring or deep well, which is charged with mineral matter in appreciable quantity and possesses a peculiar taste or odor, is commonly called "mineral water."

The crust of the earth is built up of certain materials, and the water percolating or passing through these will hold in solution certain of the substances with which it has come in contact. If the underlying strata are of limestone, the water will be charged with lime; if of magnesia, with that mineral. Waters of this kind are known as "hard waters." Where there is little material to go into solution, as in a freestone or granite country, the more shallow waters are apt to be almost free from mineral matter, and in this case the water is called "soft water."

In the strict scientific sense, absolutely pure water is unknown in nature. The purest rain water contains traces of gases, of mineral matter and small amounts of organized matter. Water caught in the open country in clean receptacles may be regarded as practically pure. The process of contamination begins with the passage of the water through the gas and dust-laden atmosphere and is continued with renewed vigor when the water reaches the earth.

PURE WATER.

A few words in regard to the meaning of the words "pure water" may not be amiss. The term "pure water" is capable of various definitions; it depends altogether on the standpoint from which considered. The chemist, for instance, may say a water is pure for chemical purposes—"chemically pure"—when it contains no appreciable amount of gases or leaves no residue on evaporation to dryness. Water used for chemical purposes might contain innumerable minute organisms, micro-organisms, and he not concern himself about their presence. The bacteriologist will call a water bacteriologically pure if it be free from living micro-organisms and their spores, although it may contain considerable chemical impurity; in this case the water would be "germ free," or "bacteriologically pure." A mechanical engineer would call a water pure, or fit for boiler purposes, if it contained only small quantities of lime or magnesia—these forming the boiler scale—and (excluding gases

from decaying vegetable matter which may cause troublesome foaming or frothing) with him the term "pure water" is generally synonymous with "soft water."

To the sanitarian a water is pure if it is free from disease-producing microbes or bacteria, and if the quantities of the commonly occurring chemical impurities fall within certain accepted limits.* Certain chemical impurities may be present, as well as harmless bacteria, but water reasonably pure in these respects may pass as "potable water." The waters from many of our slightly mineralized springs properly come under this head.

In ordinary daily life the use of the terms "pure" and "impure" varies somewhat; a water may be sufficiently pure for one purpose, but not for another. The water that we ordinarily demand for drinking and household purposes must be clear, odorless and without any marked taste. Any turbidity, peculiar flavor or odor leads us to regard a water as impure. However, conformity to these three conditions alone must not be accepted as proof of the purity and wholesomeness of a water.

Some waters possess a peculiar flavor, but by constant use this is noticed less and less—we "get accustomed to it," as we say. People coming from a sandstone country to one of limestone are apt to complain of the water, and, on the other hand, on reversing the conditions, complaint will be made of the flat taste of the sand or free-stone water. It may be added that whenever any diarrheal symptoms occur in a person away from home he at once ascribes it to the water, when, as a matter of fact, the water rarely has anything to do with it, and the real cause may be obscure. Slight traces of sulphuretted hydrogen gas or of iron compounds produce peculiar flavors, but these, in the course of time, are no longer noticed. The same may be said of the alkali waters of the Western plains.

The difficulty of obtaining a pure water supply for our towns and cities is increasing from year to year. Our streams are becoming more and more polluted, and water from wells is objectionable on account of its hardness. It is only a matter of time until each city dependent upon a surface water supply will be compelled to erect a filtration plant, after the fashion of European cities. A properly filtered water does away with the danger of many water-borne diseases, such as typhoid fever and cholera.

The water from streams, rich in vegetal or animal life, especially in summer and fall, at times acquires a disagreeable flavor, due to the decay of these organisms. At times, also, the water is full of

*These standards differ with the kind of water, locality, etc.

mud—"mud baths," after a fashion, can readily be had by the use of some city waters following a heavy rain. With such a water we can never be safe from typhoid fever.

Water performs a most important part in nature; wherever there is life, whether in animals or plants, water plays a part. Even in the mineral kingdom the formation of many crystals would be impossible without the presence of water.

MINERAL WATERS.

SOURCE. ELEMENTS IN THEM AND HOW COMBINED.

In any part of Indiana a variety of waters is to be found. Rain water is ordinarily regarded as pure water, especially if carefully collected. The water from our streams and lakes may or may not be pure, depending on circumstances. Well water which in its descent through the soil filters through a sand soil is usually a pure, soft water, but in a limestone or drift-covered region it will contain considerable lime and magnesia, with more or less well-marked traces of sodium, iron, alumina, etc. Unless a water has filtered slowly through a thick stratum of earth, it is apt to contain more or less organic matter derived from plants and animals with which it came in contact on the surface.

As ordinarily understood, the term "mineral water" is applied to a water which is used in the treatment of diseases, either internally or externally, and which differs from ordinary water in that it holds in solution certain solids or gases. Mineral water may come from springs or from wells, especially deep wells.

A large number of ingredients occur in mineral waters. Primarily, these are chemical elements, as calcium, sodium, iron, sulphur, chlorine, etc., but only a few are to be found in an uncombined state, oxygen, for instance. With few exceptions, chemical elements are found combined with each other, usually as bases and acids, forming salts. The element sodium—a white metal in its pure state—is, for instance, never found in this condition in water, nor in nature, as far as known, but is always combined with some other element or elements. When combined with chlorine, we have sodium chloride, common salt; with sulphur, sodium sulphide. Sodium in combination with sulphur and oxygen forms sodium sulphate. There are a large number of sodium compounds found in different waters. Among them may be mentioned: Sodium arsenite, borate, bromide, carbonate, chloride, iodide, nitrate, phosphate, silicate, sulphide, sulphite and sulphate.

The chief ingredients of the mineral waters of Indiana are, from a medical standpoint: Calcium, magnesium, sodium, potassium, iron, aluminum, silicon, chlorine, sulphur, carbon, phosphorous—these latter generally in combination with oxygen as sulphates, carbonates, bi-carbonates or phosphates.

Among the minor ingredients, because occurring very rarely or only in minute quantities, may be mentioned: Lithium, bromine, iodine, boron, zinc, with perhaps a few others.

Among the gases may be mentioned oxygen, nitrogen and hydrogen; also sulphuretted hydrogen and carbonic acid gas.

It should be kept in mind that the above substances are not to be looked for in their uncombined state; they occur combined with each other, and usually as salts.

Elements are usually grouped on account of some properties they have in common. Some of the metallic elements form a group known as the alkaline metals, the two chief ones, as far as concerns the purpose of this paper, being sodium and potassium. They are found, in combination, throughout nature, and we take variable amounts in almost every mouthful of food we eat.

Sodium and Potassium.

Sodium enters into the chemical composition of every part of the human body; potassium, also, though to a much less extent. These elements are to some extent interchangeable in the body. On a vegetable diet, potassium accumulates. In the case of the herbivora it may gradually accumulate to such an extent that animals like the buffalo will go hundreds of miles to the "salt licks" to satisfy the craving for common salt, the sodium displacing the accumulated potassium. Animals living on flesh, the carnivora, get all the sodium required, in fact, all the needed mineral matter in their food. A cow will gnaw at bone to get the needed calcium or phosphorous of which bone is composed. We, as a rule, use salt, that is, table salt, more as a seasoning than on account of the actual need of it; some stomachs get too much salt.

It may, perhaps, appropriately be here stated that the substances needed in largest quantity by the body of man, as well as of other animals, are so-called carbon compounds, or organic compounds, the element carbon being in combination with oxygen, hydrogen and nitrogen mainly. These compounds are the substances that are mostly concerned in our daily life, in the wear and tear of the body, and they are obtained primarily from the vegetable kingdom, and

are produced—manufactured, if the term may be so used—by the plants themselves from the inorganic materials—earth.

Sodium, as such, does not occur in the body, but is always found in combination with other substances, notably with chlorine, and in this combination we take it daily as table salt, or, chemically speaking, sodium chloride, the older name being chloride of sodium. It is found in every part of the body, and some of it is decomposed by special cells in the stomach wall, into hydrochloric acid, also known under the older name of muriatic acid; it is a combination of chlorine with hydrogen and is needed in the process of digesting albuminous foods, such as meats and eggs.

Combined with carbonic acid, a compound of carbon and oxygen, sodium occurs in small amounts in the body, also with phosphoric and sulphuric acids. Besides these, there are a number of other combinations, some of them being with so-called organic acids, as those of bile or urine. Some of the sodium compounds will be again referred to under their medicinal properties and uses.

In a general way, the above remarks on sodium also apply to potassium, but, since the latter plays a less important part, no special mention need be made of it at present.

The element lithium is one of the rarer members of this group. Lithium plays an important role in the advertisements of mineral waters and health resorts—often waters with a mere trace of it are called “lithia waters” and extravagant claims are made for their curative properties. Lithium owes its medicinal reputation to the fact that it brings uric acid or deposits of uric acid in the body into solution, its solvent power in this respect being greater than that of potassium or sodium.

Calcium and Magnesium.

Calcium and magnesium belong to the group of alkaline-earth metals; they are the chief elements entering into the composition of bone—in combination with phosphoric and carbonic acids. They occur more or less abundantly in our food and drink.

Our drift soils, covering the greater portion of the State, are full of lime, and water in contact with such soils becomes saturated with it—becomes “hard.” To persons using a freestone water, free from lime, additional quantities of it may be of advantage, but too much lime is by some authorities considered detrimental to the body, as it may help to produce a degeneration of the arteries—so-called calcareous degeneration, known also as pipe-stem arteries. It is sometimes said that a man is no older than his arteries, meaning that he

will show his age most in the condition of the arteries; some men old in years are young in this respect.

Strontium and barium are elements that occur in some mineral waters, though very sparingly. They have a great affinity for sulphuric acid, with which they are usually combined. They may be dismissed with this bare mention.

Iron.

Iron as found in our mineral waters is combined with carbonic or sulphuric acids. Chalybeate waters, which will be referred to more in detail later on, are iron waters.

Iron is an important element entering into the composition of the body, or, to be more exact, into the coloring matter of the blood. Ordinarily, we get all the iron we need from our food, from beef-steak, especially. Where there is a deficiency, a condition which can be accurately determined by the use of diagnostic instruments, additional iron may have to be supplied to the body.

Among the rarer and less important members of the group to which iron belongs may be mentioned aluminum and manganese. The latter is a very rare ingredient of mineral waters, and to a certain extent possesses the properties of iron, but as far as its uses by the body are concerned we may neglect it altogether in this paper. Aluminum is a common ingredient of nearly all mineral waters, though usually only in infinitesimal amounts. Alum waters contain it in considerable quantity, and such waters have a peculiar astringency. Aluminum plays no especial part in the nutrition or functions of the human body, nor does the small amount in ordinary mineral waters have any medicinal effects.

Arsenic, belonging to a different group from any of the preceding, occurs in some waters, notably the poison waters of Tyrol. Arsenical water, or arsenic, has a peculiar effect on the body and is sometimes used in medicine, but since our Indiana waters do not contain this substance, no further mention need be made of it.

Chlorine, Phosphorus, Sulphur, Carbon.

The above elements, as found in our waters, are in combination with other elements, occurring usually as acids, and these in turn are combined with bases, the chief ones having been enumerated above. The principal acids are: Hydrochloric, phosphoric, sulphuric and carbonic. As their effects on the body are dependent almost wholly on their combination with bases, these combinations, so-called "salts," may now appropriately be considered.

Taking up the salts in the order in which their bases have been given above, we may now briefly enumerate the chief ones, with mention of their physiological and therapeutical, or medicinal, action, or effect, on the human body, though in a general way only.

SODIUM CHLORIDE.—Common Table Salt.—This is the most common combination of sodium; it is found everywhere, and all mineral waters contain it, in quantity from a mere trace up to 10,000 grains per gallon. This salt occurs in every part of the body, and a certain amount is required every day to keep the system in a healthy condition; the longing for salt is hence a very natural one. Sodium chloride regulates absorption, nutrition and secretion, and is of the utmost importance in these vital processes. It was for a long time held that if given in increased amounts it would promote tissue changes—proteid metabolism, as it is called in physiology. Taken into the stomach, it causes, or may produce, an increase of the gastric juice, of bile, pancreatic juice and intestinal fluid, promoting the appetite and assisting digestion. Part of the salt is decomposed by the stomach, and the acid, set free, with the secreted pepsin, brings albuminous foods (meats and eggs, for instance,) into solution ready for absorption. On the bowels it has a slight aperient effect, and also restrains decomposition of the intestinal contents. It has some expectorant action on the respiratory mucous membranes. Large doses are emetic and purgative.

It finds its chief employment in disturbances and diseases of the alimentary tract, in certain affections of the stomach, liver and bowels. It is of service in certain forms of dyspepsia marked by atony or a deficient secretion of acid; in forms marked by an excessive secretion of acid it may aggravate the difficulty. Stomach disturbances should always be thoroughly investigated and diagnosed, and the amount of free acid determined before attempting to prescribe a remedy, and especially before sending a patient to any mineral spring.

SODIUM SULPHATE, Glauber's Salt, is a common and abundant constituent of most of our mineral waters. It may be so abundant in a water as to exceed in its action all other constituents. This salt is not needed by a healthy body, and it plays no part in the tissue changes of daily life; any that might possibly be required is obtained from our food, which contains it in minute quantities. Taken medicinally, as by drinking a water containing it in solution, it acts chiefly by the process of endosmosis and exosmosis, or the to and fro movements of soluble substances in liquids. Small doses stimulate the intestinal and urinary secretions, larger doses are laxa-

tive, and still larger doses are cathartic; in other words, the amount of reaction depends on the amount taken.

This salt is useful in some disordered conditions of the digestive tract—gastric, hepatic and intestinal—and may be used daily in small doses, or in one or two large ones, as may be required. When the action on the bowels is gentle, it is known as aperient; when more active it is called laxative, and when very active, cathartic. An aperient is very frequently indicated, that is, it may be properly used, in deranged conditions of the alimentary tract, and may act very beneficially, while a cathartic is rarely indicated, and, given in improper cases under unfavorable conditions, may act injuriously. In their action, salts, or salines, may take much fluid from the body. In certain dropsical conditions, as that dependent on some forms of heart disease, it may give relief by helping to abstract the accumulated fluid. It must, of course, not be regarded as a "cure" in the latter condition, dropsy being simply a symptom of an underlying disease. It should be added that in a number of diseases the use of a water containing much of this salt must be avoided.

SODIUM CARBONATE.—This salt is commercially represented by the common washing soda, and, when combined with an additional amount of carbonic acid, by baking soda, the latter being sodium bi-carbonate. It is found in the body, in the blood and saliva, and these fluids are alkaline. Both these salts occur in most of our waters, usually only in very small amounts. They impart to water a greasy touch and a peculiar taste. Free acids are readily neutralized, the sodium combining to form a new salt, and for this reason these carbonates are much used in acid dyspepsia and may be of value in the treatment of gallstones. The bi-carbonate is usually prescribed. It is useful in certain affections marked by acid conditions, among which may be mentioned some of the fevers, rheumatism, gout and irritable bladder, particularly if the irritation be due to excessive acidity of the urine, the latter becoming alkaline under its use. In uric acid conditions the potassium bi-carbonate is to be preferred. In conjunction with other salts, as found in some of our mineral waters, it is frequently of service in catarrhal conditions.

A remedy which may produce good results in a proper case may, on the other hand, aggravate the difficulty in a case where it is not indicated. That sodium carbonate will derange digestion is at times shown in the case of persons who have for a long time eaten soda biscuits. The bi-carbonate originally used, under the influence of heat, is changed into the simple carbonate, the excess of the gas being liberated, "raising" the biscuit. The continued ingestion of an

alkali is certainly not conducive to increased digestive power of the stomach.

SODIUM IODIDE.—This salt is found in some waters, at least the small amount of iodine found in a water is usually given as combined with sodium in the report of the chemist, but it does not matter in what combination the iodine may be, it will produce the same effects. Where decided results are desired the salt itself, as obtained from the pharmacist, is usually prescribed. The effects of iodine and of iodides is conveniently expressed by the term alterative. In some way alteratives hasten the disappearance of some of the abnormal tissues, such as are found, for instance, in scrofula, syphilis, goitre, etc. If too much is given or for too long a time, the vitality of the normal tissue may itself be affected and the system undermined. In some parts of the world springs are found rather heavily charged with iodides and where their peculiar effects may be brought about without the action of accompanying salts, as those of the laxative sulphates of sodium or magnesium. A small amount of iodine may have its effects increased by the presence of other salts, notably those of iron.

SODIUM BROMIDE.—Bromine is usually associated with iodine and occurs in very minute quantities only. Bromides have a sedative effect on the nervous system, and are often given on this account. No reaction is to be looked for from the small amount that may be taken in any of our mineral waters in which it occurs. To get any effect from the sodium salt may require from a few grains up to several drams, the dose to be repeated as occasion demands.

SODIUM BORATE.—Boron or its sodium salt occurs plentifully in certain countries, but is rarely mentioned as occurring in our waters. The double salt, bi-borate of sodium, is known in common language as borax; it has a limited use. Boric acid, separated from its combination with sodium, is a white powder used in lotions, gargles and as a dusting powder. The presence of this salt in any of our mineral waters does not enhance their value.

POTASSIUM CHLORIDE.—This salt is generally associated with sodium chloride, but usually in such small quantities that its action on the body may be disregarded, or simply included with that of the latter, which it resembles in its main effects.

POTASSIUM SULPHATE.—This occurs sparingly in some of our waters, but since its action or effects on the body resemble those of the sodium sulphate and magnesium sulphate, no further mention need be made.

POTASSIUM CARBONATE, or usually the bi-carbonate, occurs in small amounts in some of our alkaline waters; its action resembles that of the sodium salt; it is an antacid and diuretic. Its solvent action on uric acid is greater than that of the other, but unless used in its pure form and in considerable amount, from five to fifty grains in a glass of water, no decided effects are to be looked for. Its presence in our mineral waters, in common with that of the other potassium salts, may be wholly disregarded as far as its medicinal effects are concerned.

The above remarks also apply to lithium carbonate, occurring in small (often exceedingly minute) amounts in some waters. There is so little of it that it can be left out of account entirely. As mentioned elsewhere, lithium forms a more soluble compound with uric acid than sodium, and for this reason it is frequently prescribed in the so-called uric acid diathesis; of this more will be said later on. If such an action, or, rather, reaction, is desired, the salt is generally prescribed in from two to fifteen grain doses of the dry powder, dissolved in a glass of water. It would be rather disagreeable to be compelled to drink a gallon of water for the sake of the few grains of lithium in it. Many of the so-called lithia waters are really very pure waters, with a trace of lithium, just enough of it so that the name can be applied, although it may require the aid of a spectroscope to show that it is present.

CALCIUM CARBONATE is the chemical name for pure limestone. When the stone is heated, as in burning lime, the carbonic acid is driven off, leaving calcium oxide, and this, exposed to the air, gradually returns to the carbonated condition. Lime is present in nearly all of our common waters, and most of the mineral waters, as has been mentioned under calcium, and what was there said also here applies to its carbonic acid compound. It is only slightly soluble in water (about one part in 10,000 parts of pure water), but more freely so in water impregnated with carbonic acid gas. Although in itself it may have some slight medicinal properties, chiefly antacid and diuretic, yet as found in mineral waters, excepting, of course, the calcic or alkaline calcic kinds, its possible effects are wholly overshadowed by those of accompanying salts, particularly of the laxative sulphates of sodium and magnesium.

CALCIUM SULPHATE.—The calcium in mineral waters is generally combined with sulphuric acid, and the resulting salt, the one just mentioned, is a common constituent of many waters. The amount present may be small, owing to its slight solubility, and no importance is to be attached to it in waters rich in other sulphates. It has no particular medicinal properties.

CALCIUM PHOSPHATE.—In considering, on a previous page, the chemical elements to be found in mineral waters, mention was made of phosphorus. In waters this is to be looked for in combination with calcium as a phosphate salt, and, as this is almost insoluble, only traces are to be found. No medicinal effects are to be looked for from the small amount in our mineral waters.

MAGNESIUM SULPHATE.—This is commonly known as Epsom Salt and is a most important ingredient of some springs and wells. It is a very soluble salt and may occur in large amount. Its effects on the body are similar to those of sodium sulphate, but it is less unpleasant to the palate and milder in action, and may be retained by the stomach, where the other is rejected. It is generally preferred to the sodium salt. If no action results from one dose it should be repeated.

MAGNESIUM CARBONATE.—This is given as an occasional ingredient of waters, but, because of its slight solubility (one part in about 2,500 parts of water), it may properly be excluded from the list. It is used chiefly as an antacid—in neutralizing acids—and for this purpose the dry calcined magnesia is the preparation prescribed.

IRON CARBONATE AND BI-CARBONATE.—Iron is of frequent occurrence in waters and is usually tabulated as a carbonate by the chemist. There may be only a mere trace, or, as in the case of some chalybeate springs, well-defined quantities. The importance of iron to the body has already been referred to. In many affections, notably in alterations of the blood, "iron waters" may be of decided benefit. The importance of iron will be again referred to in that part of this paper devoted to a consideration of diseases.

IRON SULPHATE.—Sometimes the iron is combined with sulphuric acid, particularly in waters of acid and sulphur springs. In this combination the iron is more astringent and less palatable than when combined with carbonic acid, although the ultimate effects of the iron on the blood may be the same.

It may be added that nowadays physicians do not depend on inorganic iron compounds to get iron into the system, into the blood cells, of their patients. They use organic compounds, usually such as are obtained from blood itself, as from that of the beef.

ALUMINUM SULPHATE is an occasional constituent, notably of some so-called alum wells or springs. The astringency of alum waters resembles that of alum itself. No special claims can properly be made for such waters, and when found in saline waters its possible effects are outweighed by the action of other salts. At times the analyst does not separate the alumina, or oxide of aluminum, from the accompanying iron in the process of analysis, and in that case he will

give the combined amount of iron and aluminum oxide. Occasionally the quantity of aluminum is given as aluminum silicate.

Of the gases found in mineral waters the following two should be mentioned as the most important:

CARBONIC ACID GAS.—This is a combination of carbon and oxygen and is found in all cold waters in variable amounts. It gives a sparkle to water, and if present in considerable amount may give a pungent taste, like the carbonated water of the soda fountain. Such waters are at times very soothing to an irritated stomach and may allay nausea. Where the effects of this gas are desired, the water should be either pure or only feebly mineralized.

HYDROGEN SULPHIDE, OR SULPHURETTED HYDROGEN, is the gas with the rotten egg odor, and a constituent of many saline or alkaline-saline waters, usually associated with other sulphur compounds. Exposed to the air, such waters become milky, turbid, from a precipitation of the sulphur in the decomposition of the gas. It is doubtful if this gas, especially when the amount ingested with the water is considered, has any influence on the body or is of any marked benefit in diseased conditions. Used externally it may have some influence in certain skin diseases. Warm sulphur baths may be useful in chronic lead poisoning, as that of painters. Many of the famous sulphur waters are hot or thermal springs, and their virtues, aside from that of accompanying constituents, are often due to the manner in which they are used.

One of the anomalies connected with the application of remedies for the relief of affliction from disease, is the belief that strong smelling or strong tasting substances are "powerful medicine." A tasteless medicine may have the same influence on physical conditions, but it may not influence the mind, and this is an important factor with many persons who are constantly taking medicine for one thing or another. Frequently all that is needed by a sick man is water, pure water, water in abundance, but unless something is added to it to give it some taste or odor, it is often impossible to get him to use it as he should.

A few other salts might have been mentioned in the above list, but since they occur in exceedingly small quantities or because they lack any medicinal properties, it was not thought necessary even to mention them.

From the above list it will be seen that the number of important constituents of our mineral waters is rather limited. Compared with the number of medicinal agents or remedies used by a physician—and mostly of an organic or non-mineral nature—the number found

in mineral waters seems small indeed. The reason why one water differs from another may be chiefly that the difference is a matter of quantity, the same constituents may occur in both waters. Often one constituent predominates to such an extent as to outweigh in its effects all others, giving the water its character. A water is apt to be more powerful, more effective, when the chief ingredients have similar action than when the action of one set of ingredients counteracts that of another. As a matter of fact it is often difficult to say just what the action of a water will be from the published analysis. Some waters can readily be assigned to the class to which they properly belong, while others can not.

From the preceding it will be seen that the therapeutic or curative range of action of substances ordinarily found in mineral waters is quite limited. The limitations will be still more marked if we distinguish sharply between palliative and curative effects. Although the range is limited, yet taking into consideration the prevailing affections of mankind, the common ailments of daily life, it will be found that the occasion for prescribing or for taking mineral waters is an extended one. As a general rule, when a person is ill, he feels bad all over, the whole system seems to be upset, and no one part of the body, no one organ, can be picked out and the difficulty definitely ascribed to it. Compared with the number of cases of illness, the number of cases of typical diseases is small. Very frequently a little fasting, a brisk laxative and a good night's rest is all that is needed to restore the normal or healthy condition. Mineral waters find their chief application in chronic ailments.

It should here be said that salts occurring in mineral waters can be obtained in a pure form from the pharmacist, as well as mixtures of salts resembling, in their chief effects, at least, those of mineral waters; these latter are known as "artificial mineral water salts." As a matter of fact, many of the noted waters are now closely imitated by manufacturing chemists. These combinations of chemical salts may be obtained in crystalline or in powder form or in the shape of tablets of definite strength. These tablets often contain such a mixture of acids and alkali that when they are dissolved in water, carbonic acid gas is given off, making the solution of the salts more palatable, or more closely imitating the natural water.

Now, although we may be able to determine fairly well what will be the result, the effect, when a certain salt is supplied to the body, when we come to mineral water itself we may in many instances be wholly at a loss to know beforehand what the effect will be. The most active ingredient may dominate all the other salts, as where a

large amount of sulphate of sodium or of magnesium very speedily produces a cathartic effect, or where a water containing arsenic produces its peculiar, perhaps toxic, effect, outbalancing all others. That the effect varies with the dose is known to everybody. Where salts of antagonistic actions occur, their usual effects on the body will probably be neutralized, and, on the other hand, where their action is along the same line, the effects may be greatly increased.

As a general statement, it may be said of the mineral waters of Indiana that the salts most abundantly present will determine the activity of the water, and that this activity will be modified by the amount of water taken.

There are no hot mineral springs in Indiana;* all belong to the non-thermal or cold spring variety, and this fact makes some slight difference in their therapeutic application. The effect of hot water is quite different from that of cold water, irrespective of the mineral ingredients.

A chemical analysis of mineral water will show what elements are present, but not how these different elements—usually divided into bases and acids—are combined. When the chemist has completed his determinations of the kinds and amounts of each element found, he goes to work to arrange his table, combining acids with bases, according to certain chemical laws or rules, and in this form they appear in the published analyses. Analytical chemists may all find the same kinds and amounts of ultimate chemical elements and yet their views may differ on how these are combined with each other. The tendency at the present time is to greater uniformity in this respect.

If the analysis of one water approximates closely that of another, then we may infer that the waters are essentially alike, and we may look for similar medicinal effects from each—though in practice there may be found slight differences, making one water more efficient and more valuable in the treatment of diseases than the other.

Mineral waters occur in great numbers and variety, and for convenience of classification they may be grouped according to some marked constituent or some decided therapeutic or medicinal properties; a spring very rarely has any marked property aside from that of its class. To the physician it is very important to know to which class or group a water belongs, in order to enable him to properly advise his patients concerning its use. Whether a patient should be sent to the nearest spring of its kind or to a distant one with different surroundings, perhaps a different climate, from those to which

*The warm "thermal wells" with a temperature of 80° F., to which Mr. Blatchley calls attention, may merit investigation and be put to a more extensive use. There seems to be an abundant flow of water.

he has been long accustomed, are questions that must also be considered at the proper time. It is not simply a question of going to a spring, or even a spring of the same class, and drinking the water, in limited or unlimited quantities, as we shall see later on.

CLASSIFICATION OF MINERAL WATERS.

There is little uniformity among authorities on the subject of the classification of mineral waters, and views on the proper position of any water in a given classification may vary widely.

Pliny, the old Roman naturalist, divided waters into acidulous, sulphurous, saline, chalybeate, nitrous, aluminous and bituminous. This was nearly two thousand years ago, and his classification survived for a long time, indeed, some of his terms are in use today.

A modern classification, including the various waters to be found throughout the world, is rather elaborate. The number of kinds of waters in Indiana is small and the classification of them will accordingly be brief. Based on their chief ingredients, our waters can be arranged into groups with names like the following: Carbonated, alkaline, alkaline-saline, saline, chalybeate.

Alum waters, although really saline, may perhaps best form a group by themselves.

The present writer will not attempt to refer to their respective classification the mineral waters of the State. All he desires to do in this paper is briefly to indicate, in a general way, the lines along which waters may be grouped and to give a few statements concerning indications for the use of each kind of water. Just where a mineral water from any particular spring or well belongs can be determined from the analytical tables in Mr. Blatchley's report. Often it is a difficult matter to determine just where a water belongs on account of the number of ingredients and amounts present; some waters may properly be placed in more than one group.

The indications for use in diseases or ailments will be but briefly referred to here. A more thorough consideration will be given the subject under the head of "Disorders and Diseases." The effects of individual salts have been briefly mentioned on pages 164 to 172

The following extract is from Crook's "Mineral Waters of the United States:"

"In what way do mineral waters act, and how do they produce their therapeutic effects? We may answer this query by the statement that in a general way their influence is wrought in the same manner as is that of other medicinal agents. It is easy to understand that a water densely impregnated with the sulphate of magnesia will cause alvine evacuations, and that one containing iron will increase the amount of hemoglobin in the red blood-cells; yet it must be confessed that an element of mystery still shrouds the action of many waters, and the good effects obtained from their use are difficult to explain."

Where reference is made to European waters, it is done mainly on account of their having been so long known and so fully studied. In justice to our local springs and wells we can not refer to any one as typical of a class without also naming others which would answer equally well.

CARBONATED WATERS.—Waters of this kind contain an excess of carbonic acid gas, holding in solution or accompanied by the carbonates of calcium, magnesium, sodium, and, to a less extent, by other bases. Reference was made to waters of this class under carbonic acid gas, on page 172. It may further be said that waters of this kind are often very palatable, and, other things being equal, they may be desirable for table use. The famous Apollinaris water, coming from near the River Rhine, in Germany, is essentially a very pure water, slightly alkaline, charged with this gas, each pint containing about 42 cubic inches. Some of our so-called lithia waters also come under this head.

ALKALINE WATERS.—Waters of this class contain considerable sodium and calcium carbonate and small amounts of chlorides and sulphates, with more or less free gas. If much sodium carbonate is present the water has a greasy touch. Such waters are regarded as diuretic, producing an increased flow of urine, and so may be of service in flushing the system and helping to get rid of accumulated waste products. Such waters also have an antacid effect, neutralizing the acid of the stomach, blood or urine, and in properly selected cases a favorable influence may be expected, as in hyperacidity of the stomach, in continuous flow of the gastric secretion and in pyrosis or heartburn. Continued use may possibly bring about a change in the formation of the acid itself, that is, in a diminution of the amount produced. To simply neutralize the acid is, of course, not a cure. In diseases of the liver, attended by disturbances of the biliary passages, or by gallstones, it may be of service, as well as in certain kidney and bladder disturbances. Diabetics are often greatly benefited by a prolonged stay at some alkaline mineral water resort. Theoretically, such waters are said to be indicated in many catarrhal affections—to loosen and dissolve the mucus—as in the case of ca-

NOTE.—Properly speaking, nearly all the wells and springs of Indiana whose waters are used for household purposes, certainly those of the limestone regions or of the glacial drift areas, must be classed among the alkaline mineral waters, on account of the amount of calcium they contain—held in solution chiefly by free carbonic acid gas. If this latter is driven off, as by heating the water, a deposit of limestone follows, as that in the tea-kettle. The difference in the taste of such waters from freestone waters is quite marked to persons accustomed only to the use of the latter and they may also notice some unusual effects from its use. Waters of this kind are, of course, too feebly mineralized to be of service in the treatment of diseases for which waters like those above mentioned are indicated. The possible influence of the lime where such waters are constantly used has already been referred to under "Calcium Carbonate."

tarrh of the respiratory system or of the digestive tract. The waters of Vichy and Ems are types of this class. The former contains 26 grains of sodium carbonate to the pint, with about 15 cubic inches of carbonic acid gas. For minor ingredients, present in small amounts, see the table at the end of this paper. In the water of Ems there is less carbonate and more of the chlorides; it is really an alkaline-saline of a mild type; it differs greatly from the Carlsbad water by the absence of sodium sulphate.

ALKALINE-SALINE WATERS.—These differ from the last in that they contain greater quantities of sulphates and chlorides. The well-known Carlsbad water is a prototype; its chief constituents, with amounts per pint, are as follows: Sodium carbonate, grains, 9; sodium chloride, grains, 9; sodium sulphate, grains, 20; round numbers being given.

A water of this kind in continued small doses stimulates the secretion of the gastric mucous membrane, while large doses diminish it. It increases peristalsis of the stomach and intestines, thus tending to empty the stomach and intestines. It reduces the irritability of the stomach.

In attempting a Carlsbad cure, it is necessary beforehand to ascertain the condition—the amount of acid secreted should be accurately determined. It may be added that the diet regulations at Carlsbad play an important part in the treatment of alimentary tract disturbances and diseases. The best results are obtained in cases resulting from habitual overfeeding.*

*According to Boas' "Allgemeine Diagnostik und Therapie der Magenkrankheiten," Carlsbad thermal waters are indicated in the following conditions:

1. In acute cases of dyspepsia, particularly those with increased acidity and moderate constipation.
2. In gastritis acida, especially if accompanied by an abnormal secretion of mucus.
3. In many (non-nervous) forms of hyperacidity, of continuous flow of gastric juice, and in hydrochloric acid pyrosis.
4. In the milder forms of atony of the gastric muscles, dependent on sedentary habits, limited diet (soups), habitual constipation and increased secretion.
5. In insufficient chemical activity and diminution of the amount of free hydrochloric acid.
6. As an after-cure following the healing of a chronic gastric or duodenal ulcer, especially in the hyperacid forms.
7. In dyspeptic disorders dependent on constipation, disturbances of the liver and while still in the sub-chronic stage.

In 1, 2, 3 and 6, large doses of the thermal waters are indicated; in the others, small doses. Carlsbad water should not be used in the following:

1. In advanced forms of dyspepsia, particularly if free acid has disappeared.
2. In all forms of real chronic gastritis with a complete loss or disappearance of hydrochloric acid.
3. In dilatation of the stomach, whether dependent on atony of the walls or on stenosis of the pylorus.
4. In all forms of nervous dyspepsia.
5. In dyspepsia accompanied by severe constipation.
6. In suspected malignant disease of the alimentary tract.

SULPHURETTED WATERS.*—Most of the waters of this kind in Indiana are alkaline-salines, or salines charged with sulphuretted hydrogen, and they are readily recognized by their odor. Objection is rarely made to this gas, or rather to its odor, and after a few days' use it may no longer be noticed; it does not disagree with the stomach. In a general way, the action of these waters is that of other springs or wells having the same mineral ingredients, minus the gas.

These waters in Indiana play a prominent part in the treatment of disturbances of nutrition—in derangements of the stomach and kidneys. Their therapeutic or medicinal range is a wide one. Full-blooded, plethoric individuals are often greatly benefited by a prolonged stay at one or the other of these springs or wells, particularly persons living in cities, leading sedentary lives, eating too much, or too rich food, and not knowing what it means to be really hungry.

Waters of this kind do not add anything to the body—anything that is needed for its nutrition—which may not be obtained from food. Their action is in just the opposite direction; they deplete, they take away products that have accumulated by the abnormal mode of living, by the over-eating and under-exertion.

These waters are esteemed in many disordered conditions of the stomach, liver and bowels. A sallow complexion, with a coated tongue, is quickly cleared up by waters in which the sulphates predominate. The condition following the prolonged use of alcohol is speedily and beneficially modified by a short stay at one of these springs. The use of such water will again be referred to under diseases of the alimentary tract and under uric acid conditions.

SALINES, SALINE WATERS.—These waters contain large amounts of sodium chloride, with variable amounts of chlorides and sulphates and little, if any, sodium carbonate.

*There are four fairly well defined kinds of sulphur waters found in Indiana and they can be characterized in a general way about as follows:

1. Waters with very little sodium chloride and with fair amounts of the sulphates of sodium and magnesium. Waters of this kind are especially serviceable in cases of hyper-acidity of the stomach and where sodium chloride is contraindicated. Some of the waters contain more or less of the carbonates of calcium and sodium, and these aid in neutralizing the acidity.

2. Waters with considerable sodium chloride and with practically no sulphates; these are indicated in conditions the opposite of those mentioned above.

3. Waters with much sodium chloride and considerable of the sodium and magnesium sulphates. These waters are indicated in conditions marked by sluggish bowel movements; they are chiefly aperient in their action.

4. Waters with variable amounts of sodium chloride but with large amounts of sulphates and having a decided action on the intestinal tract. These are essentially purgative waters.

The writer would like to mention some of the waters coming under the above heads, but in justice to others he can not single out a few.

Sodium chloride waters are said to be useful in stimulating the gastric mucous membrane, in increasing the appetite and in getting rid of excessive amounts of secreted mucus. The best results are obtained in gastritis, with diminishing amounts of hydrochloric acid, but the water must be used at least for many weeks. Chronic cases may be benefited by the continued use of such waters, as they help the digestive process. In cases with increased formation of hydrochloric acid, such waters are contra-indicated, as might naturally be inferred from the preceding.

Salines differ very much in their composition. The waters of Wiesbaden contain 52 grains of sodium chloride to the pint, those of Nauheim, mostly used for bathing, contain 110 grains. When salines contain much of the sulphates they are termed purgative. Hunyadi Janos is an example of this kind.

CHALYBEATE WATERS contain a variable amount of iron in combination with an acid, as carbonic. Waters of this class differ greatly in the amount of accompanying salts; the best waters are those in which these are in minimum quantity. A saline water may contain a large amount of iron, more than is found in a purely chalybeate water, yet little or no benefit may be received from the iron on account of the action of purgative salts. Although iron compounds, if taken in sufficient amount or for a long time, may cause constipation and may even derange the digestive system, the amount usually found in our waters is so small that their effects may be wholly disregarded.

The springs of Schwalbach, in Germany, and Spa, in Belgium, are types of good chalybeate waters.

Chalybeate springs are common everywhere, and, unless the accompanying minerals do not disturb, they are indicated in conditions of under-nutrition, with blood deficiencies.

In chronic anemic and chlorotic conditions, a prolonged stay at some distant iron spring is often beneficial; the change in scenery and climate may be of value.

OTHER WATERS.

All sorts of combinations of salts occur, in kind as well as in amount, but, medically speaking, the above list will answer the requirements of classification or grouping. All the waters of the State may be placed under one or the other of the above heads. If belonging to more than one group, it can be indicated by such combinations as saline-chalybeate, saline-carbonated, or, in still greater

detail, as, for instance, alkaline-calcic-carbonated-chalybeate. It should be distinctly understood that we have no mineral waters in Indiana that stand alone, or which may not also be found in other states of the Union, or in other countries.

Just where to place any given water may be a difficult matter, as already mentioned. Sometimes it may properly be placed under two groups, and allowance has to be made in this respect. With an analysis before us, we ought, however, to be able to arrive at some satisfactory conclusion.

Whether the waters of one locality should be used in preference to those of another locality when of practically the same composition, is a question that will depend on a variety of conditions—the nature of the disease, the condition of the patient, the distance to be traveled, the hotel or home accommodations, the cost, climate, season of the year, etc., all must be considered. In the matter of health resorts as elsewhere, the best is generally the cheapest.

ARTIFICIAL MINERAL WATERS.

Although chemists can take the various chemicals or salts and add them to pure water in proper amounts and thus closely approximate the composition of mineral waters, yet the results obtained by their use may not be exactly the same, especially to the mind of the invalid, as those derived from the use of the real mineral water—even after allowing for the modifying conditions under which the waters are taken at the springs. When speaking of a “mineral water cure,” we mean a journey to some certain spring and using the water as it issues from the earth.

Some invalids prefer to use a mineral water simply because, as they say, it is “prepared in nature’s own laboratory,” or because it is “nature’s own remedy.”

In many conditions physicians prefer to use pure salts, because they can be accurately weighed or dosed out to meet the indications, as in the use of a definite amount of an alkali to neutralize an excessively acid gastric juice or an acid urine. If patients prefer to use a natural mineral water, they can, perhaps, be accommodated by a water containing a suitable alkali and without any accompanying deleterious mineral matter.

THE HUMAN BODY IN HEALTH AND DISEASE.

The human body is a complex organism. It is essentially a machine for the performance of certain functions, consisting of a framework, the skeleton, with the various organs grouped around. The numerous functions are performed by differentiated organs. The real work is done by the individual cells of which the organs are composed. For instance, muscle cells contract and expand, and thus we get motion; glandular cells secrete and excrete; nerve cells control the other cells and bring the body in relation with the outside world. Of the organs, we speak of the organs of respiration, or of sight, or of locomotion, and the like, each set performing some special function.

The cells of the body correspond to the bricks out of which the house is built. Cells are alive; they are born, live and die. Cells require food for the performance of their separate functions; they grow, especially in number, as the body itself grows. Food is carried to the cells, and, in fact, to every part of the body, by the blood stream. Products of vital activity are carried off by the blood and are eliminated by the lungs, kidneys and skin. Unused parts of the food itself are directly discharged from the alimentary tract without having entered the body proper, for, strictly speaking, the inside of the bowel is outside of the body.

The human body, like animal bodies in general, breaks up organic compounds, these latter having been built up by plants from the inorganic materials, that is, from the earth, air and water. The number of chemical elements entering into the composition of the human body is quite limited, and what we need for growth and keeping the body going and to replace the wear and tear we obtain from our food. Oxygen, hydrogen, nitrogen and carbon compose approximately 95 per cent. of the human body; mineral matter, such as calcium, phosphorous, sodium, iron and several others in very small quantities, composing the other 5 per cent. Seventy-five per cent. of the body weight is water. It should be remembered in connection with the use of mineral waters that the small amounts of mineral matter needed to replenish the wear and tear of the body are supplied in our daily food.

The chief waste products of bodily activity, of metabolism, are carbonic acid, urea, uric acid and combinations of uric acid, creatin, cholesterin and several other substances in lesser amounts. In a general way we may say that the food consumed in the production of heat and force is burned up just like coal under a boiler—that is,

oxidized—combined with oxygen—and the resulting carbonic acid gas is given off by the lungs. The wear and tear of the bodily organs themselves in the performance of this function is excreted by the kidneys; this is chiefly urea and uric acid, and a quantitative analysis of the urine will, in a measure, show the amount of this wear and tear.

People living in a cold climate require more food to keep the body warm—to keep up the animal heat, and the body must oxidize more food and the lungs act more energetically to supply the air and displace the carbonic acid gas. In the struggle for existence, a person with a poor digestive apparatus has a very poor show. On the other hand, people living in a warm climate require little food to keep up the bodily heat; the same may be said of persons living in warm rooms, and dressing warmly on going out. With large quantities eaten and little actually used, the body naturally stores up material to be drawn upon later—the body becomes fat.

In a general way it may be said that the materials entering into the production of heat and force are starches (cereals in general), sugars, oils and fats; they are literally burned up in the body. The wear and tear of the machinery itself—that of the body cells and tissues, is replaced from the animal food we eat—meats, milk and eggs. When these latter are habitually supplied in large quantities, the system becomes overloaded and the kidneys have to work harder to get rid of them. In the process of carrying off such products, water plays a most important part; in fact, if the amount of water passing through the kidneys is insufficient to properly carry them off, all sorts of disturbances may arise. The blood itself is mainly water, holding some substances in solution and the corpuscles in suspension. It may safely be said that, of all the substances required by the body, water occupies first place. Frequently, when the system is deranged, all that is needed to restore the equilibrium is the free use of water.

DISEASE.

Naturalists tell us that a constant struggle for existence is going on in the world among all the different kinds of life, animal as well as vegetable. We see it in the field, where strong plants crowd out the weak, and in the woods, where trees take possession of the soil to the exclusion of the smaller plants. Among animals, one lives at the expense of another; the stronger destroy the weak, and the strong themselves may fall through a combined attack of the weaker ones. Some animals live solely at the expense of vegetable life. Man

himself lives at the expense of all other living things, animals as well as plants.

Man, too, has his foes that threaten his existence. There are all sorts of living things, both animal and vegetal, that are ever ready to attack and destroy him. In civilized countries the danger from large wild beasts has of course been reduced to a minimum—we are no longer in danger of being eaten by wolves and bears, but a host of small animals, parasites chiefly—worms, tapeworms and trichina, mites and amoeba, constantly assail us. At present our direst enemies are among the plants. We have all heard of the festive bacteria that are ever ready to attack and destroy us. Bacteria, belonging to the vegetable kingdom, as causes of diseases, play a most important role.

When the cause of a disease or of an injury is large enough to be plainly seen by the unaided eye, we readily take it for granted that it is the cause. For instance, a child is suffering and has a peculiar train of symptoms. What ails it? What is the cause of the illness? After a short time, several worms are passed and the child is well again, and we at once, and properly, conclude that the worms were the cause of the disturbance.

As the cause, or causes, of diseases diminish in size the difficulty in recognizing them increases. Seeing usually means believing. The smaller an object the fewer are the people in this world who are able to see it. By way of illustration, the cause of the human "itch" is a good example. Several hundred years ago a little mite was suspected to be the cause of the itch, and soon after the microscope came into use—about two hundred years ago—it was figured and described. Yet strange to relate, it was not until about seventy-five years ago that it was universally recognized as the cause.

At the present time we know positively that quite a number of diseases are due to the growth of minute forms of life, especially bacteria, in and upon the human body. It is not to be understood, however, that all diseases are due to "germs," as this is not the case. Moreover, many diseased conditions may be simply the after-effects of former attacks of such minute organisms; the original cause of the disease, or the disease process, may have utterly disappeared. It may be added that the number of diseases that may be inherited is quite small, and such inheritance occurs only exceptionally.

Nowadays we always want something definite as a cause for the production of a disease—something that can be seen, felt, weighed or measured, a something that appeals to the senses.

Disease has been defined as: "A condition of the body marked by inharmonious action of one or more of the various organs, owing to abnormal conditions or structural change."

The natural defenders of the body against the attacks of bacteria, of disease germs, are the white-blood corpuscles; they are the soldiers that fight our minute foes. They do their work so perfectly that ordinarily we are not aware of any struggle going on within us. At times, however, the struggle becomes so intense that we are led to realize that something is wrong, as when we have fever. The fever is literally the heat of the battle that is going on within our body after some disease-producing germ has gained an entrance and is trying to overrun it. When the fever or heat producing process is localized near the surface, as in an inflammation of the finger, the battle may be fought within narrow limits and the white cells that have fallen in the battle may be discharged from the surface as pus or matter—a pus corpuscle is simply a dead white-blood corpuscle.

The human body reacts in a certain manner to a given cause. In the case of diseases due to microbes this reaction is very uniform, and this is what we ordinarily call the symptoms of disease. A critical study of the symptoms may therefore tell us what the disease is, as well as its cause.

The body in relation to disease-producing bacteria may aptly be compared to a bare field ready for the seed. If no seed is sown, no crop results; if corn is sown, the resulting crop will be corn; if wheat, then wheat results. We do not expect corn when wheat is sown, nor anything else than wheat. So in diseases. If, for instance, the germ of cholera begins to grow in the body, cholera results and nothing else. If a body be in a locality where there are no cholera bacilli, there will be no cholera. The point is this: No germs, no disease—a given disease for a given germ.

In regard to bacterial diseases, it may be said that as long as the body is in good working order, the skin unbroken and the organs, especially the digestive tract, perform their functions well, then we are in good condition to resist the attacks of our enemies, the disease-producing bacteria. Occasionally some may gain an entrance and flourish for a short time, but ultimately they are dispelled—and we are well again. Where the body is in poor condition, enfeebled for some cause, it is less resistant and may succumb to an attack that a strong person would readily overcome.

Besides acute diseases due to infection and chronic diseases the result of such infection, there are many diseases or diseased conditions to which no outside, no foreign, or in other words, no bacterial, or microbial, cause can be assigned,

A sharp distinction must be drawn between *acute disease processes*—acute disease due to some infection—and the *after-effects* of such diseases. The latter may be due to impaired functioning of an organ owing to a partial destruction of its substance, or to some perverted action having been induced which is kept up after the subsidence of the acute disease—there may be some remaining chronic functional derangement, or, as we say, a chronic disease.

The kinds of diseases chiefly benefited by the use, internally or externally, of mineral waters, belong to the non-acute, or non-germ kind, mostly diseases or disorders of the alimentary tract, kidneys, blood and skin. These will be considered in some detail later on, together with the benefits to be derived from the use of a proper mineral water.

WHAT MINERAL WATERS WILL NOT DO.

Not to go into this question would practically defeat the object of this paper. It is a cardinal principle in medicine that to “know what not to do” is just as important as to know “what to do.” It is just as important to know what mineral waters will not do as to know what we may reasonably expect from them.

Confining ourselves to Indiana mineral waters, we may safely say that none of them add anything to the body which may not as well be administered at home, and perhaps in a more palatable or agreeable form. We have no waters that are healthful, that is, full of health, and no sick person can drink in health by drinking water.

Our mineral waters do not contain anything that adds to the nutrition of the body which may not be found in the daily food.

There is nothing in mineral water that will keep the body in health—nothing except the water itself. Everything that is needed by the body in health is supplied by our ordinary foods and when the body is sick it is only exceptionally that a mineral spring supplies anything that is needed to restore health, as the iron in an iron spring, for instance.

Simply to go to a health resort and drink the water in prescribed, or perhaps in unlimited, quantities, is not all of “Going to a health resort,” no more than to fish is all there is of “Going fishing.” Nature cures. This is a fact not to be forgotten. Doctors may help and mineral waters may help, but they help only by assisting Nature. If a patient depends on physicians or on mineral waters to make him well without his serious co-operation he will likely be disappointed. He must co-operate even at a health resort.

The belief in the efficacy of mineral waters in curing disease is almost as widespread as the belief in the healing herbs that grow somewhere—if we only knew where to find them. "Health Food" should also be mentioned in this connection. Health foods are advertised to cure many of the ills of mankind, so easily digested you know, the stomach has nothing to do but just to absorb them. It has often seemed to the writer that some one ought to "get up" a food with a minimum amount of digestible substance, a food that fills the stomach but adds little to nutrition. Many persons have a strong desire to fill the stomach, and when they do this too much is absorbed, the system is overloaded and it has difficulty in getting rid of the surplus. What persons of sedentary habit need is a food that will satisfy the craving of the empty stomach but really add little to the tissue metabolism, which, with their mode of life, should be reduced to a minimum.

A great amount of our mineral water lore has been inherited from the ancients, much of it has been found untrue; in fact many physicians question, even deny, the curative properties of mineral waters. The old books are entirely out of date and are not worth quoting at all; they contain too many general but indefinite statements about the curative action of certain waters. Much doubt has, for instance, been expressed lately as to whether saline waters influence tissue metabolism—changes among the cells and tissues or organs of the body—in the least, and yet this is a statement that has appeared in one treatise on mineral waters after another. According to the experimental researches and investigations of V. Noorden, Ludwig and Dapper, such a role must now be denied saline waters. With all the research now carried on, we will, no doubt, in the near future be able to arrive at better conclusions concerning the classes of patients, that is, the kinds of disorders and diseases that are most apt to be benefited by a longer or shorter stay at any given mineral water resort.

The writer himself is much of a skeptic when it comes to the outright curative properties of mineral waters. It may be objected that his ideas on the influence of mineral waters in the curing of diseases are too radical, too pessimistic, too iconoclastic, but if any fact is to be explained for the advantage of the proprietor of a mineral spring, he will attend to that. What some men will not claim for their waters is not worth claiming.

In this connection, the following quotation from the recently issued *Cyclopedia of Medicine and Surgery*, by Gould and Pyle, may be of interest: "An undue value is placed by the laity and inter-

ested proprietors upon the medicinal value of mineral waters. The benefit in most instances from them is due to the change of climate and scene, freedom from business and home cares and worry, regularity of life and diet, drinking water in quantity, and, in many instances, the substitution of water for alcoholic beverages. Those springs which are farthest removed from the patient's residence, are, as a rule, of the most value to him, as similar invalids whose homes are in the vicinity of the springs are often not benefited by its water."

If certain mineral waters possessed the properties ascribed to them by their owners or by the residents of the vicinity, then the people of that community ought to be the healthiest and longest lived individuals in the country. As a matter of fact, the health of a people of a health resort, of a mineral spring, is not apt to be better, nor are they longer lived than the people of a country with no mineral springs—conditions otherwise, of course, being equal.

We must draw sharp distinctions between being benefited and being cured. Some invalids, especially "high livers," with an accumulation of waste products in the body, may go to a health resort, drink the waters freely and in a short time feel rejuvenated. They return to their homes elated—resume their old habits and in the course of time the old difficulty returns.

We at times hear patients say: "I felt perfectly well while I was at the X Mineral Spring, but the moment I got home the old trouble returned." Some will perhaps add: "I believe I did not stay long enough to get cured, and I guess I will go back for another round." Alas for that patient. He may go again and again, and each time be benefited while at the spring and using the water, but may never be cured. The effect of the water may be simply to relieve symptoms—for instance, a gastric pain due to an excessively acid stomach, and when this is neutralized by the alkali in the water the pain subsides. In this case it is a purely chemical reaction which may not have any influence on the underlying cause for the production of the acid. Sometimes the mere drinking of water, pure water, or water only slightly mineralized, is all that is needed to a sense of well-being.

The final outcome of a disease or of a diseased process may differ greatly in different individuals. Some may recover promptly, others recover only after an indefinite period; there may be a long convalescence ending with ultimate recovery, or, on the other hand, functioning may ever after be impaired—the individual may be chronically ill.

The body can no more replace a lost mucous lining of the stomach or replace a lost lung than it can replace a lost arm.

To get decided lasting benefit from the use of mineral waters, the stay at a health resort should be a more or less prolonged one—weeks or perhaps months may be required to bring about a favorable influence—an influence that will last after returning home. That the waters should be carefully and properly chosen to meet the indications is of course assumed.

A story from the *Fliegende Blaetter* shows the faith of some men in the efficacy of a mineral water.

Mrs. Brown: "Your husband seems to be a great believer in the waters of the Gushing Mineral Springs?"

Mrs. Gray: "Yes. He ought to be."

Mrs. Brown: "Why?"

Mrs. Gray: "For the reason that it has cured his stomach trouble four times this year already."

Although the subject of mineral waters and their curative influence may not interest a person in health, it becomes an interesting one to the invalid—and each one of us may at any time become ill.

Experience has demonstrated that certain mineral waters do have curative effects when intelligently used; this may be said particularly of European waters. Americans, as a rule, have paid too little attention to the springs of their own country, and too little scientific study has been given the matter. Even at the present time, little use is made of our springs, when compared with those of European countries, although many of our waters are doubtless as valuable as those of the famous European springs.

DISEASES AND AFFECTIONS BENEFITED BY THE USE OF MINERAL WATERS.

Compared with the number of known diseases and disorders, the list of those in which mineral waters are properly applicable may seem very limited, as a matter of fact there are only a few groups that stand out distinctly—chiefly chronic conditions.

According to Gould and Pyle, "The principal affections in which mineral waters are esteemed are the following: Cirrhosis of the liver, dyspepsia, gout, rheumatism, uricacidemia, lithiasis, hepatic diabetes, constipation, strumous diathesis disorders, obesity, plethora of the pelvic organs, hypochondriasis, skin-diseases, especially those dependent on gastric derangement, phthisis, constitutional syphilis, metallic poisoning, etc. Aperient and purgative waters are useful when a prejudice exists against purgative medicine."

We shall now take up some of the chief ailments in which the use of mineral waters is indicated. This can of course be done only in a general way and without going into special details. It is not the intention to write a medical treatise.

Taken in connection with what has been said heretofore on the properties and uses of water and mineral waters, it is hoped that the present consideration of conditions, of affections, in which the use of mineral waters is advisable, will permit definite conclusions to be arrived at in any given case. In case of doubt, however, it is always advisable to apply to a physician and be guided by his advice.*

The blind or indiscriminate use of mineral waters, as of any other supposed remedy, should be discouraged, for a water rich in solids may aggravate rather than alleviate conditions or certain forms of ill-health.

CONVALESCENCE FROM ACUTE DISEASES.—Frequently after the acute symptoms of disease have passed away, a more or less prolonged state of convalescence may follow. This may be marked by a feeling of lassitude, an inability to concentrate the mind on any subject and a tendency to become irritated from slight causes. Any mental or physical exertion is apt to increase the action of the heart and it may beat very actively. Ordinary medication seems to have lost its effects, there is little improvement. In such conditions it is well for the patient to spend some time at a pleasant health resort in the country, with pure air, cheerful surroundings and enough recreation to while away the time. Waters only slightly mineralized are best in such cases. If there is an anemic or thin-blooded condition, the use of some iron spring may be indicated, the small amount of iron in the water often acting very beneficially.

ANEMIA AND GENERAL DEBILITY.—In conditions of this kind, without any well-defined symptoms of disease, and not the result of an acute disease but due to some chronic disorder or overwork, worry, sleeplessness, dissipation or deranged digestion, and marked by an indisposition to exertion, becoming easily exhausted on exertion—with perhaps ill-defined pains and aches which the idle mind magnifies—is a condition often greatly benefited by a visit to some spring with a bland or slightly saline water or to some iron spring, with a freedom from care and the worry of home life. Where the debility is due to the retention of poisonous products in the body, moderate

*When a physician can give a decidedly favorable opinion, he is only too glad to do so. The laity, as a rule, are wholly unable to judge the adaptability of a water or a resort to an individual case, and one should always hesitate before condemning a water because it did not give the expected relief, especially where the water has been chosen arbitrarily and independently of the advice of a physician.

amounts of some of the sulphuretted waters may be found advantageous.

STOMACH AFFECTIONS.—This is a large field and one difficult to treat from a popular standpoint. It may be said that the tendency at present is to make finer and finer distinctions and to differentiate between disorders that on superficial examination seem alike, this is especially the case with affections of the alimentary tract. The words dyspepsia, constipation or diarrhoea no longer stand for diseases, but simply for disease symptoms or conditions, showing that something is wrong, and these may be due to a variety of causes. The tendency now is to find the cause and remove it, if such be possible, the symptoms disappearing when the cause is removed.

By the use of test-meals, chemical and microscopical examinations, test diets and by a study of the tissue changes as revealed to a great extent by a systematic examination of the urine, much has been, and can be, learned concerning the management of affections of this kind. Often a very definite form of treatment can be prescribed, replacing the old time guesses at various appetizers, bitters, tonics, digestive ferments, laxatives and purgatives. What to eat and drink, as well as what not to eat or drink, are very important questions which can at times be answered very satisfactorily. Such an examination will show more or less clearly what the conditions are and what the patient can or can not do. There are some cases where an exact diagnosis can be made but, unfortunately, little can be done in the way of giving relief. If, for instance, the mucous lining of the stomach is destroyed, it can not be replaced. All that can be done in such cases is to give advice or suggestions how to get the most out of life under existing conditions and to reduce the disagreeable symptoms to a minimum.

Compared with other means or resources—such as diet, exercise, baths, medication, etc.—mineral waters play a minor part in the treatment of such affections. In some cases, however, especially those dependent on mental and nervous disorders or overwork, the intelligent use of mineral waters will be followed by good results.

The subject is such a vast one and so complicated that it becomes highly unsatisfactory to attempt even a few brief general statements, as almost any general statement would have to be qualified.

Acute dyspepsia is of course best treated at home. Regulating the diet and habits of the invalid, with some definitely indicated medication, are among the essentials of treatment.

Catarrhal conditions may call for the use of a suitable mineral water, of a mild alkaline or alkaline-saline type, especially at a resort

with pleasant surroundings, simple diet, the avoidance of excesses, and leading an outdoor life as much as possible. A spring with a small amount of iron is beneficial in many cases. Nervous dyspepsia is greatly benefited by resorting to a distant spring, with perhaps a radical change of climate. The same may be said of some of the bowel affections.

At many of the old European springs careful attention has been given both to a proper diagnosis of the condition or disease and to the influence of the water in varying amounts and in connection with certain kinds of diet. The indications for the use of Carlsbad water have been given on page 177. Our own health resorts have been too recently established and everything is yet too primitive to enable us to draw proper conclusions as to what the waters will do when more intelligently administered. It is gratifying to know, however, that strong efforts are now being made in this direction.

Crook, in his "Mineral Waters of the United States," has well said: "It is not an exaggeration to say that at least nineteen out of every twenty mineral spring waters now in use in the United States are recommended as being useful or curative in dyspepsia. Without admitting the oftentimes extravagant claims of proprietors or others in interest, it must be admitted that a very large class of patients suffering from enfeebled digestion are materially benefited by the rational use of a proper mineral water." He then continues to say that the waters indicated for ordinary dyspepsia with gas formation, fulness after eating, etc., are those belonging to the alkaline class, with sodium and magnesium carbonates and free carbonic acid gas. To overcome the acid condition they should be taken with the food or soon after a meal. Where the gastric juice is deficient, a water with a small amount of sodium chloride may prove beneficial.

INDIGESTION is a general term covering a number of conditions and may refer to the stomach or to the intestines or both. In a general way it may be said that the digestion of animal foods—meats, milk and eggs—is carried on in the stomach and the digestion of vegetable foods in the intestine. The reaction of the one is acid, that of the other is alkaline. The derangements of the digestive tract are many, and the treatment depends altogether on the cause or nature. In the stomach one form of indigestion may require the use of acids while in another form alkalies are indicated, the amount of acid being too great. Where the amount of pepsin is deficient, or even absent, it must be supplied. The character and quantity of food taken are of the utmost importance in some forms of indigestion.

The percentage of acid in the stomach juice can be accurately determined by laboratory methods, the juice being usually withdrawn from the stomach by the aid of a tube one hour after a so-called test-meal. The salient features of the case and its treatment are generally revealed at once.

In cases with an excess of acid, the use of an alkaline mineral water is often of decided benefit, a simple calculation based on the amount of free acid in the stomach and the amount of alkali in each glass or tumbler of the water will determine about how much should be used—that too much of such a water is injurious is self-evident. On the other hand, in those forms where the secretion of acid is deficient, saline waters may be of benefit. The normal acid of the stomach is hydrochloric acid, and this acid combined with soda forms common salt, which is the chief ingredient of many saline waters, or, to be exact, of muriated saline waters.

LIVER AND BILE DUCTS.—The liver being an important part of the alimentary tract is often affected in digestive disturbances. Occasionally the difficulty may lie in the liver alone. Congestion of the liver may occur from the free use of alcohol, from malaria, weakness of the heart and especially from habitual over-eating. The term "biliousness," formerly much used by medical men and still commonly used by the laity, may apply to a number of different conditions depending on a variety of causes for their production. Generally such disturbances are due to metabolic changes, as mentioned under uric acid diathesis, and in such cases the use of mineral waters of the sulphated alkaline type, or sulphur waters, is especially indicated. Such waters are also useful in jaundice, where there is a tendency to the formation of gall-stones, the bile becoming thinner and less likely to harden, or bile salts to crystallize out.

ABDOMINAL FULLNESS, OR THE FULL HABIT.—In this condition rather strong saline or sulpho-saline waters are indicated. The full habit is one due chiefly to excessive eating and drinking, especially of malt liquors. Corpulent individuals are, of course, the chief sufferers. All bodily activities are usually sluggish, due chiefly to a sluggish alimentary tract. A discolored complexion, coated tongue, perverted taste, and constipation are among the chief symptoms. Strong active waters of the kind mentioned above are especially indicated. Many individuals do well on an occasional brisk purge, as by the use of bottled mineral waters. To reduce the condition to a minimum will, of course, require attention in the matter of food and drink also.

OBESITY.—Cases coming under this head must depend mainly on dietetic treatment, although mineral waters of the sulphated and sulphated-alkaline types may be found useful. Each case must be studied separately and the general health must be maintained. To lose fat at the expense of good health otherwise is not desirable. Free purgation may react injuriously.

CONSTIPATION is a very prevalent ailment and might perhaps be considered in some detail. Without a previous study of the subject it would seem that this is a very simple affection which will readily yield to treatment. According to some, all that is required is a little medicine taken for a short time and the case is cured. The pathological ideas of some persons are very simple.

A person afflicted with constipation usually resorts to home remedies at first to get relief, after that he is apt to turn to patent medicines, taking various kinds in turn, until finally he comes to the physician at a time when, perhaps, the habit is well established. He may try one remedy after another and try one physician after another—and remain just the same. It is highly important to know just where the difficulty lies, what are the causes and how to remedy them, and then live accordingly. Sometimes all that can be done is to reduce the condition to a minimum and to cease striving after the unattainable.

It must be remembered that the stomach digests and absorbs mainly the animal foods, those of vegetable origin being passed on into the intestine where they are digested and absorbed, the residue, or undigestible portions, being passed on and out.

Some persons have a movement of the bowels every other day, while some have two or more movements a day, yet, provided there is regularity and no distress, the former may be the normal number, and suffice. The time element, the relation between the amounts ingested and excreted, as well as the consistency of the excreted matter, must always be considered in the study of a case.

A physician generally first inquires into the family history, then into the personal history of the patient, making especial inquiry into any circumstances that may have a causative relation to the disorder.

In chronic constipation a large number of causes are now recognized and these may be grouped under different heads.

Malformation or imperfect development of parts of the alimentary tract may be a cause; there may be an over or an under-development resulting in impaired functioning. The intestinal tract is about twenty-five feet long and a defect in any part may cause the condition known as constipation.

It may be the result of disease. This may be due to the healing of some inflammatory disease process, the scar tissue resulting so contracting the intestine as to narrow the lumen or bore, making the passage of the food very difficult.

There may be a tumor or cancer which may tend to close the lumen, either by pressing on it from the outside, the tumor being in some adjoining organ or tissue, or the tumor may be in the walls of the intestine itself, taking up part of the channel.

In women, the womb may at times press on the bowels in such a manner as to cause an arrest of their normal movement.

The secretions poured into the bowels may be abnormal, as in the case of liver disease where the bile may be wholly altered or diminished; or the pancreatic secretion may be altered or absent.

The peristalsis, the wormlike movements of the intestines, may be absent on account of some nervous disturbance, as in some brain or nervous diseases or some chronic forms of poisoning or after an attack of fever. There may be so-called atony, a loss of strength of the muscles of the intestines, and stomach as well. It may also be due to a congested condition of the blood-vessels, as in the case of heart or lung diseases.

The mucous membrane of the bowel may be so altered that its quantities of mucus or mucous matter.

function is greatly impaired, at times with the production of large

Having very irregular hours for going to stool is in itself a sufficient cause for constipation, as it breaks up the regularity of the work of the bowels, by not allowing them to act when ready and trying to force them when not ready.

There may be some disease of the stomach or esophagus causing great pain on or after eating, and as a consequence little food may be taken, and if most of that taken is absorbed, there may be little to reach the lower bowel and no desire to pass this until a sufficiency has accumulated. The contents of the stomach may be so excessively acid that the bowel refuses to take it, and it may require an unusual amount of activity to neutralize the acid—the reaction of the bowel being alkaline.

The cause may be a so-called reflex one. There may be, for instance, some painful inflammation or disease of some organ or part of the body in contact with the bowel, and its movement may aggravate the pain, and, to lessen this, the nervous system, perhaps unconsciously to us, lessens the movement of the intestines, and from this lessened movement constipation may result.

Improper food plays an important part, as many of us know from experience. One of the chief causes, in the writer's opinion, is intemperance in eating, especially albuminous or animal food. The body is constantly eliminating waste products generated in the organs and tissues during activity, these products being chiefly urea and uric acid, which are greatly increased while taking large amounts of nitrogenized foods—meats, eggs, cheese and animal food in general except fats, and as a consequence the urine becomes very dense or heavy, entailing additional work on the kidneys in getting rid of these substances—urea and uric acid. Whenever the urine becomes very dense, some of its components, as uric acid, tend to crystallize out, and this is apt to irritate the urinary tract. In order to prevent this, the kidneys take all the fluid, all the water, they can get, to keep the urine diluted. Now, the great reservoir of the body is the alimentary tract, particularly the intestine, and when the kidneys draw heavily on it, it becomes dry, and constipation is the result. It will readily be seen that cases of this kind are greatly benefited, they may be cured, by proper attention to the kind and quantity of food consumed and the amount and kind of fluid taken, so that the bowel has enough water to keep it moist without the kidneys being compelled to draw on it excessively.

Several other causes might be mentioned, but enough have been cited to show that chronic constipation is not such a simple matter as some seem to think, and may require considerable time and observation to ascertain what the real cause is.

After the cause has once been determined, then the question of what is best to do to overcome the difficulty should be taken up. Whether mineral waters should be used in the hope of affecting a cure is a question that must be considered in the light of the cause. It may give relief in many cases, often only as long as used, but there is a great difference between relief and cure. Palliative treatment may not be curative treatment at all.

"The various means of treatment may be classified according to their curative value, in the following order: Diet, massage, electricity, gymnastics, hydrotherapy, medicines, mineral spring water, psychic or suggestive methods, mechanic methods. The management of constipation will differ according to whether it occurs in children, in middle age, or in senile persons. It is only by a severely individualizing management that constipation can be radically cured."

The detection of the causes of constipation presents many difficulties, and occasionally it is entirely impossible. Where no definite

cause can be assigned, mineral waters may be given a trial, but it must be kept in mind that "These waters do not act curatively, but simply as all other purgatives do; they produce an evacuation the day they are used, and do not affect the underlying causative condition of the constipation."

Dr. Crook, in his treatise on the mineral waters of the United States, says: "In obstinate states of this kind a course of mineral waters is frequently a valuable adjunct to the treatment, and, with proper dietary rules, will usually prove successful in obtaining relief. One of the sulphated saline or bitter waters, containing the sulphate of soda or magnesia or both of these salts, is applicable to these cases. The presence of a certain amount of the chloride of sodium and the alkaline carbonates held in solution by carbonic acid gas lends additional efficacy to the water.

"Fortunately we have many such waters in the United States, and the springs from which they flow are within easy reach of almost all sections of the country. They need not necessarily be highly mineralized. It is surprising how slight a proportion of saline ingredients will serve to give a natural water aperient properties. Such waters are usually best taken early in the morning before food, the quantity to be regulated in accordance with the strength of the water, the weight of the patient, and the obstinacy of the constipation. A brisk walk or other form of exercise after taking will expedite the action of the water. One, two, or even three, painless, watery evacuations of the bowels usually occurs soon after breakfast. If further action is desirable, a somewhat smaller quantity may be taken before each of the two following meals."

CHRONIC DIARRHOEA AND DYSENTERY may here be mentioned. In affections of this kind the calcic waters may be of some service in cases where the cause of the disturbance can not be found, or if found, can not be removed or overcome. A resort to the use of a limewater can be recommended only to those persons living in a freestone region with little or no lime in the water. In the glacial drift and limestone areas the spring and well waters used for domestic purposes are as a rule heavily charged with lime. A purge may sometimes remove the offending cause in an acute condition and thus act curatively.

KIDNEY OR RENAL DISEASES.—Bright's Disease.—The kidneys are subject to a number of well defined disturbances, some of them characterized by the appearance of albumin in the urine. The disease process may be acute or chronic. Pure water is indicated in all cases—to wash out the impurities—but it is in chronic cases that mineral waters are most frequently used.

Just how much benefit will be derived from the use of such waters is a difficult question. It will depend on so many conditions; on the constitution of the patient, on the nature of the disease process, on the amount of alteration of the kidneys, on the diet adopted, and finally on the kind of water used.

If we were to believe the circulars of some of the owners of mineral springs we might conclude that kidney disease or Bright's Disease was easily curable by the use of their waters. As a matter of fact, physicians are very skeptical concerning the curative properties of mineral waters, and, in some kidney diseases, of any remedy. If a kidney disturbance has been going on for a long time, and this is often the case before the true nature of the affection is recognized, it may have become chronic before a sick person goes to a physician and then it may be too late to restore a normal or healthy condition. Often the best that can be done is to arrest the destructive disease process; if this can be done before too much tissue has been destroyed, there may be little, if any, impairment of function and the individual may live on to old age.

Nature produces scar tissue when she heals a wound. We see this particularly in the case of wounds on the surface of the body. Many disease processes leave a lot of scar tissue after their subsidence. We may have a scarred kidney or lung as well as a scarred skin. In the case of the kidneys, if we can stop the disease process that results in the scarring, we may be doing well.

If at any time the urine is abnormal, scanty, high-colored or very acid in reaction, the use of water is indicated and it should be used freely. Whether the water should be mineralized and, if so, whether alkaline or saline, will depend on existing conditions. No general rules can be laid down that will enable a person without a sufficient knowledge of physiology and pathology to decide the matter for himself. The best that can be said, perhaps, is to eat sparingly of animal foods and drink pure water freely. Such a course will reduce the work of the kidneys to a minimum and dilute the urine passing through them. Kidney diseases are more prevalent in cold climates because the kidneys have more work to do. In some kidney affections with an accumulation of much fluid in the tissues of the body, strong purgative waters may at times be of service in draining off the fluid.

In kidney disturbances the urine should be examined from time to time, for in no other way can reliable information be had of the intensity of the disease or of its progress.

The physician who carefully examines into the metabolism, into the tissue changes of the body, often marvels at the great quantities of excretory products—urea and uric acid chiefly—in those coming under his care or for advice.

It may be added that there are really different kinds of Bright's Disease, depending on different causes. One of the chief causes, or at least an important factor in producing Bright's Disease, is habitual over-eating and under-exercising, leading a sedentary life and the resulting accumulation of large amounts of waste products. One of the penalties of "high living" is Bright's Disease.

Many of the cases of kidney disturbance are properly placed among the uric acid diathesis, and such cases are often decidedly benefited by the use of mineral waters, as mentioned on page 201.

URINARY GRAVEL, CALCULI AND STONE IN THE BLADDER.—These are due to a variety of causes, and the substances composing them differ, perhaps the most common material being uric acid, or this acid in combination with some other substance. Where the urine is loaded with this acid or with urates or with oxalates, as in heavy eaters, there is a tendency to form crystals. This crystallization may take place in either the kidneys or the bladder. Drinking large amounts of water will dilute the urine and prevent the crystallizing out. Many of the so-called "lithia waters" are useful as pure water, there not being a sufficient quantity of lithium in solution to be of service. Lithium itself, it will be recalled, has a special solvent action on uric acid. Alkaline waters may be of service in overcoming the excessive acidity of the urine by combining with the acid to form bland and soluble salts of uric acid, thus giving relief from the bladder irritation.

CYSTITIS is the medical name for inflammation of the bladder, but is usually qualified as to kind. If due to the crystals of uric acid mentioned above, the free use of water to prevent their formation, or the use of an alkaline water to bring them into solution is indicated. Where the cystitis is due to an infection by pus germs, less benefit is to be derived from the use of waters; alkaline waters may even be contra-indicated as they favor the growth of the infecting organisms by rendering the urine alkaline.

AFFECTIONS OF THE RESPIRATORY SYSTEM.—Our habit of living in close, over-heated houses, often with a sputum contaminated atmosphere, tends to enfeeble the body and to make us more susceptible to disease. The disturbances that follow exposure to cold after having been confined to a close, hot atmosphere are mostly of the respiratory system. The skin, liver and bowels are more active in hot

climates and more liable to derangement, while in cold climates or in winter lung troubles prevail. This is partly because the lungs have to supply more air, to keep up the bodily heat, which oxidizes the food, burning it up to carbonic acid gas, which is expelled from the lungs, but mainly due to the fact that the atmosphere we inhale in our homes is bad. Living in close, illy ventilated rooms, with the air often contaminated by the ground-up spittle of persons afflicted with lung diseases, makes the task of the lungs doubly hard.

Morbid processes affecting the respiratory system are not influenced by mineral waters, certainly not to a sufficient extent that they need be considered at any length. To the inhabitant of a crowded, smoky or dusty city, a change to the country, to some pleasant health resort, with a mild mineral water, may be indicated at any time. In lung diseases, the chief requirements are pure, fresh air, free from irritating dust, especially dust containing ground-up spittle, and a nutritious diet, with much outdoor life and sunshine. Nature often does wonders when the body is placed under favorable conditions. To bring a person sick with a lung affection to a dusty, smoky city for treatment is the height of folly.

DISEASES AND AFFECTIONS OF THE HEART.—Affections of the circulatory system are so numerous in kind and demand such diverse treatment that no mention can be made of them in a paper like this. Where the heart disturbance is due to some other disease for which a course of mineral water treatment is indicated, there can probably at least be no harm in giving the waters a trial.

NERVOUS DISEASES AND AFFECTIONS.—There is a great number of diseases of the nervous system, but only ailments due to some functional derangement can properly be considered in connection with the use of mineral waters. In cases depending on some disease process in the nervous system, energetic treatment is indicated and mineral waters may play no part at all. Among the more common functional disturbances may be mentioned headaches, neuralgias, neurasthenia, mental depression, hysteria, sleeplessness, general malaise and similar affections, which make up the bulk of complaints of daily life.

The kind of water to be used will depend on the nature of the disturbance or on its causes. In a general way it may be said that a resort removed as far as possible from the home of the patient, with perhaps a change of climate and altitude, will be most effective. If the disturbance is the result of over-work, almost any mildly mineralized water will be of service. In cases depending on an impoverished condition of the blood, a chalybeate spring will be indicated.

In most cases of over-feeding or deranged digestion or of constipation on which the nervous phenomena may depend, a saline or sulpho-saline water will be indicated. The change of diet and surroundings are powerful factors in restoring nervous patients to health.

That many of the affections mentioned above are dependent on disturbances of other organs, especially of nutrition, will readily be understood from previous remarks. Part of the nervous system is set apart simply to tell us that something is wrong, and pain is the warning signal. If we neglect to heed the gentle warnings at first, these may be followed by more strong and effective ones. The trouble with most of us is that we do not heed the warnings, but persist in doing things—in eating and drinking and general habits of life—that are reacting injuriously on the body. A holiday out in the woods now and then or a more protracted vacation in the wildwoods or at the seashore will help us to keep well. If we are not feeling well, a stay of a few weeks, or, if need be, months, at some mineral spring, with pleasant surroundings, will greatly assist nature in restoring a healthy condition of body and mind. In Europe it is quite customary for those able to afford it to spend about six weeks each summer at some health resort with a suitable water.

BLOOD DISEASES AND "IMPURE BLOOD."—These terms are in common use and are applied to a number of conditions, perhaps only symptoms of some disease process, and should be more exactly expressed by the name of the disease. They are convenient terms, but mean little to the physician. Blood diseases proper are not of frequent occurrence. The term impure blood is a very vague expression. An eruption of pimples or boils on the face is often ascribed to the blood, when, as a matter of fact, the blood may have nothing to do with it; it may be a purely local disturbance.

In diseases attended with a change, a deterioration of the blood, careful tests are made nowadays by the use of delicate instruments, giving the results in figures, doing away with a large amount of guess work. The results of the treatment are, moreover, watched from time to time to ascertain the effectiveness of the remedy. Diseases attended with a profound alteration of the blood do not get well in a few days, nor by taking "sarsaparillas" or "blood medicine."

In regard to the use of mineral waters, it may be said in a general way that chalybeate waters are indicated where the blood is below standard, while in some conditions that are ascribed to "impure blood" a saline or sulpho-saline water may be of service, as outlined under "Abdominal Fulness" on a preceding page.

MALARIAL POISONING.—In former years, when malaria was very common in certain parts of the State, notably along the Wabash River, enlarged spleens and livers, resulting from the accumulation of waste materials from the destructive action of the malarial parasite, were frequently seen, but are rare at present. The free use of water, combined with a residence in a malaria-free region, will greatly assist in the recovery.

SKIN DISEASES.—Some mention should be made of skin diseases. There are many kinds, and most of them are difficult to diagnose correctly. Some are due to disease in other parts of the body, in some organ, and where this is the case an appropriate mineral water may be found beneficial. The sulphur, in some of the milky sulphur waters, has a curative influence in some cases when used in baths.

URIC ACID CONDITIONS.—Reference was made to this condition, also known under the name of "Uric Acid Diathesis," on previous pages, and a more detailed discussion has been reserved until now in order that the subject may be taken up a little more fully. Conditions coming under this head constitute the great field for the application of our Indiana mineral waters.

Concerning uric acid, and urinary waste products generally, it may be said that in adult man the food taken is consumed in the production of heat to keep the body warm, and in the production of force or work. It is evident that a manual laborer, toiling hard all day, will require more food than the man who does not exercise his muscles, a brain worker, for instance, and if the laborer is working out of doors on a very cold day, an additional amount of food is required to keep up the animal heat. It will at once be seen, on the contrary, that a man who is confined to a warm room all day and who takes no exercise, requires comparatively little food to keep the bodily machinery going. The food that is consumed in the production of heat and force is oxidized, combined with oxygen, just as we see it in the case of the fuel under the boiler of an engine, and the waste products are given off by the lungs as carbonic acid gas, corresponding to the smoke from the coal under the boilers. The wear and tear of the body itself is taken away by the kidneys. According to the amount of this wear and tear, the urine will be more or less loaded with waste products. Heat and force are obtained mainly from the starches, sugars, fats and oils we use, or, we might say, from the bread and butter we eat, while the wear and tear of the machinery itself, of the bodily organs, is replaced by the animal foods, as meats, eggs and milk.

In a well regulated body the amount of intake and outgo is equal, and the body remains at practically the same weight. Just enough of what is needed is taken out of the alimentary tract. Where much is consumed, much will likely be taken out. This explains why the laborer has such a splendid appetite when he returns from his labor, and why, on the other hand, the sedentary city worker, housed up in a warm room, with almost no bodily exertion, has such a poor appetite—he has not used up much of the food eaten at the last meal.

Now, here is an important point: Whenever an individual habitually eats more food, especially animal food, than is required to replace the wear and tear, there is a tendency for certain products to accumulate in the body, which should be excreted by the kidneys. Just what these products are need not be discussed in detail, but mention may be made of uric acid, as this is one of the chief products of tissue changes in the body and which is ordinarily passed out by the kidneys—taken from the blood. It may be formed by the body itself or taken up in a somewhat different form from the alimentary tract.

Now, these waste products, or let us say in brief, this uric acid, is a very important factor in the welfare of the body—with many men it is the deciding factor between a life of health and enjoyment or one of ill-health or misery.

We all know that the sedentary city worker does not enjoy animal life—life as we see it at its best in the animals of the woods and fields, where it is apparent that simply to live is a pleasure, and that he does not enjoy it as does his fellowman who leads an active out-of-door, fresh-air life. Loss of appetite is usually the first symptom that something is wrong, yet, in spite of this, large quantities of food are forced into the stomach three times a day, in getting rid of which the digestive tract has difficulty. Instead of eating less and exercising more, the poor, misguided man resorts to the use of “appetizers,” of digestives to help the stomach, of “health foods,” and then to laxatives and purgatives to help to get rid of it all.

With the body constantly over-loaded with food, especially with rich animal foods, there is apt to occur a gradual accumulation of products that should have been eliminated by the kidneys from day to day. Depositions are apt to take place in the white tissues about the joints (manifested by tenderness and rheumatic pains), then in that of the blood-vessels (with symptoms, perhaps, of weak and irritable heart and headaches), and later on deposits may occur in the kidneys themselves (with gravel, stone, albumin and symptoms of

Bright's Disease). If the process continues, there will sooner or later be a general breakdown.

The "high liver" who relishes his three meals a day and eats enough for two men comes under the above heading, for besides accumulating weight in fat, he is accumulating waste products.

The experienced physician can usually pick out the individual who is over-eating and under-exercising, or, in other words, who is living under abnormal conditions of nutrition and secretion or excretion. An examination of the urine will reveal a high specific gravity, that is, a dense urine, with a high acidity. In many cases there are tell-tale swellings alongside the finger joints, with perhaps pains in the feet, knees or back.

The effects on the bowels have been referred to under constipation, the kidneys taking all the fluid they can and leaving the bowels dry and constipated.

GOUT OR GOUTY CONDITIONS.—There are several disorders that seem more or less closely related, especially in regard to their symptoms, and unless a case is closely studied, it may be impossible to say just what it is. One man may call it the gout, another calls it rheumatism or muscular rheumatism, other names that may be used are myalgia, arthritis, rheumatoid arthritis, lithemia and perhaps several more. Lumbago and sciatica are at times placed in the same list.*

The scope of this paper prevents going into the details, and no attempt will be made to explain even what the above names mean. In regard to gout, it may be said that it is essentially a disease of nutrition and is greatly influenced by diet. People who eat heavily and exercise little to work off, to oxidize, the food they have eaten, tend to accumulate waste products, particularly uric acid, in the system, notably in the joints, and after a time symptoms appear, and if the mode of life is persisted in, may produce considerable disturbance. There may be an attack of acute illness, marked by sharp

*Just what the relationship of rheumatic arthritis, or rheumatic inflammation of the joints, is to gout or the gouty condition is not fully established; indeed, there are a number of inflammations of the joints and the tissues about the joints that are not fully understood. As far as regards treatment, all of them may, according to Cohen, be divided into two groups:

(1) A multiple affection of the joints, or about the joints, more or less active, although generally chronic in character and occurring in comparatively young and middle-aged persons.

(2) An affection generally occurring in debilitated old persons, less active and more wasting in its manifestations. In older persons one of the larger joints is often singled out, as, for instance, in senile hip-disease, especially when some injury seems to have brought on the disease.

Mineral waters of different kinds, but adapted to the general physical condition of the patient, may be tried, as well as hot mud-baths, but the results obtained from treatment are often very unsatisfactory.

pains in a joint or in the joints, with more or less fever and general systemic disturbance. From its acute stage it may gradually develop into a chronic condition.

The condition described under the name of "Uric Acid Poisoning," known also under the names of "Uric Acidemia," "Lithemia," "Lithic Acid Diathesis," "Uric Acid Diathesis," "Lithuria" and "Latent Gout," differs from gout chiefly in the absence of swellings in the small joints, and the disturbance is not localized in any one part of the body. The chief symptoms may be briefly given as follows: Pains and aches in the back and head, sleeplessness, sluggish circulation with cold hands and feet, deranged digestion, with uncertain appetite, the urine heavy and acid, often smarting. If the condition exists for some time, a whole train of other symptoms may follow, indicating profound disturbances of many of the bodily organs.

RHEUMATISM.—This is a term that covers a multitude of affections as used by the laity, and even by many physicians. Any pain in the joints or muscles, whether acute or chronic, which can not be accounted for otherwise, or called by some other name, is likely to be called rheumatism. As the term is ordinarily used, it refers more to a condition than to a distinct disease.

"Rheumatism is a very vague term and is frequently used to include a number of different morbid conditions, some of which are probably of microbic origin, while others are the result of metabolic perversions, and still others of complex etiology."—*Cohen*.

Of acute articular rheumatism it may be said that it is now generally regarded as a specific infection and that certain remedies have a distinctly curative influence; quiet and absolute rest in bed are demanded. As the use of mineral waters plays no part in its treatment, we shall dismiss this disease with this bare mention.

So-called chronic rheumatism may be due to, or the result of, a variety of causes. Cases of this kind may resist very stubbornly all medicinal treatment. To get relief may lead both the sufferer and the physician to adopt and try all and every sort of remedy or means of treatment, and sooner or later the question of going to some mineral spring or well will probably come up.

Although mineral waters do not act quite so favorably in any one case as a person might be led to believe from reading the circulars of mineral water resorts, yet in many cases their influence is really marvelous. No doubt every one knows persons who have tried everything to get relief and failed, until they sojourned for several weeks or months, perhaps, at some mineral spring and returned home cured of their affliction. Just what brought about the good result may be

a difficult question to decide, but the fact remains that many patients are restored to health, and for this reason the use of mineral waters is advisable in intractable cases where all other means have failed.

The waters especially indicated are those of the alkaline or alkaline-carbonated class. So-called lithia waters with a mere trace of alkali are less apt to exert a favorable influence than a water which contains a considerable amount of alkaline solids.

THE GREAT FIELD FOR INDIANA MINERAL WATERS.

The diseases or conditions just enumerated form the field, par excellence, for the use of our mineral waters. Whether they be called uric acid, rheumatic or gouty conditions, matters little so long as we keep the underlying causes in mind—these being chiefly the habit of over-eating and not getting sufficient bodily exercise.

The uric acid diathesis may be said to be an accompaniment of civilization; the active life of the savage precludes the accumulation of waste products in the body, and even if they did form, he would stand a poor show to survive through the wanderings of the tribe. In order that civilized man may get rid of his affliction he must for a time return to the simple life of his ancestors, live out in the country, at some health resort, perhaps, on a simple diet, with considerable exercise and the free use of water.

Water is the great remedy, and if it hold in solution certain substances, like potassium, lithium or sodium, its solvent power is greatly increased and the accumulated waste products are more speedily eliminated.

It is sometimes said that mineral waters are not indicated in an acute attack, let us say of pain-racking gout, and that they are useless. But such a statement should be qualified by saying, useless for the accompanying pain. Because mineral waters do not speedily ease the pain, there is no reason why they should not be used. They will help to remove the cause, and should be given along with the anodyne to relieve the excessive pain.

Too few of us know that pain is a good thing for the human family; if it were not for the accompanying pain we would do many things that would react very injuriously on the body. Pain is a warning that something is wrong and that we should keep quiet and allow a return to a normal or healthy condition. If we disregard the preliminary warning, the pain soon returns more severely, compelling us to desist. In the case of gout, for instance, the pain may

finally assume such intensity that the poor, afflicted individual is rendered wholly helpless.

When pain is excessive, it should, of course, be assuaged, and if due to motion, the body or part of the body affected should be kept at rest until the pain subsides. Unfortunately for themselves, too many persons come to the physician simply for relief from pain—in order that they may go about as usual. If they do not get the anodyne from one physician, they go to another. One of the simplest things in medicine is to relieve pain—if not by the use of one remedy, then by another. It is true the nervous system may have to be depressed very much to get the desired relief, but to most persons that does not matter. Pain should properly be relieved by removing the cause that produces it, not by depressing or benumbing the nervous system. To relieve pain by drugs means in many cases the masking of the disease process; the absence of pain deludes the patient as well as the physician, and the disease process continues its ravages.

The pains incident to high living should, therefore, receive proper attention, not by resorting to anodynes or narcotics, but by giving attention to the diet—eating less rich food, by leading a more active life out of doors and by a more free use of water. If deposits have formed in the joints, attempts should be made to get rid of them as much as possible. We may well imitate the custom of Europeans, as previously mentioned, who every year spend about six weeks at some pleasant spring, drinking the waters freely, living on a simple diet and taking more or less lengthy foot tours. Such a life, with the freedom from home care and worry, adds considerable to a person's life, both in the amount of added time and in the degree of comfort in living.

It is, of course, not to be assumed that because a man is a high liver all his ailments are due to such a mode of life. Each case must be studied separately, and only proper cases should go to the springs, otherwise the whole question of "mineral water cures" is apt to be brought into bad repute. They are certainly beneficial in properly selected cases.

The kinds of waters that are especially indicated in conditions enumerated above are:

- (1) Pure water or waters containing only a small amount of mineral matter. Many of the so-called lithia waters come under this head. Pure water used freely and at a time when the amount of rich food is reduced to a minimum will help to rid the body of the noxious material. The tendency of the body, of nature, is constantly

directed to overcoming abnormalities and to correcting deficiencies, and with a little assistance it usually succeeds. Water is a great diluent, it dilutes the heavily charged fluids of the body, and, like water flowing over a rock, brings back into solution substances deposited under abnormal bodily conditions.

(2) Alkaline Waters.—Uric acid crystals go into solution when brought in contact with alkalis, and urates are formed, and these are carried away in solution. The urates of potassium and lithium are very soluble, and for this reason these alkalis are preferred to sodium.

(3) Salines and Sulpho-Salines.—In cases with torpor of the alimentary tract and where the bodily functions generally are sluggish, waters of the above type may be especially indicated; tissue changes may be stimulated at the same time with the depleting action of the waters.

Mud baths may be valuable adjuncts in helping to eliminate waste products from the body, the skin, especially when acting freely, acts vicariously for the kidneys.

The following from Cohen's "System of Physiologic Therapeutics" bears on this point: "Whether we hold that gout and gouty conditions are due to the excessive formation of uric acid and the so-called alloxuric bases, or of the latter substances only, or to deficient excretion of some or all of these substances by the kidneys, or partly to excessive formation and partly to deficient excretion, we can easily understand that baths and various hydrotherapeutic processes may be of great use by aiding in the elimination of waste products from the body. In regard to internal courses of mineral waters, the sulphated and the sulphated-alkaline waters exercise the best effect in robust constitutions with a tendency to obesity and abdominal plethora. The sulphated-alkaline waters, the simple alkaline waters, and the alkaline earthy waters * * * are recommended when there is a tendency to uric acid deposits in the urine; the sulphated-alkaline group particularly in the plethoric cases. In weaker patients the muriated, muriated-sulphurous, and simple thermal waters are of use."—Vol. IV, p. 284.

BATHS.

HOT BATHS AND MUD BATHS.

Baths play an important part in the process of getting well. Simple cold, warm or hot baths can readily be had at home, or certainly in any town, and without going away.

To take mineral water baths, or moor or mud baths may require a long journey, and we may, therefore, briefly refer to these forms of baths.

To a person unacquainted with the structure and function of the skin it might seem that to take a bath in a mineral water might, in some manner, produce an effect analogous to that of taking the water by the mouth, or, as some express it, that it will "strike in" and in some way drive out or cure the disease. Unfortunately mineral waters have no such action or effect. They act, perhaps, wholly by the process of osmosis, dependent on the specific gravity of the fluids. The skin of the body is for the purpose of keeping out substances, and absorption through it is so slight that it may be disregarded altogether. It is true there are some institutions, as at Nauheim, in Germany, where good results are obtained, but after all the success depends on other means employed along with the baths, rather than on the mineral matter in the water used.

Mud and peat baths, especially if hot, are of service in disorders dependent on over-feeding with an accumulation of waste products in the system, and in rheumatic affections of the joints. The pores of the skin are apt to be opened freely with a profuse perspiration, which may carry off much of the waste products. There is no special virtue in the mud or peat itself, even if it were charged with certain minerals, as claimed by some. Any effects to be derived from their use must be sought in the way the heat is applied to the body by means of the peat or mud.

In cases of a kind that may be benefited by mud baths, it is always difficult to judge one case by another, for in two cases the symptoms may be almost exactly similar, yet one case may be greatly benefited by the use of the baths and the other not at all, the symptoms being produced by causes radically different. Trial alone will determine whether any benefit is to be derived from the use of the baths.

CHOOSING A MINERAL WATER RESORT—DETERMINING FACTORS.*

In the preceding pages we have outlined more or less briefly the functions and uses of water by the body in health and disease, and the influence of chemical compounds, or salts, found in our mineral waters, with indications for the use of the different kinds of mineral waters to be found in Indiana.

The subject of the proper application of mineral waters in disorders and diseases is a complex one, whether the application be made in the hope of a cure or simply for relief from pain and misery. It is often very difficult to distinguish between cause and effect, and persons habitually dealing in simple matters are likely to assume a simple relation in other things. Men as a rule are ignorant of the needs of the body when sick. Probably the best thing that a sick person can do after the idea of going to a mineral water spring or resort has once been entertained, is to consult the nearest and best physician and place himself under his observation—if not treatment—for a time at least, to enable him to find out as much as possible about the normal and abnormal functions of the body. A disease process may have a local distribution, or it may affect the whole body. In the latter case it may be spoken of as a constitutional disease. After a period of observation and after deciding what water and which spring or resort is best suited, the patient should be provided with a letter to the physician of the health resort or spring, giving the results of the observations and the probable indications for treatment. The tendency of health resorts is to group patients or invalids, to bunch them, and to prescribe a routine treatment without sufficient individualization. The patient himself should have some definite idea of what to expect from the waters used, of the influence of diet, recreation, rest and exercise, and also of the place itself. He should, of course, have a sufficient knowledge of his condition to enable him to know whether he is getting sufficiently individualized attention aside from group treatment.

*To the writer it has always been an interesting psychological question why a man selects one spring or resort in preference to another; that is, what is the final, the sufficient reason? The testimony of friends and acquaintances is in many cases the deciding factor. Only exceptionally does a patient follow the advice of his physician throughout. There is one good reason why this is so: The non-medical friend who has an opinion favorable to a certain resort or water is apt to express it unequivocally and to be very positive in his statements of the benefits to be derived, the possibility of failing to be benefited being scarcely considered. The physician, on the contrary, in the light of his greater experience with diseases and advising patients about going away, is apt to give, along with the pros, many cons, and this may lead to indecision on the part of the patient, and in his undecided state of mind the opinion of the friend carries the day, and the patient may go to a spring and use a water wholly unsuited to his condition, probably to return a sadder but a wiser man.

Among the questions that are likely to come up for consideration in the matter of going to a mineral water health resort are the following:

(1) *The condition or constitution of the invalid or patient.* He may be so enfeebled as to be unable to withstand a lengthy journey. "In sending away a patient it is not merely the disease that is to be considered, but also, and in even greater degree, the patient himself, his condition, his habits of thought and living, and his peculiarities."

Disease is not an entity, but the reaction of the individual against some abnormal condition; the reaction may differ in kind as well as in amount. Invalids differ greatly in their temperament when away from home; in fact, temperament has been described as the reaction of the individual to his environment. Some react quickly, others slowly. The terms "sanguinous," "nervous," "phlegmatic" and "lymphatic" are still in use to describe different temperaments.

"We all of us doubtless believe that the degree of prudence and intelligence shown by the invalid in regulating his life greatly modifies the result; and, further, that his general physique and his temperament are important elements in determining improvement or deterioration."

Diseases or ailments most benefited by a prolonged stay at some health resort, or some mineral spring, are those due to living under abnormal conditions, as viewed in the light of man's development from the savage state. Men are now so massed together that they neglect to take bodily exercise, fresh air, simple food and sound sleep. The sedentary brain-worker is a product of our civilization. Many persons improve the moment they leave the large city and seek the retirement and fresh air of the country, or of some sanitarium where they can find congenial surroundings.

In the case of the chronically ill, after the question where to go has once been satisfactorily decided, the invalid may return again and again, and each time be benefited.

The mental attitude in regard to going away from home must be taken into account. Some persons get very homesick in a short time and any gain derived from a stay at the resort may be offset by worrying about home. To be alone in a strange place is very depressing to some persons, and where the disease has produced an irritable temper, it may be difficult to make new friends.

The unpleasant features connected with a journey to a distant resort, such as the transportation and accommodations, the prevalence of irritating dust, doubtful drinking water, illy arranged and

unsanitary hotels where stop-overs have to be made, are disagreeable features from which many shrink.

The following may be considered unsuitable for making a long journey: Weak, nervous or excitable persons; those who suffer from sea or car-sickness; the subjects of severe hemorrhages; those in the acute fever stage; the subjects of advanced organic diseases and where the disease is still actively extending.

(2) *The character of the mineral water itself must be considered.* Although such waters may be grouped under a few heads, yet there may be minor differences that will lead to the preference of one water over another, other conditions being equal.

Where the composition of the water, its contents in salts and gases is known, we can easily calculate how much of each ingredient the invalid is taking daily in the number of glasses drunk.

Many mineral waters, so-called, contain such small quantities of mineral matter that the water may be used freely, drunk in almost unlimited amount, without producing any evil effects. Others should only be taken under the advice of a physician, particularly if more than a few glasses be taken daily, or if the waters be taken for some time. If a water is a powerful one in influencing or curing a disease, it is evident that its powers for evil must also be great when used in the wrong disease or at the wrong time. Moreover, if the invalid's expectations are built on the advertising circulars of some mineral wells or springs, he may be disappointed. Many claim too much. Too many back their claims by testimonials of persons not qualified by study or experience to give valuable testimony. The simplicity of some persons in the matter of diseases and "cures" is something remarkable.

The question of what waters will do, as well as what they will not do, must be carefully considered, otherwise there may be great disappointment. Merely to drink the water or take the baths, in the expectation of being cured, may also lead to disappointment. Although the range of diseases and disorders in which mineral waters are useful is limited, the number of cases that are likely to be benefited is large.

The truth in regard to what mineral waters will do and what they will not do can not hurt any established institution that aims to conduct its business on ethical and established business principles. To exaggerate or to promise more than can reasonably be fulfilled, will sooner or later inevitably produce an unfavorable reaction. An institution that has been long established or aims to continue in business indefinitely has no need to adopt any questionable methods.

(3) *The Medical Supervision.* The invalid is apt to place the water itself in the first place, then, perhaps, the accommodations, and after that the sanatorium physician, if he gives him any thought whatever.

The personality of the medical director of a health resort plays an important part in the progress of the patient and his scientific acquirements are considered by the family physician in determining where to send his patient. If a health resort is well managed in all other respects, but has at its head a physician not properly qualified to give needed medical attention and supervision, the institution is apt to be avoided by the family physician.

One of the complaints made of some health resorts is that the physician caters more to the social side of the patient's life than to the medical needs or to the hygienic or scientific aspects of the case. Too often the holiday nature of the sojourn is given more attention than the serious business of getting well.

Sanatorium or health resort physicians are often at a great disadvantage in properly judging the constitution, the nature of the disease-process and the extent of its ravages in the body, as well as the particular needs of the patient coming under his care. Where an abnormal condition has existed for some time, has become chronic, it is often a difficult matter to properly classify the case; it may require continued observation and repeated examinations to arrive at proper conclusions.

The consulting physician at the sanatorium, unacquainted with the history of the patient during the months, or perhaps years, of suffering, can not readily classify him, but must depend on the family physician or regular attendant. Knowing what the past has been, noting the amount of exercise or apathy, worry, the appetite, the action of the body and mind generally, he can draw proper conclusions as to the needs and the progress being made while under his care and making use of the waters. *A letter from the home or family physician should always accompany the invalid*, and it is evident that a patient who has no such letter must be placed under observation and be examined for some time ere he can be placed on the proper treatment.

It is very irritating to the home physician who has long had a patient under observation and knows fairly well what is going on in the body—what should be done and what not, what foods can be eaten and which are to be avoided—to have the sanatorium physician tell the patient who comes to be benefited or cured, without having made a particular study of the case, that he or she can eat

and drink all that the appetite calls for, perhaps making some arbitrary exception, as avoiding the use of coffee or tea.

The reason why some of the European resorts are so famous in the treatment of certain affections of the human body is not so much in the medicinal qualities of the water as in the personality of the medical director, the attendants, the mode of life, the diet and the general regimen. The most careful and firm supervision is maintained over every detail of the invalid's daily life. Some of the famous institutions limit themselves to the treatment of a few affections or diseases and discourage everybody else from coming. Physicians, for instance, always associate the name of Carlsbad waters with disturbances of the alimentary tract and nothing else.

(4) *The Daily Life at the Springs.* The question of what to do at the mineral springs is an important one. Where one case may demand quiet and rest and the patient readily adapts himself or herself to such requirements, many will require recreation and amusement to while away the time. One of the banes of life away from home, from the daily routine, or from business, is to while away the time, hence proper recreation at a health resort occupies a very important place in the list of essentials. To get up in the morning with no definite program—unless it be to take a drink of the water, eat breakfast, take more water, eat dinner, again drink water, eat supper and drink more water before retiring—is not an ideal life to look forward to or to lead, and a few days of such a life may cause the invalid to long for a return home. There should be something to occupy the patient's mind and time during the day. Indeed, in certain cases where a sedentary city life has induced derangements of the nervous system or of the alimentary tract, outdoor exercise is an important factor. "Active exercise, according to the patient's state, is of the greatest use in all cases. It is quite obvious, indeed, that exercise in the open air is likely to be of the utmost value in a disease, the symptoms of which are connected with defective processes of oxidation in the body." In such cases a hilly country, with shaded walks among the wooded hills and valleys, is preferable to a flat, monotonous country. Outdoor games and amusements, music, a daily bath or two, perhaps in the mineral water itself, a course of exercises on machines or Swedish treatment, or of massage, all help to fill out the time.

To be compelled to sit about idly all day, or to play cards, or to spend the time in the nearby town or village, are things not conducive to the selection of a resort that offers nothing else in the line of recreation.

The kind and amount of exercise should, moreover, be under the personal direction of the local physician. Patients left to themselves are apt to overdo the matter on one hand—as by tiring themselves trying to keep up a long walk with more healthy friends—or, on the other hand, to make no effort on their own part to get about. Often a proper mode of living adopted under the advice of a good physician at a health resort will be continued on the return home, and will greatly aid in thoroughly getting rid of the disease or in preventing its return.

Rest is an important factor, both at home and at a health resort. Often all that is needed to restore health, to restore a normal functioning, is rest. Nature repairs the damage, but she does it slowly. A disease process must be arrested before repair can take place, just as a backing train must be stopped ere it can again move forward. When we have an external wound, as a cut in the skin, which we can see, we keep the part quiet and wait until nature cures, and, as we see the repair taking place from day to day, we naturally adjust our expectations according to the rate of progress. In the case of a sore lung or a sore kidney, where we can not see the injury and do not appreciate the necessity of keeping the part quiet, of resting the body or the organ, as we do in the case of a sore arm or foot, we are apt to get impatient if we do not get well in a very short time. Pain usually is simply a warning that something is wrong, and if quiet or rest relieves it, that is conclusive evidence that the body or organ needs rest.

To get the full benefit of a mineral water cure, proper attention must be given to the diet. This does not mean that the invalid must simply avoid the use of tea or coffee, which seems to be a regulation of some health resorts—such routinism has only one merit, simplicity—but it means that the diet should be adapted to the patient, to his physical condition and to the condition of the alimentary tract. Without a proper examination of the stomach contents after a test-meal, repeated if necessary, little that is of value can be expected in the case of chronic stomach affections or disturbances, nor in cases of Bright's Disease, unless repeated urinary examinations are made. Diet in many conditions is all-important. The use of a mineral water and the regulation of the diet are complementary; the effects of the one may be enhanced or negatived by the other. Perhaps nowhere else does diet play such an important part as in the cases where the use of a mineral water is properly indicated.

The matter of pure air should also be looked after. Disease germs are found floating in the air in variable numbers, abundantly in the

atmosphere of a large city and in close rooms, where many people are congregated, but sparingly in thinly settled regions, and are practically absent in the atmosphere of the ocean, on deserts and on high mountains. The air of the open country is what we may call healthy. The dust in the air is one of the chief factors to be considered in sending a patient away from home; it may in certain diseases, as of the respiratory system, outweigh all other considerations. For a person with weak or diseased lungs to spend much time in the close, dust-laden air of a ballroom in the cold season is decidedly injurious.

Other things being equal, especially the waters, as revealed by an analysis, a health resort with attractive, perhaps scenic, surroundings, is always preferable to one located in a level, monotonous country, with nothing attractive upon which the eye can rest. Only too often the nearby towns and villages, or the general surroundings of a spring or health resort, are in a dilapidated condition—fences down, houses unpainted and barns and outhouses in a tumble-down condition. Even the application of a little whitewash makes a remarkable difference. To a person who has seen the neat and well-kept houses and gardens of the health resorts of the old world, the difference is all the more noticeable, and it is no wonder that the more fastidious, the delicate and refined invalids—the ones most desirable, and able to pay the best fees—are the ones who prefer going to Europe rather than patronize many of our home resorts, whose very surroundings depress them.

Then, too, in the case of the old established resorts, there is a certain, almost indefinable, spirit which newer or more recent institutions or resorts lack. The inhabitants, the natives, as we say, are accustomed to seeing strangers with apparently nothing to do—nothing but to get well—and they are not so apt to make remarks, which are very irritating to an invalid, often heard at newer resorts. A similar spirit is manifested in old college towns, where the people are accustomed to students and student-ways, and do everything to make it agreeable to the young men and women coming among them.

The situation of some of our smaller resorts is picturesque, and interesting excursions may be made through the neighborhood. Others that are situated among uninteresting or monotonous surroundings have been rendered attractive to visitors. Many give special attention to social matters, balls, concerts, dramatic performances and the like.

(5) *The matter of climatic influence must be kept in mind, as it may overshadow the influence of the mineral water itself. The season*

of the year may have a determining influence. In mid-winter a southern resort may be chosen, in the hot summer weather a cooler northern spring may be deemed best. Sudden and severe variations of temperature often exert a depressing effect, especially in a climate with considerable moisture. The amount of moisture in the air is an important factor in the degree of comfort with many invalids. Dry hot air or cold dry air is more agreeable than moist air. Moist air is usually chilly.

Climate has an especially important relation to certain diseases. In cold climates, or in cold and damp weather, affections of the joints, as rheumatism, or of the respiratory system, as catarrh, bronchitis or pneumonia, are more prevalent. In hot climates, or during hot weather, diseases of the abdominal organs prevail. Some invalids are at their best during the prevalence of cold weather, others during hot weather; some seek to get benefit by traveling from one climate to another, by going south in the winter and north on the approach of warm weather. A health resort that may be found to exercise a favorable influence in warm weather may not do so in cold weather, but the water itself should not be condemned on account of these modifying factors.

The question of living out of doors mainly or of being confined to close, over-heated rooms, so common in this country, and responsible for "colds" and catarrhal disturbances, is an important one. Pure air in many diseases is as important as pure water or pure food. In this respect the health resorts located away from communities, as cities and villages, have a decided advantage. Those of a city are least desirable.

(6) *The matter of expense.* If an invalid requiring a certain type or kind of water can not go 4,000 miles to Carlsbad, or a thousand miles to Saratoga, he may perhaps derive just as much benefit from the use of one of our Indiana waters. Indeed, at the present time, in many affections, even the most fastidious can be accommodated to suit his taste at some of our home resorts. Springs and health resorts to suit any purse can be found.

Invalids may grumble at paying a little more for attractive surroundings and superior accommodations, but if the returns are satisfactory, they will pay cheerfully, and, moreover, they will recommend the institution to their friends.

Some of our smaller resorts, although not so fashionable as the larger ones, are nevertheless well patronized by invalids who intend to make it a business to get well. At some, the mode of life may be simple but wholesome and the food good. The matter of expense

is a serious one to many, and the one at which a man is apt to pause longest ere deciding to make the trip, especially when there is much doubt as to the possible benefit to be derived.

The remark of a friend may here appropriately be quoted: "If a man can afford to spend his money in the good living which brings on a morbid affection, he ought to be equally willing to pay for getting rid of his afflictions."

(7) *For how long a time to go, and how long to stay at a health resort,* is another question that comes up for consideration.

So many factors enter into this question that no general answer can be made. In suitable cases, as in those coming under the uric acid diathesis, a short stay will do some good, while a prolonged stay may be of decided benefit. In a general way, it may be said that where a particular water is indicated, and so long as it is indicated, the benefit derived will be in proportion to the length of the stay.

Invalids, as a rule, expect immediate results from treatment. Many simply want relief from pain and suffering, and as long as there is no pain they do not care what pathological process is going on in the body. Others, again, may be aware of some slight disturbance, so slight as not to inconvenience them, and which may not tend to produce any future evil results, and yet they are continually taking some treatment or remedy. For instance, where the stomach has been acutely inflamed, there may be some peculiar sensation for a long time afterward, after the acute disease process has disappeared, but this is no reason why treatment should go on indefinitely. Where some are too indifferent about what is going on in the body, others are too much and too easily concerned about their health, magnifying slight ailments, or some slight symptom, unduly.

The distinctions made on a previous page between curative and palliative treatment, between being cured and being benefited, must be kept in mind. In certain affections all that can be claimed for mineral waters is that they are beneficial, and expectations should be placed no higher. A remedy for a disease does not necessarily mean a cure, but relief from affliction and misery is always indicated, even if there can be no cure.

To go to a health resort in too high hopes and then come back disappointed can only bring any resort into bad repute with an invalid and his friends, whereas, if the hopes are set no higher than may reasonably be expected to be realized, any benefit derived will be duly appreciated, and any failure to be even slightly benefited will not be so keenly felt.

Dr. Crook, in his "Treatise on the Mineral Waters of the United States," has well said: "It is a fact which few will deny that most persons visiting a spa during the summer months experience, almost from the beginning, an improvement in their physical condition, and in many instances return to their homes fully restored to health. This can be accounted for to a great extent by the change of air, food and surroundings and the escape from the worry and cares of business. Perhaps numerous cases would do as well at summer resorts where there are no springs; yet, after a liberal deduction for all other assignable influences, we may justly attribute a large share of the good results to the aid rendered by a properly selected mineral water. An obstinate case of chronic constipation or catarrhal jaundice is not apt to yield readily to a mere change of diet and environment, and the same may be said of protracted cases of rheumatism, uric acid gravel, and numerous other conditions. No doubt these changes and the use of the water supplement each other, and this explains the fact that mineral waters usually act with greater efficacy at the springs than when taken at home.

CONCERNING INDICATED WATERS IN CERTAIN DISEASES.

It was suggested to the writer that he add or give under the type of water, as of a saline, a list of affections that may be benefited by its use.

Such a list might be of value where the nature of the disease or the disease-process is definitely known, as well as its intensity, the amount of loss in function and the probable reaction of the body to the water, or, rather, its ingredients. It is evident that unless the indications for the use of any type of water are distinct, the proper application of the water itself will be indistinct, even though the analysis of the water is before us.

It is often said that the use of mineral water is wholly empirical and that there is little scientific basis to guide in their application. Such a view is too extreme, because in the case of mineral waters which have been properly analyzed and whose composition is known, a proper use can be made of the water in disordered and diseased conditions—assuming that these latter themselves are fairly well understood. If we do not know the nature of the water and have no definite knowledge of the disease-process, then our whole procedure becomes empirical, a trial may result in good, it may have no influence at all, or it may do evil.

THE FUTURE OF INDIANA MINERAL WATER HEALTH RESORTS.

It was a great surprise to the writer to learn on a recent tour through Europe to what great magnitude health resorts have risen and how popular they are with the people—with the masses. It is a common custom for the inhabitants of cities to "go to the baths" for four or six weeks every season, and this is a custom to be recommended to our own citizens.

The mineral springs and health resorts of Europe have long been appreciated on account of their therapeutic or medicinal properties, as well as for their financial value.

Europe has solved many problems, and as we grow older we will probably solve many of them in the same manner. Increase of population brings about changed conditions. Judging our country by the condition of affairs there, the conclusion that the sanatoria with pleasant and cheerful surroundings will be more numerous and most thoroughly equipped is irresistible.

While the United States, as a whole, abounds in all kinds of mineral springs, rivaling those of any country, yet, taking any limited portion, say a State like Indiana, it may be said that the subject of their full utilization is still in its infancy.

To people not actually ill or afflicted, it matters little where they go, whether to the seashore, mountain, hills or plain—each according to his taste or mental or bodily requirements.

After the worry of business or after a season of social functions, nothing so recuperates both body and mind as a stay at some pleasant resort; it certainly prevents break-downs and sickness.

To an invalid some greater circumspection is advisable. The term "health resort" is a very vague one, many factors must be considered, as mentioned on previous pages. In the case of a mineral water resort, the nature of the water itself is not the only question involved.

Although the distinctively curative influence of mineral waters is quite limited if confined to the use of the water alone, taken in connection with the change of scene, of diet, rest, open air exercise and recreation, a stay at a mineral water resort may be of great value. Properly conducted sanatoria or health resorts are important aids to the invalid in regaining lost health.

It would be mutually beneficial if owners of mineral springs or wells would restrict their claims of beneficial and curative properties of their waters to diseases or affections in which they are of undoubted benefit. The invalid would know better where to go, and the resort itself would gain a better reputation on account of the

results obtained. A resort that encourages any and everybody to come and use its waters is apt to receive many invalids who will not be benefited, but whose condition may even be aggravated, and whose testimony on the return home will be decidedly unfavorable.

If a cure is promised, invalids go in full confidence of being cured, and unless this does occur, they are disappointed, and are apt to speak unfavorably of the institution and the treatment, while if they come merely in the hope of being benefited they will praise it for the good it has done them.

Although the kinds of diseased conditions, of affections, in which mineral waters are properly applicable are rather limited, the number of individual cases that will be benefited by their use is large. Take the uric acid condition alone, chiefly induced by a sedentary city life, and the number of individuals to be benefited by a sojourn at a properly selected spring or well is a very large one indeed.

When capitalists invest large sums of money in properly building up an institution for the accommodation of the afflicted, it shows conclusively that these men have faith in the properties of their waters and feel certain of a liberal patronage, and, most important, a return for their outlay—which they deserve. The influence for good of such institutions is not to be minimized, although to a physician the quackish methods adopted by some are obnoxious—but then they reap their own reward by not getting the good will of the family physician.

Sanatoria will increase in number and completeness in the course of time. They are accompaniments of our civilization. With a proper limitation—with a knowledge of what they can do, and what they can not do, that the impossible should not be expected—the attendance at such resorts will certainly increase in the course of time.

SUMMARIES AND CONCLUSIONS.

Water is one of the essentials of life.

Water performs a part in every vital process of the body.

Water with the addition of mineral matter may at times be useful.

Mineral waters play an important part in the treatment of certain diseases.

Mineral waters are to be taken at their true value. We now no longer expect impossibilities from their use.

The number of kinds of mineral water in Indiana is quite limited and Indiana has no mineral water not also found in other States or countries.

The term "mineral water" as commonly used applies to a water containing minerals in solution and used in the treatment of disease.

The number of kinds of diseases or disease-processes in which the use of mineral water is indicated is small, but on the other hand, the number of cases of affections and ailments of every-day life favorably influenced by the use of mineral waters is large.

The chief ingredients of Indiana mineral waters are: Sodium, magnesium, iron, calcium, potassium, aluminum, chlorine, sulphur, carbon, phosphorus; also oxygen, hydrogen and nitrogen.

Minor ingredients, as lithium, iodine, bromine, strontium, zinc, silicon, boron, with perhaps several others, occur in too small amounts to be of service in the treatment of disease.

The above chemical elements are combined with each other, generally in the form of salts.

Mineral waters add nothing to the nutrition of the body which may not also be obtained from the daily food.

Mineral waters, except iron waters, deplete, they take away.

Sulphur, in the form of sulphuric acid, is a common constituent of mineral waters; combined with sodium it forms Glauber's salt and with magnesium, Epsom salt. Both are aperient or purgative.

Sulphuretted hydrogen is the gas with the rotten egg odor. It is a common ingredient of our sulphur waters; of itself and in the small amounts present it has no marked influence on the body.

Strong-smelling or strong-tasting substances are not necessarily "powerful medicine."

The number of constituents of our mineral waters is quite limited and the action of some of the rarer constituents or those occurring in small amounts, is overshadowed by the action of the more active constituents or those present in greater amount.

Although the curative range of our mineral waters is quite limited, the number of everyday ailments in which they are indicated is large and in many of these mineral waters may be used with good results.

Sharp distinctions must be made between curative and palliative treatment, and between being benefited and being cured. In many chronic ailments a "cure" is out of the question.

An indicated mineral water may be of benefit although it may not influence the underlying cause, merely modifying the symptoms.

To use water freely is in many cases equivalent to taking less solid food. To get the best results from the use of a mineral water, the diet should be properly regulated.

Mineral waters are indicated chiefly in chronic affections, or the after-effects of acute disease processes.

The indications for the use of pure water and of water only slightly mineralized are many, those for the use of heavily mineralized waters are comparatively few.

The kinds of mineral water found in Indiana are: Carbonated, alkaline, alkaline-saline, saline, chalybeate.

Sulphur waters or sulphuretted waters may be salines or alkaline-salines; they are common in Indiana and play an important part in the treatment of affections, especially of perverted nutrition.

Waters of the above kinds do not add anything to the nutrition of the body; on the contrary, they deplete.

The conditions, par excellence, for the use of our Indiana mineral waters are those due to over-eating and under-exercising—conditions incident to a sedentary city life.

People living at a mineral water health resort are no healthier than people who have no mineral springs or wells in their midst, other conditions being of course equal.

The human body is a complex organism, a complex machine for the performance of certain functions. The machinery is kept going by the vegetable food we eat, which is oxidized in the process of producing heat and force. The wear and tear of the body is replaced by the animal food we eat.

In disease the body is working under abnormal conditions.

As a cause of disease something definite is demanded, a something that can be seen, felt, weighed or measured.

Many acute diseases are now known to be due to micro-organisms, to bacteria, but not all diseases have such a cause.

There may be permanent impairment after the subsidence of an acute disease process, with defective bodily activity, and this may be known as a chronic ailment or disease.

Many chronic conditions must be endured, they can not be cured, but palliative treatment may be indicated at all times.

Too much medicine, so-called, is taken, and in conditions where the pathological or disease process is not known, no accurate diagnosis having been made. "He who has himself for a patient has a fool for a physician."

The most important ingredient of mineral water is the water itself.

Simply to go to a mineral spring or well and drink the water is not all that is involved in a "mineral water cure."

The change of scene and perhaps of climate, the freedom from business and home cares and worry, regularity of life and change of diet, are important factors.

In addition to the use of the water at the sanitarium the aid of massage, electricity, gymnastics, and the use of certain indicated medicines are important elements of treatment.

Mineral waters are not indicated in acute diseases, these are best treated at home. In tedious convalescence from an acute disease, a stay at an indicated mineral spring may be of service.

Mineral waters may be of decided benefit in disturbances of the alimentary tract, though the difficulty lies in properly diagnosing the nature of the affection or disease and selecting the proper kind of water.

Kidney disturbances may in many cases be favorably influenced by the use of one kind or another of mineral water, especially where the difficulty is due to defective elimination of waste products.

Nervous affections of a functional nature and dependent on derangement of other organs, may be favorably influenced.

In conditions of impoverished blood, as revealed by testing the blood, the use of an iron water may do good.

So-called uric acid conditions, are the great field for our Indiana mineral waters. They may be called "perverted conditions of nutrition."

In uric acid conditions the relationship between the amount and kind of food and the amount of water taken are complementary. Lessening the amount of albuminous food gives the water a better chance to produce favorable results.

The use of baths, either simple hot water, or of mineral water, or of peat or mud baths, helps to eliminate waste products from the body by causing the skin to act more freely.

In choosing a mineral water spring, well or health resort, attention should be given to certain factors, otherwise the invalid may not receive proper benefit and the waters—good in properly selected cases—may be unjustly condemned.

Among the factors or elements that require special consideration are the following:

1. The condition or constitution of the invalid or patient: His condition should be one where the use of mineral water is indicated, and he should be able to bear the journey.
2. The character of the mineral water must be considered: What it will not do must be considered as well as what it may do for the invalid. Do not expect impossibilities from the use of a water.
3. The medical supervision at the springs: A properly qualified physician can do much to assist the invalid in regaining lost health.

4. The daily life at the springs: The question how the time is to be spent at a resort must be considered; the recreation, amusement, how to while away the time, etc. Many persons away from home, with nothing to do, tire very readily.

5. The climate influence: The seasons of the year, whether warm or cold, and the amount of sunshine or rain, have a marked influence in many cases, and an otherwise suitable water should not be condemned on account of the modifying weather conditions. A water that may be found beneficial in the summer with an outdoor life, may be held to be of no use in the winter with a life confined to close and over-heated rooms—the water itself should not be condemned on this account.

6. The matter of expense and the probable good results should be considered: If the indications for a favorable influence from the use of the water are uncertain, expectations should not be set too high or the disappointment will be keen.

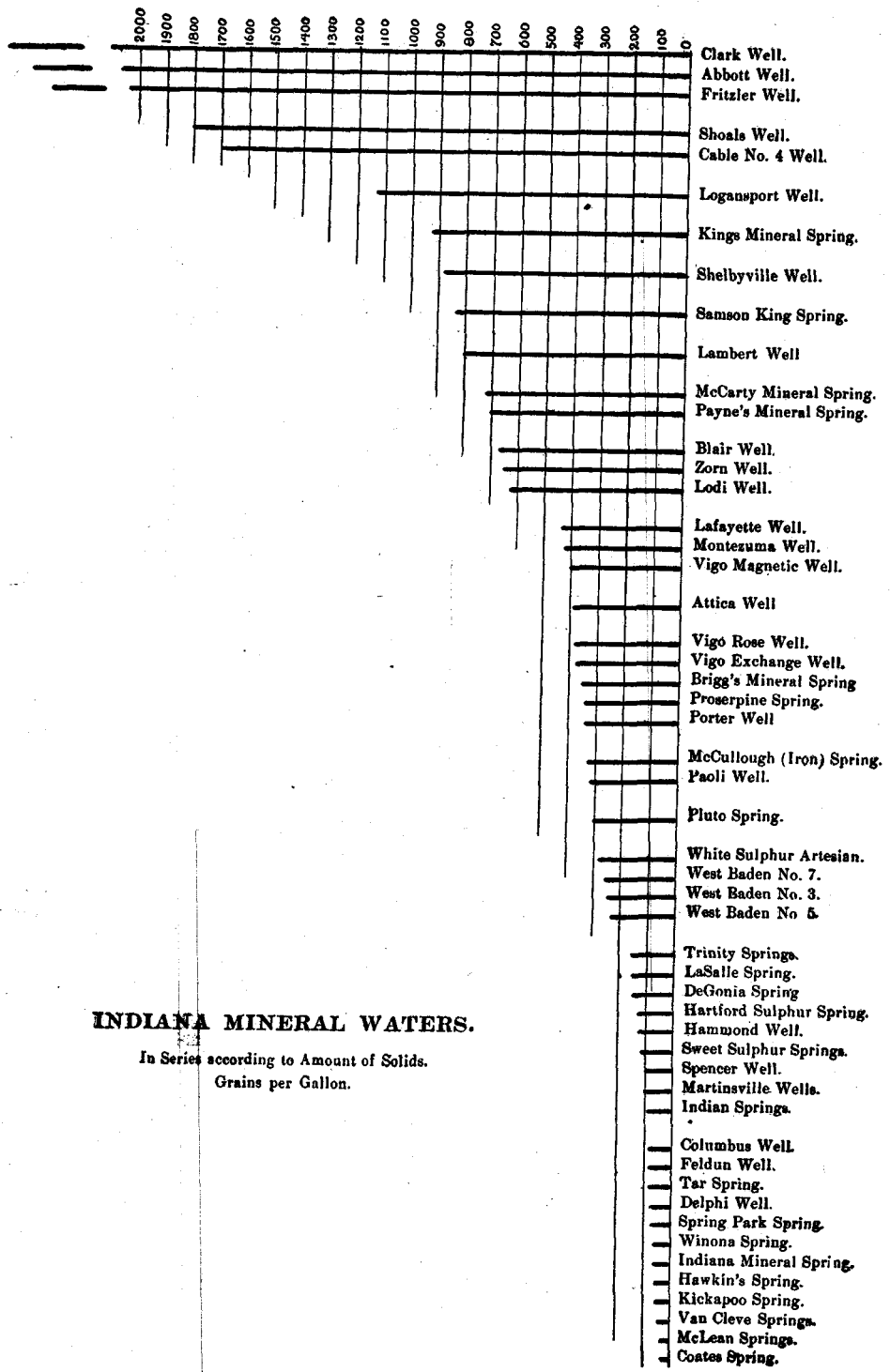
7. The probable duration of a stay at a resort must be considered before going—and how long to remain determined after having been at the spring at some time. How long to stay is a difficult question. In a general way it may be said that if the use of a water is beneficial, and continued use brings about improved conditions, the longer the stay the greater the improvement.

Our mineral water health resorts are still in their infancy. Judging by the experience of European countries, Indiana's mineral water health resorts are destined to occupy an important place in the future.

TABLE OF SOME TYPICAL EUROPEAN WATERS.

THE CHIEF INGREDIENTS ONLY ARE GIVEN. THOSE TO WHICH THE WATERS OWE THEIR CHARACTER ARE GIVEN IN BOLD FACED TYPE.—FIGURES REPRESENT GRAINS PER GALLON.

WATER	Vichy.	Ems.	Carlsbad.	Wiesbaden.	Nauheim.	Schwalbach.	Contrexville.	Apollinaris.	Hunyadi Janos.
NAME OF SPRING	Grande Grille.	Kesselbrunnen.	Sprudel.	Kochbrunnen.	Kurbrunnen.	Stahlbrunnen.	Pavillon.	Apollinaris.	
KIND OF WATER	Alkaline.	Alkaline-	Alkaline-	Saline.	Saline.	Chalybeate.	Calcic.	Carbonated.	(Purgative.)
Sodium carbonate	208.00	84.24	72.48	.....	.....	.88	11.44	55.68	105.60
Calcium carbonate	18.48	10.00	16.16	25.68	64.16	9.44	39.36	15.20	48.32
Magnesium carbonate	11.04	6.80	3.12	.64	.....	7.68	12.80	22.00	.....
Iron carbonate .....	.16	.16	.24	.32	1.12	3.68	.48	.....	.64
Sodium chloride	32.80	62.16	69.76	420.00	879.36	.40	8.00	21.92	92.82
Sodium sulphate	13.32	.....	159.68	.....	.....	.48	7.52	12.32	1081.76
Magnesium sulphate .....	.....	.....	.....	.....	.....	.....	11.04	.....	1108.84
Calcium sulphate .....	.....	.....	.....	5.52	5.92	.....	67.12	.....	.....
Carbonic acid gas (cubic inches).	117.92	54.24	62.40	183.60	249.60	402.16	2.32	342.48	64.48



INDIANA MINERAL WATERS.

In Series according to Amount of Solids.
Grains per Gallon.