

**On dyspepsia induced by the habitual use of soda-water and artificial seltzer-water / by Dr. Le Guillon.**

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# ON DYSPEPSIA

INDUCED BY THE HABITUAL USE OF SODA-WATER  
AND ARTIFICIAL SELTZER-WATER

By D<sup>r</sup> LE GUILLON

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Knight of the Legion of Honour.

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Gastritis which, forty years ago, was predominant over the whole pathology, and was considered as contributing three fourths, if not more, to the general mortality of the population, has disappeared with the doctrine of the illustrious French reformer Broussais, a doctrine as chimerical as the sickness on which it was founded.

But if gastritis, which represented a false theory, has almost ceased, dyspepsias and gastralgias, which represent morbid phenomena, an abstract term applicable to every theoretical explanation, replace it more and more. If the stomach be not inflamed, which is certain in the immense majority of cases and doubtful in many others, it is undeniable that it often suffers and that, still more often, it fulfils badly its functions even when it suffers but little or not at all.

I mean that gastralgia and dyspepsia take a larger and still larger place in our practice and, consequently in our treatises; especially as to the latter of these facts, to be convinced of which, it is sufficient to remark the great number of authors who have occupied themselves with dyspepsia during the last fifteen years, and, to mention only the principal among these coriters, the works of Chomel, Trousseau, and Beau, in France; and of Graves, and Leared, in England.

At first sight, it might be supposed that dyspepsia and gastralgia have only taken the place of gastritis, and that there is nothing changed but the name in the pathological condition of the populations of France



and England (1). This hypothesis would evidently be erroneous : Broussais and his partisans need not state the existence of serious troubles on the part of the stomach, in order to make us admit the existence of gastritis : a trifling modification, would suffice them for that, even a functional disturbance of any other organ than the stomach.

By reading a great number of *Observations* on gastritis, published during the fair days of the doctrine called physiological, one is assured that the stomach was not at all suffering nor disturbed in its functions, whence we may surely conclude that real gastric derangements were, in fact, much less frequent forty or fifty years ago than now.

What is the cause of this grievous circumstance ? It is not evidently due to any cosmical, meteorological or climacteric change : there is no question at all here, besides, of that epidemic « *génie* » to which the illustrious : Sydenham, Thexam, P. Hoffmann, and other great physicians have directed the attention of practitioners ; not only does this epidemic « *génie* » exercise but little influence on chronic diseases, but also it is seldom observed more specially, in a persistent manner, among a nation or two and it is still more seldom observed, (there is scarce one example) among a portion only of the population of which those nations are composed.

Few authors seem disposed to attribute the great number of our dyspepsias to intemperance or to irregularities of alimentary regimen. The reality of this cause seems to us nothing less than demonstrated. In the case of substantial food, we don't believe that very sensible modifications have been thus produced, for thirty years in our customary hygienics ; and as for liquids, if alcoholic excesses are now more frequent (which seems a fact well established), it must be remarked that it is not in the class where are chiefly observed these excesses, that dyspepsias have increased, but rather in that class in which drunkenness is scarce enough relatively, and in which, in every case, nothing appears to be changed, in this respect, since a quarter of a century. It is known besides, that dyspepsias caused by alcoholic excesses present particular characteristics and are attended with other morbid phenomena, which are themselves more grievous than dyspepsia, and attract much more the physician's attention.

(1) We name the populations of France, and England, without prejudging in any respect, the pathological conditions of other people much less known to us. Yet, we believe that the change here noted, is less pronounced than among the two countries above mentioned, if it exist really elsewhere to any degree. Thus, this particular condition in France and England would have a natural explanation in the cause to which we attribute the increase of dyspepsia, as will be seen farther on.



One of the chief causes to which it seems rational to attribute the frequency of dyspepsias, is simply the use, or abuse, of artificial gaseous beverages, such as *soda-water* or artificial *seltzer-water*. The grievous influence of these beverages has already been made known, in certain special cases, by the two celebrated French professors of therapeutics, TROUSSEAU and PIDOUX.

« Irritable women, » say these two authorized writers », afflicted » with gastralgia, without chlorosis and with constipation, find themselves ordinarily very ill by making use of *seltzer-water* « (read : artificial *seltzer-water* ») Its use is positively forbidden in all spasmodic affections of the stomach and intestines, especially of those which are attended with flatulency. This remedy, which appears harmless in a great number of cases, sometimes has inconveniences sufficiently serious (1). »

If the authors of the excellent treatise on therapeutics have observed the inconveniences of *seltzer-water* or artificial *seltzer-water*, only among irritable women, it is because they have remarked its bad effects only when it has been given as medicine, a case in which these effects are much more easy to be perceived, because they are a great deal more pronounced and more severe on an organisation and organs already deranged, than on an organisation and organs not so disturbed; but it is not less certain that these effects are produced in every case.

A physician who has especially occupied himself with this subject, Dr Trenille, has published in « *Lagazette des Eaux* » (January, February, and March 1859), a lecture in which he has generalized the observations of MM<sup>rs</sup>. Trousseau and Pidoux; in which he has moreover sought to explain the mode of action of *artificial Seltzer water* and *Soda-water*

We do not believe that the explanations of Dr Trenille are right, as we hope to demonstrate farther on, but his general observations seem well grounded, and are confirmed to day by a great number of physicians and notably by all or almost all hydrologist physicians, amongst whom it will be sufficient for us to name Dr Durand Fardel (2).

We will explain; in a few words the reasons which make us agree with the opinion of these clever physicians; and will try to explain by physiological data, which appear peremptory to us, the injurious influence of artificial *Soda-water* and *Seltzer-water*.

It must be remarked; firstly that before the year 1830, artificial

(1) Trousseau and Pidoux. Treatise on Therapeutics. Vol. 11, p. 574.

(2) Treatise on Rheumatism and Gout. Vol. II. p. 38.



*Seltzer-water* was scarcely in use, and only in certain uncommon cases; and *Soda-water* was almost unknown. Now, the city of Paris alone consumes, at the present time, more than *ten millions* of bottles of *artificial Seltzer-water*; and probably it is not enough to estimate at twice such numbers, the consumption of *Soda-water* in the city of London. Now, this consumption, in London, in Paris, and in all the other large cities of France and England, is made exclusively by the wealthy portion of the population, that is to say, precisely by that class which offers to us such numerous examples of dyspepsia. This single consideration would be already sufficient to show us the true cause of this kind of endemic dyspepsia which we observe during about thirty years, especially during the last fifteen years, and which increases every year in proportion as the consumption of *Soda-water* and *Seltzer-water* increases.

We have previously said that we needed positive data on the increase of dyspepsia among other nations than England and France; but we may conclude almost surely in conformity with the little place that these affections occupy in the contemporaneous medical literature of these countries, that no very material difference exists among them between the pathology of to day and that of twenty or thirty years ago. And as none of these nations but England and France make so great misuse of artificial *Soda-water* and *Seltzer-water*, that is a new reason for imputing to such misuse the sicknesses with which we occupy ourselves.

Now, these legitimate deductions of statistical data, are they confirmed by what physiology positively teaches us concerning the mode of action of *Soda-water* and artificial *Seltzer-water*? It is that which appears to us indubitable, and which all our brother-physicians will acknowledge, if they are willing to follow with attention the considerations we are about to submit to their appreciation.

The physicians who have remarked the grievous influence of artificial *Seltzer-water* and *Soda-water*, have attributed it to the three following actions.

- 1° Action of the water which serves to prepare those beverages.
- 2° Action of the matters of which are composed the vases containing them.
- 3° Action of the carbonic acid which is incorporated in them.

Of those three actions, it is really only the last which has any importance.

- 1° The author of lectures on the gaseous waters, natural and artificial,



has thought that the action of these latter waters (the artificial) was hurtful, because they are prepared with very impure river-waters, such as the water of the Seine and of the Thames. But the impurities of which he speaks, though real within a certain limit, have but a very weak influence, if none at all, on one's health. Besides, at Paris, as at London, as at Vienna, at St-Petersburg and elsewhere, the water which is used to prepare *Soda-water* is the same that is used for habitual alimentation, and if its action were very hurtful, that action would make itself felt by all classes of the population; it would have made itself felt twenty years ago as well as now; and consequently, dyspepsias would not be more numerous to day than before.

We don't mean, assuredly, that the water of the Thames or of the Seine, is as good, as healthy to drink as the water of a pure fountain; with still greater reason, as healthy as the water of a mineral spring such as Vals or Schwalheim, but we don't believe that it is necessary to derive from the use of such water the numerous dyspepsias which we now witness.

2° As for the action of the substances composing the vases in which artificial *Soda-water* and *Seltzer-water* are enclosed, those substances are composed of glass for the vase itself, and of tin or lead, for the fittings of the neck; for some of those vases, a silvered copper spring also may be found. It is, to speak strictly, possible that the water, acidulated by the carbonic acid gas, dissolves and carries away, in passing over them, a very small quantity of those metals, especially of copper, when the spring becomes unsilvered, which almost always takes place. But we acknowledge that those quantities, almost or entirely imponderable, of dissolved metals, supposing that the dissolution takes place, do not appear to us capable of impairing seriously the health, and, in any case, it is not to them that rationally may be attributed dyspepsia.

3° There remains, then, the carbonic acid, as the sole, or almost sole cause of the illness which we have declared.

But how does carbonic acid act?

Is it; as, without sufficient cause, is admitted by the author of Lectures, on « natural and artificial gaseous waters »; by its inner action upon the tissues after its absorption?

We don't believe it; and the author is not himself well convinced, since he rightly acknowledges that natural gaseous waters have a favourable action upon the « economy of life. »

We believe that an attentive study of the true action of carbonic acid, will dispel the confusion into which this eminent author is fallen and some other fellow-labourers also with him.



The action, or rather the actions (for they are many) of carbonic acid, are now known, in an almost complete manner; and these actions enclosed within certain limits, are almost all of them favourable to the functions of the organs upon which they exercise an influence.

The first action of carbonic acid, of which every one may give himself a first idea, by keeping in his mouth for few instants a small quantity of gaseous water, is a slight and agreeable stimulant by reason of which the circulation and secretions are accelerated, muscular movements are rendered more easy, more rapid, more energetic.

When the contact of the gaseous water with the palate lasts a long time, the stimulant becomes an excitement and sometimes an almost painful excitement; afterwards, the excitement becomes an analgesia, and analgesia itself does not delay to change itself into true anesthesia, which is occasionally sufficiently complete; since certain surgeons have proposed carbonic acid as a local anesthetic, and have desired to base upon this action a method of local anesthesia, a method which has even been practised and given some satisfactory results, though not sufficiently certain for the method to stay in the practice as a general method.

Introduced by absorption and circulation even into the inner parts of the tissues, carbonic acid there shews some effects analogous to those produced by it upon the skin and mucouses.

The learned physiologists, the brothers Weibert, have stated directly that the contact of carbonic acid with the blood vessels, excites them nearly in the same manner that a weak galvanic current would.

The celebrated experimentalist Brown-Sequard has observed also that carbonic acid injected into the lungs of an animal which has just died, is expelled by the excitement and the contractions which it impresses at the bronchial and areolar tissues; whilst that that excitement and the expulsive contraction which is the consequence of it, do not take place when azot or hydrogen has been injected.

It has also been stated — which was easy to foresee *a priori*, at least as probable — that that light excitation and those consecutive contractions are equally produced by carbonic acid gas in the capillaries which surround or penetrate the tissues of the spinal marrow, and that the direct and especially reflex phenomena of innervation are notably accelerated and favourably influenced thereby.

In short, these same phenomena of excitation and contraction are equally produced, in a direct manner, by the contact of carbonic acid with the muscular tissues of organic life and of relative life, and we are



to day much inclined to admit that the contractions of the first of these tissues, especially the muscles of the heart and of the gastro-intestinal tube, are due almost exclusively to the presence of carbonic acid in the blood, which explains how the contractions of those organs persist after death, till the dose of carbonic acid introduced into the blood by breathing, be exhausted.

From those remarkable physiological properties, it may be pretty surely foreseen what are the advantages or disadvantages of the introduction of carbonic acid gas into the stomach; seeing that it will be introduced in large quantities at a time (which takes place in the use of *Soda-water* and artificial *Seltzer-water*); or in very small and successive quantities, (which occurs in the use of the best mineral gaseous waters such as the springs of : *St-Jean, Désirée, Rigolette, Magdeleine, and Précieuse* of Vals, of which we will make known, compendiously in the sequel of this work, the composition and properties.

In *Soda-Water* and artificial *Seltzer-water*, the carbonic acid gas is not at all intimately combined with the water, so that, as soon as it ceases to be compressed therein, it evolves itself abruptly and after a few minutes exposure to the open air, there is no more trace of gas in the liquid.

When thus one or two glasses of *Soda-water* are injected into the stomach, as soon as the injection is made, a quarter, a third, half of a litre of gas, even a litre or more is evolved into the intestines according as the artificial beverage is more charged or less. The first action of the carbonic acid is, as we have seen, to excite the gastric mucus and soon to irritate it by the prolonged stay of the acid in the intestines. Then analgesia succeeds to the excitation and irritation and complete anesthesia would even succeed if the presence of the gas be prolonged a sufficiently long time.

Such are the various chimico-vital actions of carbonic acid brought into contact with open surfaces, and previously enumerated by us.

But the stomach being an organ nearly closed, those chimico-vital actions are accompanied by important parallel physico-vital actions.

The first of those actions, a purely mechanic action, is the distension of the organ, a distension which excites the contraction of the muscular membrane, the result of which is the discharge, by the mouth, of a portion of the gas, and also the ejection of an other portion through the duodenum. According to the energy of the contractions, this double expulsion is more or less considerable but, it is always very considerable when we first make use of artificial gaseous beverages ;



for the compression of the gastric mucus between the gas and the musculus tunicle, resulting from the distension of the intestines, closes the orifices of the absorbing vessels; so that only a very small quantity of gas passes into these vessels and almost the whole of the gas is obliged to escape by the two large orifices, pyloric and cardiac.

But it is not only the absorption of the gas which is prevented by this closing, of the absorbing orifices resulting from the compression or distension (which is the very same thing); the absorption of the alibil substances, is also prevented; this obstacle does not last very long, it is true, because the energetic contractions of the musculous membrane do not delay to eject almost the whole of the carbonic acid, and in every case, the whole portion which produces the distension; but it is not the less true that during ten minutes, a quarter of an hour or more, the various acts of the digestion are notably disturbed.

It is only, as has already been said, when we first make use of *artificial* gaseous waters, that the ejection of the totality of the gas, or at least of all its superfluous portion, is made in so short a time, and that the disturbances of digestion, consequently, are of so short a duration.

In proportion as the injections are repeated, the effects extend themselves more and more so as to become permanent and to last even after the use of those pernicious beverages is given up. Those effects are of divers kinds, changing according to the idiosyncrasy of the various individuals, or being the same for everybody and changing only in degrees.

The disturbances which vary are those that are connected with the excitability of the gastric mucus, and with the alterations of its secretions; those which are alike in all its subjects, consist in modifications of the musculous tunicle.

According to the idiosyncrasy of the patient, it is sometimes the irritating action that becomes persisting and transforms itself into a chronic irritation; sometimes, on the contrary, it is the analgesic action which is characterized by a sort of torpor of the stomach, that has for consequence to keep the aliments during a great number of hours, before they are ejected; and often they are still there found in a greater or less proportion, the day following that of their injection.

The second of these two effects has seemed to us much more frequent than the first, the reason of which is probably that it is favoured by the disturbance brought at the functions of the musculous tunicle, disturbance that we said was identical in every subject and changeable only in its degrees.

This disturbance which is observed in all the hollow organs distended



too strongly or too often, is but a decrease of the contractile action, which never, or almost never, passes as far into the stomach as the bladder, by reason of the prolonged accumulation of the urine, or even as far as into the intestines, by reason of the tympany : it nevertheless is sufficient to render impossible or very incomplete the mechanic phenomena of digestion, phenomena which are not the less essential than the chemical phenomena, and without which these last themselves would be accomplished in only a very imperfect manner, even when all the gastric juices are secreted in a normal manner.

It is not in a few days nor in a few weeks, as may be well supposed, that the grievous effects of artificial gaseous beverages reach such a degree as we have just described ; a circumstance which we unhesitatingly call unlucky ; because it may be conjectured that if those effects displayed themselves more quickly, the patients would be ready enough to attribute the effect to the cause and would cause this latter to disappear ; and also because, having displayed themselves rapidly, those disturbances would be probably less stubborn and less obstinate to the resources of medical art.

But the slowness of the development of these grievous phenomena, makes that the most part of the persons who feel them do not trace them up to their true cause ; even most frequently it happens that when the physician shows to them the dangers of artificial gaseous waters, those persons call chimerical such prudent apprehensions and willingly turn them into ridicule, till their digestion be disturbed for many years if not for the remainder of their life.

These digestive disturbances are not even partly compensated by the beneficial action of the injected carbonic acid upon the capillary circulation and specially upon the capillary circulation of the spinal marrow ; since it has been seen that the distension and the consecutive semi-paralysis of the muscular gastric tunic prevent almost totally its absorption ; and so little or none at all of that large quantity of gas in excess, passes into the general circulation.

The whole passes away whether by the cardia and mouth or by the pylore and intestines on which are produced some effects analogous to those that are observed on the stomach, though they be not so much developed.

It is scarcely necessary after such circumstantial evidence to bring forward the immense difference there is between artificial gaseous beverages (*Soda-water*, common *Seitzer-water*, etc.), and the natural



gaseous waters, especially the best among them, such as those of Vals (1) in France and Schwaleim in Germany. In these waters, the carbonic acid gas forms an integral part with the water, in such a manner that many days exposure to the open air is necessary for the gas to be disengaged, entirely or almost entirely. For even after several days, a notable portion of it remains still in the water.

The consequences of this intimate combination are such that instead of producing upon the gastric mucus a true irritation, waters, such as those of Vals, cause but a slight excitation which acts favourably on the gastric secretions, the absorption and the contractions of the muscular tunicle, contractions which produce of themselves a more perfect trituration of the food.

In short, in consequence of the regular accomplishment of all the precedent acts, the carbonic gas of these natural waters enters slowly by small successive quantities into the blood, and by the blood enters into the vast net-work of the capillary circulation, so it will produce in the medullar nervous centre a salutary excitation of the nervous influx or innervation, and it will produce in the general capillaries, an activity which causes the resolution of the obstructions that may exist, and the improvement of the normal nutritive assimilations.

All the facts that have just been signalized ; though perhaps they have not yet been exposed with so many particulars and sufficient precision ; are however known or at least suspected by almost all our fellow-physicians. Therefore, it is not precisely to teach them something new that we have determined to write out the following « *Note* ; » but only to strengthen them in an opinion which was perhaps not strongly fixed in their mind, and which it is very important, for the improvement of the public health, to see inculcated by them on their patients' regard.

We don't doubt that the day when (thanks to the unanimous intervention of physicians), the public shall be convinced (as we are ourselves), of the danger of artificial gaseous beverages, hundreds of thousands, we don't exaggerate, hundreds of thousands of dyspepsias will be prevented; that the day when the use of the best natural gaseous waters shall be

(1) As for instance, in taking a litre a day, in two meals, of the spring *Rigollette* of Vals, near two grammes and a half of carbonic acid may be introduced into the circulation ; for except the small quantity of acid which is disengaged from the water, when it is poured into the glass, almost all the rest is absorbed with the water, of which the gas is an integral part.

(See at the end of this work.)



substituted for those insalubrious beverages, hundreds of thousands of weak, lymphatic sickly individuals will see their health restored or improved. It is seen that there are but very few hygienic questions of so great importance as that to which we direct all the solicitude of our fellow-physicians, chiefly of England and France.

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**Note on the composition, properties and application  
of the principal springs of Vals.**

As it has just been said (see page 7), the action of carbonic acid is as much beneficial when this gas penetrates by degrees into the circulatory system with the natural mineral water with which it is intimately united, as it is pernicious when it disengages itself suddenly in abundance in the stomach as soon it is injected thither. As type of the natural mineral waters which contain carbonic gas in a considerable quantity and in the state of inmost combination, we have quoted the Waters of Vals. Some particulars concerning the principal springs of this important station, will not be read without interest. But before presenting the summary statement of each of those springs, we believe it necessary to mention that their general properties have been valued for a very long time long before our own studies, and by the most competent and eminent men.

In his *«practical guide on Mineral waters»* the eminent academician Patissier thus expresses himself :

- « In a state of health, the water of Vals taken as a beverage, increases
- » the appetite, renders the digestion easier, regularises the alvine evacuations and produces sometimes a purgative effect.
- » The circulation becomes more active, the skin warmer ; a feeling
- » of strength and unusual wellbeing shews itself. A few glasses of this
- » water are sufficient to render alkaline the sweat and urine which are
- » naturally acid. »

So that, the eminent practitioner acknowledges that these sodic waters have a real general action upon the economy of health, and moreover, a special action upon certain apparatus of organs in particular.

The eminent Dupasquier, professor of medical chemistry at the School of Medicine of Lyon, expresses himself as follows :

- « The influence that the waters of Vals have on the digestive func-
- » tions, as soon as the patient begins to take them, is most remarkable;



• and the effects are so immediate that one may safely say that they have  
» in them something of the wonderful.

• From the very first days they are taken, they generally bring on a  
» considerable increase of appetite. The patient who, for a long time did  
» not know the sensation of hunger, is quite surprised to feel it so  
» strongly, and still more so to be able to satisfy it with impunity,  
» thanks to the action of these excellent waters.

• Under their influence, the stomach seems to recover new powers  
» of digestion; the digestion formerly slow and difficult, now becomes  
» wonderfully easy. »

The principal alkaline springs of Vals are five in number; we must now let speak a distinguished hydrologist, Dr Clermont, of Lyon: in his learned *«Selection of physiological and chemical observations on the Mineral Waters of Vals,»* the eminent writer expresses himself in the following manner:

• The alkaline Waters of Vals are clear, limpid, sparkling, of an  
» agreeable and little piquant taste.

• They are unalterable by the shaking of carriage to the farthest distances and by the most opposite interchanges of temperature; a double quality which renders much more precious their other properties. »

It has not been forgotten that in his treatise on: *air, places and waters*, Hippocrates says, first and foremost, that it is useful to know the quality of waters, which if they differ in savour and weight, do not differ less by their properties. This judicious remark, written in a time when chemical Knowledge was not able to verify what induction gave a presentiment of, should be sufficient to reveal the powerful observing genius of him who is named the *Father of Physic*, and if it may be applied to potable waters in general, it is so above all to the natural mineralized waters; for, in medical hydrology, it is not only the weight or the degree of saline saturation that must be taken into consideration in regard of such waters, it is also the chemical nature of the principles which enter into their composition.

• From the whole of the analyses which have been made of the Waters  
» of Vals by some very clever chemists, and specially by M. O. Henry,  
» member of the Academy of Medicine, etc., the result is that, besides  
» their characteristic medicinal element, the bicarbonate of soda, they  
» all contain carbonic acid in proportion strong enough to give them,  
• by itself alone, very important medico-physiologic properties. The  
• bicarbonate of iron, united to manganese, enters also into their com-



» position in useful quantity in some cases, in insignificant proportion  
» in others. The chloride of sodium and the bicarbonate of magnesia  
» make a part of the waters of three or four springs, and give them  
» some qualities to which we will later refer : In short, the water of the  
» spring *Saint-Jean* has showed by analysis, some very sensible traces  
» of sodic arseniate.

» There have, besides, been found, in the carbo-sodic springs of Vals,  
» some neutral salts (sulphate of soda, carbonate of calx, etc.); but  
» their presence (considering their little quantity), does not modify the  
» therapeutic properties of the water enough to oblige us to enter into  
» long explanations on that subject. »

However, the reader who desires information, will find the name of these substances and the dose for each of these springs on the synoptic table that follows :



**Table** of the results obtained by analyses made in the laboratory of the Academy of Medicine by M. OSSIAN HENRI, upon the samples sent to Paris. -- The following compositions are established on 4,000 grams of liquid.

SUBSTANCES CONTAINED IN THE WATERS :		SAINT-JEAN.	PRÉCIEUSE.	DÉSIRÉE.	RIGOLETTE.	MAGDELEINE
Invariable therminality at the spring .....		13°	13°	15°	14°	15°
Free carbonic acid.....		0.4250	2.218	2.145	2.095	2.050
Bi-carbonates of calx. of magnesia. of soda. of potash of lithine protoxideiron with trace of manganese. arsenate of soda alkaline iodure chloride of sodium and potassium. Sul- plates of soda. of calx. Alumin. Organic matter	of calx.....	0.3100	0.630	0.571	0.259	0.520
	of magnesia.....	0.1200	0.750	0.900	0.259	0.672
	of soda.....	1.4800	5.940	6.040	5.800	7.280
	of potash.....	0.0400	0.230	0.253	0.265	0.255
	of lithine.....	indicated	traces	not doctd.	traces	traces
	protoxideiron with trace of manganese.....	0.0060	0.010	0.010	0.024	0.029
	arsenate of soda.....	very sensible.	traces	sensible	sensible	sensible
	alkaline iodure.....	indicated	indicated	sensible	sensible	sensible
	chloride of sodium and potassium.....	0.0600	1.080	1.100	1.200	0.016
	Sul-plates of soda.....	0.0540	0.135	0.200	0.220	0.235
of calx.....		0.0700	0.135	0.200	0.220	0.235
Alumin.....		0.0110	0.060	0.058	0.060	0.097
Organic matter.....		undetermined.	little	traces	traces	little
		2.1510	8.885	9.142	7.828	9.104

- 1° TEMPERATE SEDATIVE WATERS : *St Jean.*  
 2° LAXATIVE WATERS : *Désirée, Précieuse.*  
 3° RENOVATING WATERS : *Rigolette, Magdeleine.*



We have just indicated in the synthetic table that the Waters of Vals form naturally three categories, viz :

1° *Renovating tonics*, or those which have at the same time the most bi-carbonate of soda, carbonic acid and iron. To the peculiar property which all the other springs possess in a less degree, they unite the elective property of giving iron and colour to the globules of the blood; and being also very much charged with chloride of sodium, they have a very great action upon the hematosiis. In short, they are more tonic and renovating than the waters of the neighbouring springs.

Its types are, at Vals, the *Rigollette*, but above all the *Magdeleine*.

2° *Laxative or sodo-magnesian waters* : they are a little ferruginous, but well provided with bicarbonate of magnesia. Besides their peculiar property, they have that of being slightly laxative, and answering to particular indications which physicians know and appreciate in liver complaints above all. — The *Précieuse*, and better the *Désirée*, are at Vals its true types.

3° *Temperate and sedative waters* : they are relatively a little sodic and are of the greatest use where there is pain; one of them, the *Saint-Jean*, is slightly arsenical.

We have nothing to add to this just general appreciation. We will complete it, on the contrary, by the description given by the author of the categories just laid down :

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#### FIRST CATEGORY.

##### TONIC RENOVATING WATERS.

##### **Spring Magdeleine.**

« The water of the spring *Magdeleine*, is of all our carbo-sodic waters, that which deserves the most attention of physicians. Among all known waters, it alone has given, at chemical analysis, 7 gram. 28 c. to a litre of bicarbonate of soda; nowhere else does any attain to such a proportion of alkaline salt; also we might say that it alone was sufficient to raise the station of Vals to the first rank among the stations of alkaline waters, and that, without contest, it makes Vals the prototype of its kind.

» From this enormous quantity of sodic salt, it receives to a very high degree the various properties of being solutive and alterative, qualities so often sought for in medicine; thus, the water of the spring *Mag-*



*delzine* will be selected whenever a very alkaline water may be wanted for the base of a hydro-mineral treatment.

« In short, if we observe that it is very gaseous, supplied with chloride of sodium, and contains more bicarbonate of manganic-iron than our other springs, it must be considered as furnishing the most renovating alkaline water in Vals.

« Its temperature is 15° centigrade and its discharge about 6 or 7 thousand litres a day. Its savour, which is slightly alkaline, is nevertheless agreeable.

« All the diatheses susceptible of being modified by alkalines ; « certain herpes », the gout, gravel, diabetes, are within the power of being healed at Vals.

« There are still some other sicknesses which it modifies happily and very quickly; those, for instance, where the indication is to relieve the nervous system ; provided however there are no counter-indications, such as constipation, or a too great irritability of the stomach.

« It is for that reason it is given preferably to persons already accustomed to alkaline treatment, and who have not succeeded in a previous treatment of waters of a like kind.

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### Spring Rigolette.

« The water of this spring presents a temperature of 16° centigrade and shares without however paralleling them in intensity, all the renovating and tonic properties of the water of the spring *Magdeleine*, for it contains almost as much iron ; and if the bicarbonate of soda be not represented by so high a number, in return, it is this spring which possesses the most carbonic acid and chloride of sodium among all the waters of Vals.

« When shall have been read, in the following chapter, the profound and favourable modifications which these two last elements (so plentifully developed in the water of the spring *Rigolette*) impress on the animal economy, one will not be amazed if this water is in great request to contend with the atonic diarrheas, gastrorrhœas, enterorrhœas, chloroses, anemias, leucocytemias, leucorrhœa and other symptoms which, products or causes of frequent dyspeptic disturbances, demand the use of alkalines combined with tonics,

« Its power of renovation in chronic asthenias, having even produced a beginning of cachexy; its happy influence where it is necessary to



relieve innervation, and restore by these means to the tissues their vital energy, have seemed to us to explain its true elective property, or, otherwise, its *resultant*, which sometimes even produces constipation, an effect very little hurtful and easily removed.

« Its excess of free carbonic acid communicates to it a most agreeable piquant savour, and gives it, as at the water of the spring *Saint-Jean*, the property of inducing gaiety in those who make use of it.

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## SECOND CATEGORY

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### SODO-MAGNESIAN-LAXATIVE WATERS.

#### Spring *Désirée*.

« Among the alkaline springs of Vals, of which the water possesses plentifully the special property of carbo-sodic waters, one of the most interesting for the physician, is, without contest, that which is called *Désirée*, because it unites to itself one of the most useful elective actions, in the treatment of a great number of morbid forms.

« In fact, it is slightly purgative, not in the manner of the Sedlitz, Pullna or Nierderbronn waters, but like that which was used a few years ago under the name of *Saturated magnesian water*, and which was only a dissolution of carbonate of magnesia in the water, obtained by means of an addition of carbonic acid.

« As has been seen in the above table, it contains about a gram of bicarbonate of magnesia per litre, and though that proportion may appear extremely small, considered in reference to the effect intended to be obtained, one sees ere long, when the patients have during 4 or 5 days, made use of the *Désirée* water, that its dose of magnesia is sufficient to end the constipation in a great number; and even to produce some diaorhetic reliefs of the bowels amongst other of the patients.

It is almost as much charged with carbonic acid as the water of the *Rigolette*, and after the water of the *Magdeleine*, it contains the greatest proportion of bicarbonate of soda. It has but 10 milligram of iron; therefore it is its purgative elective action which causes it to be prescribed in preference for the complaints which are accompanied by scarce and difficult reliefs of the bowels.

Diseases of the liver furnish it with a numerous contingent of drinkers on account of its alkaline melting properties, which it possesses in a superior degree.



The chloride of sodium which it contains in a sufficiently large quantity, does not give it too depressive an influence on the economy of health.

The temperature of the water of the spring *Désirée* is 16° centigrade ; it has an alkaline savour *sui generis*, approaching a little to that of the water which is contained in oysters, to which one is pretty soon accustomed.

All the active and passive hyperemias find in it an excellent means of « resolution, » and it should be said that it is for this spring that M. Herpin, of Metz, has written these words :

« The alkaline gaseous waters, even in chronic diseases of the chest, »  
» in those disposed to pulmonary phthisis, above all among very sen- »  
» sitive persons disposed to pulmonary congestions, or inflammations, »  
» can be of a very great help. »

It will thus be useful in diseases where we fear to provoke a gouty or other metastasis on important organs; and in one of our articles on the water of the spring *Désirée*, published 2 years ago, in the medical newspapers, we terminate with the following reflections which here are still quite *à propos* :

« For the use of large plethoric persons, disposed to congestive san- »  
» guine movements towards the brain, the water of the spring *Désirée*, »  
» from Vals is recommended (2 glasses at each meal.) » Besides that it maintains the belly free, it assures and accelerates digestion, and it is very often in the moment of a laborious chylicification that fits of congestion or apoplexy are produced. Besides, if it cannot be said, in an absolute manner, that every delight comes from the belly, it can't be denied, at least, that the regular function of the abdominal intestines, is a pledge of good health, and consequently of a longevity which, according to philosophers, is not without a charm nor a utility, above all when one is according to Cicero :

« *Ille vir, haud nec magnâ re, sed plenâ fidei.* »

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### Spring Précieuse.

» It is situated near the spring *Magdeleine* »

Its water, considered in respect of its physiological and curative effects on the economy of health, may be considered, if such a term of comparison can be employed, as the younger sister of the preceding. It makes the digestion and secretions active; it relieves the nervous system; in short, it possesses the special property of carbo-sodic waters; but, be-



sides, as it contains a little bicarbonate of magnesia, it produces, in the same manner as the water of the spring « *Désirée*, » a laxative effect, only it must be drunk a little more at the time or during a longer time.

Like the water of the « *Désirée*, » it has only 10 milligrams of iron per litre, and the same fixed principles at some centigrams more or less (*see the table*.) Its temperature is 15° centigrade, and though it be one of the most mineralized waters in Vals, it is nevertheless one of the most agreeable to the palate, which proceeds probably from the intimate mixture of its elements, or, rather, from the complete state of solution in which the carbonic acid is found, for although it be there in larger quantity than in the spring *Saint-Jean*, for instance, the gas is not seen in the glass in which it is received as in the water of that spring, escaping in such numerous and rapid big bubbles. By its taste, it can't be doubted that it contains 5 grams 8 of bicarbonate of soda per litre and about 2 grams of carbonic acid gas,

The morbid perturbations which need the use of the spring *Précieuse*. are thus almost the same as those cured by the « *Désirée*. »

However a distinction must be made, and it does not escape the notice of the physicians of Vals : when it is wished to obtain by our sodo-magnesian waters a moderate relaxation of the belly, one must apply one's self to the water of the spring *Précieuse*, following up the use of it without being afraid to misuse it, one or even two months. It acts very well in moderate dyspepsias and constipations; but if one has to deal with a more obstinate constipation, one must have recourse to the water of the spring *Désirée*, because its laxative action is more marked.

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### THIRD CATEGORY.

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#### TEMPERATE SEDATIVE WATERS.

##### **Spring Saint-Jean.**

« The water for dyspepsias, in their simple state, or for gastralgias, even in the moments when the pain is sharp; the alkaline tisane for children, and, without contest, also the best table drink known, is supplied by the spring *Saint-Jean*.

» It is the type of temperate and sedative waters from the carbosodic springs. It possesses sensible traces of arseniate of soda, which render more certain its elective action, and permit its employment even in the algic periods of nevropathic cases.

• The temperature of the water of this spring is 15° centigrade. Its



taste is perfect; it makes digestion active, and the persons who use it, soon feel an increase of appetite. Some of them experience a slight excitation towards the brain, a sort of high spirits and liveliness, even when they are of a sad and melancholic character.

» The relatively weak proportion of alkaline salts in the water of the spring *Saint-Jean*, allows one to drink it a long while and abundantly, at table and in the interval of meals, without being incommoded by it, and also for the purpose of confirming or continuing the effect obtained by the waters of the other springs previously employed against the grave diseases which have claimed their use.

» We may also administer it to the youngest children with whom it makes disappear the dispositions to diarrhœa so ordinary in the early age of life. The lymphatic dyspepsias of slight lesions, mere gastric derangements are equally relieved by the spring *Saint-Jean* water, and we shall restate the truth in ending this lecture, if we repeat the latter part of an article published by us on this subject. (*Gazette des Hôpitaux*, 1<sup>st</sup> march 1866) :

« The water of the spring *Saint-Jean* will be for the physician, the  
» uniting feature of two more accentuated treatments ; it will also serve  
» him to continue or consolidate the recovery obtained by the water  
» of other much more sodic springs. Like our fellow-physicians of  
» Vals, we will say that by the relative weakness of its mineralisation, it  
» marks the first degree of the sort of ascending scale represented by  
» the bicarbonated-sodic springs of the banks of the Volane, and which  
» the physicians of that station consider as an excellent remedy for  
» patients whose stomach (painful or still too weak) would be injured  
» by waters more charged with bicarbonate of soda and carbonic acid ;  
» when however a treatment by a mineral alkaline gaseous water would  
» be indicated by the kind of disease. »

These summary considerations which we might have supported with numerous clinic observations, appear sufficient to us to prove that artificial gaseous waters and especially the Vals Waters, put into our hands all the weapons necessary for combating, besides many other diseases, the dyspepsia with which we have chiefly occupied ourselves in this treatise, and for preventing this painful disease, in all the cases where is acknowledged for cause the abuse of artificial gaseous drink, viz, perhaps in the greatest number of cases. It is an immense service which physicians can render to the wealthier populations, merely by recommending with all their authority, the substitution of NATURAL for *Artificial Waters*.