

*Salt Waters* are so called from containing a predominant amount of chloride of sodium. They also generally contain chlorides of magnesia and of lime, and occasionally small amounts of lithium, bromine, and iodine. They further often contain a little iron, which is an important addition. The great majority of the drinking wells have a large supply of carbonic acid. There are cold and hot salt springs. Sometimes they are used for drinking, sometimes for bathing; and the double use of them is often resorted to.

The normal quantity of common salt consumed daily by man is usually set down at about 300 grains. The maximum quantity likely to be taken at any well may be 225 grains, but commonly not more than half of that amount is taken. The increase to the usual daily amount is therefore probably not much more than one-third. Still it may be presumed that the action of a solution of salt on an empty stomach is different from that of the same amount of salt taken with food. Salt introduced into the stomach excites the secretion of gastric juice, and favours the peristaltic actions, and when taken in considerable quantity is distinctly aperient. We thus see how it is useful in dyspepsia, in atony of the stomach and intestines, and sometimes in chronic intestinal catarrh. Salt when absorbed by the stomach appears again in the urine, of which it increases the amount both of fluid and of solid constituents, especially of the urea. It seems therefore to be pretty certain that considerable quantities of salt taken into the circulation increase the excretion of nitrogenous products through the urine, and on the whole accelerate the transformation of tissue. Salt is thus useful in scrofula by stimulating the system, and also in anaemia, especially when iron is also present. In some German stations, as at Soden, carbonated salt waters are considered to be useful in chronic laryngitis or granular pharyngitis.

Baths of salt water, as usually given, rarely contain more than 3 per cent. of chloride of sodium, some of the strongest perhaps from 8 to 10 per cent. Their primary action is as a stimulant to the skin, in which action it is probable that the other chlorides, especially that of calcium, and still more the carbonic acid often present, co-operate. In this way, and when aided by various processes of what may be termed water poultices and packing, they are often useful in removing exudations, in chronic metritis, and in some tumours of the uterus, and generally in scrofula and rachitis, and occasionally in some chronic skin affections.

The French accord high praise to some of their thermal salt waters in paralysis, and some German ones are used in a similar way in spinal affections. The salt waters are sometimes so strong that they must be diluted for bathing. In other cases concentrated solutions of salt are added to make them sufficiently strong. These waters are widely diffused, but on the whole Germany is richest in them, especially in such as are highly charged with salt. The Kissingen springs may be considered as typical of the drinking wells, and sea-water of bathing waters. The air of salt-works and pulverization of the water are employed in German baths as remedial agents.

Salt springs are found in many quarters of the world, but the chief carbonated groups for drinking purposes occur in Germany, and at Saratoga in America, where very remarkable wells indeed are to be found. France and England have no springs of this class. The stronger wells, used chiefly for bathing, occur where

TABLE IV.—Salt Springs.

Locality.	Temp. Fahr.	Therapeutic Action.
Soden, near Frankfort.....	...	Dyspepsia, anaemia, scrofula, special for throat and phthisis.
Homburg, do. ....	...	Dyspepsia, slighter hepatic affections, chlorosis, gout.
Kissingen, Bavaria.....	...	In all essentials the same.
Pymont, North Germany.....	...	Better known for its iron; has a good salt drinking spring.
Kreuznach, near Bingen.....	...	A salt well without carbonic acid used in scrofula and anaemia; bathing more important.
Wiesbaden, Nassau.....	155	Used in dyspepsia and gout; the bathing is most important.
Baden-Baden .....	156	Still milder water; uses similar; gout.
Bourbonne, Haute-Marne.....	114-149	Rheumatism, neuralgia, effects of malaria.
Balaruc, South France.....	116-6	Do.; special for treatment of paralysis.
Salins, Montiers, Savoy (1480 ft.)	96	Scrofula, anaemia, loss of power, sexual disorders.
Brides, Savoy (1700 ft.).....	95	Act on liver and digestive canal; used for obesity.
Aequi, North Italy.....	169	Rheumatism; special treatment with the bath deposit.
Abano, do. ....	185	Chiefly as baths; mud of bath used for poultice.
Caldas de Mombuy, near Barcelona.....	153-158	Rheumatism, sciatica, old injuries.
Cestona, Gulpuzcoa, Spain.....	88-94	Rheumatism, indigestion, bronchitis.

Almost all the above stations have several springs of various strengths; the cold may be said to vary from 14 to 58 per cent. of chloride of sodium; the warm are generally weaker, perhaps varying from 6.8 to 1.6.

there are salt-bearing strata, as in Germany, Galicia, Italy, Switzerland, France, and England. Very powerful waters of this class are those of St Catherines in Canada.

The presence of minute portions of iodine or bromine in salt waters is by no means infrequent, and they appear in considerable quantity in some few. It is, however, extremely doubtful whether any known spring contains a sufficient quantity of iodine, still more of bromine, to act specially on the system, even if that action were not necessarily superseded by the presence of the large quantity of other salts with which they are associated. Some of the best-known springs of the kind are:—Challes, Wildegg, Castrocaro, Hall, Adelheid's Quelle, Krankenheil, Kreuznach, Woodhall Spa.

*Iron or Chalybeate Waters.*—Iron usually exists in waters in the state of protoxide or its carbonate, less frequently as sulphate or creamate, and very rarely if at all as chloride. The quantity present is usually extremely small. It may be said to vary from '12 to '03 in the 1000 parts of water. Some wells considered distinct chalybeates contain less than '03. Many wells, especially in Germany, have a rich supply of carbonic acid, which is unfortunately wanting in French and English ones.

It has long been the prevalent idea that want of iron in the blood is the main cause of chlorosis and of other anemic conditions, and that these conditions are best relieved by a supply of that metal. Since the detection of it in haemoglobin this view has been still more popular. It is pretty certain that the blood contains 37 to 47 grains and the whole system 70 to 74 grains of iron; and it has been calculated that in normal conditions of the system somewhat more than one grain of iron is taken daily in articles of food, and that the same amount is passed in the faeces; for although the stomach takes the iron up it is excreted by the alimentary canal mainly, it being doubtful whether any is excreted in the urine. It is possible by drinking several glasses to take in more than a grain of carbonate of iron in the day, equivalent to half that amount of metallic iron. It has further been ingeniously reckoned from practice that 10 to 15 grains of metallic iron suffice to supply the deficiency in the system in a case of chlorosis. It is thought probable that a portion of the iron taken up in water is in certain pathological states not excreted, but retained in the system, and goes towards making up the want of that metal. But, whether this or any other explanation be satisfactory, there is no question as to the excellent effects often produced by drinking chalybeate waters (especially when they are carbonated), and by bathing in those which are rich in carbonic acid after they have been artificially heated. As regards the drinking cure we must not, however, forget that carbonate and chloride of sodium, and also the sulphate, are often present and must be ascribed a share in the cure. Thus chloride of sodium is a power-

TABLE V.—Stronger Salt Waters.

Locality.	Chloride of Sodium in 1000 parts of Water.	Therapeutic Application.
Rheinfeld, Aargau, Switzerland .....	311	Scrofula, effects of inflammation, chronic exudations, some chronic exanthemas, rheumatism, uterine infiltrations.
Salzungen, North Germany.....	256	Do. do.
Ischl, Austria (1440 ft.).....	256	Do. do.
Hall, Tyrol (3700 ft.).....	235	Do. do.
Reichenhall, near Salzburg (1800 ft.)	224	Do. do.
Bex, Rhone Valley (1400 ft.).....	156	Do. do.
Castrocaro, Tuscany.....	36	Do. do.
Droitwich, near Worcester.....	233-6	Do. do.
Sea-Water .....	30-4	Do. do.
Rehme, Westphalia (92° F.).....	24-85	{ Do.; special use in locomotor ataxia.
Nauheim, Wetterau (90°-103° F.)....	29	Do. do.

TABLE VI.—Iron Waters.

Locality	Height in Feet.	Carb. of Iron.	Therapeutic Use.
Rippoldsau, Black Forest.....	1,836	·12	For anemic condition; laxative.
Homburg, near Frankfort.....	...	·10	Do. do. do.
Elster, Saxony .....	1,465	·08	Do. do. do.
Liebenstein, North Germany.....	911	·08	Do.; much of a ladies' bath.
Schwalbach, Nassau.....	900	·08	Do. do.
Bocklet, near Kissingen.....	600	·08	Do. do.
Griesbach, Black Forest.....	1,614	·07	Do.; laxative; a ladies' bath.
Franzensbad, Bohemia.....	1,293	·07	Do. do. do.
Pymont, Germany.....	...	·07	Do. do.
Spa, Belgium.....	1,000	·06	Do. do.
Petershal, Black Forest.....	1,333	·04	Do.; laxative.
St Moritz, Engadine, Switzerland.....	5,464	·03	Do.; sought for its air.
Forges-les-Eaux, France.....	...	·06	Do. do.
La Malou, Highlands.....	...	·08	Do. do.
France (temp. 88°).....	...	·06	Do. do.
Recoaro, North Italy.....	1,463	·04	Do. do.
Tunbridge Wells, England.....	...	·06	Do.; deficient in carbonic acid.
Musprat Spring, Harrogate (chloride).....	...	·15	Do. do.

ful adjuvant in the strong Stahl Quelle of Homburg and in the Putnam Well at Saratoga. A whole category of female complaints is treated successfully with these waters. Indeed anaemia from any source, as after fever or through loss of blood, and enlargements of the spleen, are benefited by them. The stimulating action of the copious supply of carbonic acid in steel baths is a very important adjuvant; no one now believes in direct absorption of iron from the bath. Iron waters are scarcely ever thermal. They are extremely common in all countries,—frequently along with sulphuretted hydrogen in bogs, and near coal-measures. But such springs and non-carbonated wells generally are weak, and not now held in much esteem.

It may be added that some of the strongest known iron wells are sulphated or aluminated. They are styptic and astringent, and can only be used diluted. They are sometimes useful as an application to ulcers and sores. Such springs have often been brought into notice, but never retain their popularity. They are known in the Isle of Wight, in Wales, in Scotland, as well as in Elba, &c.; and of late years the Bedford Alum and Oak Orchard Springs, U.S., have been brought into notice, the latter containing 10 grains of free sulphuric acid in the pint. All such springs have been considered useful in scrofula, anaemia, and chronic diarrhoea.

*Sulphur Springs.*—Waters having the odour of hydrosulphuric acid, however slightly, are usually called sulphur ones. They owe their smell sometimes to the presence of the free acid, sometimes to sulphides of sodium, calcium, or magnesia, and sometimes to both. Hydrosulphuric acid is absorbed more freely by cold than by hot water, and is therefore most abundant in cold springs. The sulphides decompose and give off the gas. Most of these springs occur near coal or shale measures, or strata containing fossils, or in moors and in places generally where organic matter is present in the soil or strata. Many of them contain so little mineral impregnation that they might as well be classed among the indifferent or earthy waters. One group contains a considerable amount of chloride of sodium, another of sulphate of lime, while a third has little mineral impregnation, but contains sulphides.

Hydrosulphuric acid is a strong poison, and its action on the system has been pretty well ascertained. It has been assumed that the gas in mineral waters acts similarly, though in a modified degree; but there is next to nothing absolutely known of the action of the small quantities of the gas that are present in mineral waters, and which certainly have no toxic effect. It has been assumed that this gas has some special action on the portal system and so on the liver. On the connexion of metallic poisoning with the liver has been founded the idea that sulphur waters are useful in metallic intoxication. Drinking large quantities of these waters, especially of such as contain sulphates or chlorides of sodium or magnesia, combined with hot baths and exercise, may help to break up albuminates, but there is no proof of the action of the sulphur.

For similar reasons, and primarily to counteract mercurial poison, sulphur waters have been considered useful in syphilis. But it may be well to remember that at most baths mercury is used along with them. No doubt they are frequently, like other warm waters, useful in bringing out old eruptions, acting in this way as a test for syphilitic poison, and in indicating the treatment that may be

TABLE VII.—Cold Sulphur Springs.

Locality.	Height in Feet.	Temp. Fahr.	Hydrosulphuric Acid absorbed in Water.	Sulphide of Sodium.
Eilsen, Schaumburg-Lippe.....	...	42-3	...	...
Meinberg, Lippe-Deimold.....	...	23-1	·008	...
Gurnigel, Switzerland (3600 ft.).....	...	15-1	...	...
Leuk, do. (3593 ft.).....	...	44-5	...	...
Challes, Savoy (900 ft.).....	...	...	·478	...
Englien, near Paris.....	...	...	·106	...
Uriage, Isere, France (1500 ft.).....	...	7-34	...	...
Harrogate, England.....	...	...	·207	...
Strathpeffer, Scotland.....	...	...	·026	...
Lisduvanna, Clare, Ireland.....	...	...	...	...

TABLE VIII.—Warm Sulphur Springs.

Locality.	Height in Feet.	Temp. Fahr.	Sulphide of Sodium.	Hydrosulphuric Acid absorbed in Water.
Aix-la-Chapelle, Germany.....	534	131-140	·01	·3
Baden, near Vienna.....	...	95-115	·052	2-5
Schinzach, Switzerland.....	1,060	80-92	...	37-8
Lavey, Rhone Valley.....	1,350	92-113	...	3-5
Hercules Bad, Banat.....	500	110	...	42-6
Aix-les-Bains, Savoy.....	768	108-5	...	27-2
Luchon, Pyrenees.....	2,000	125-5	·07	...
Barèges, do. ....	4,100	113	·04	...
Amélie-les-Bains, Pyrenees.....	810	87-147	·01	...
Cantaretz, do. ....	3,254	71-134	·02	...
Eaux Bonnes, do. ....	2,400	90-5	·02	...
Ardena, Murcia, Spain.....	...	128	...	...

required. Sulphur waters, both hot and cold, are used in gout and rheumatism, in dyspepsia, in hepatic and cutaneous affections; and of late years inhalation of them has been popular in phthisis and in laryngeal affections. They have long been popular remedies in cutaneous affections. While so much doubt has been cast on the action of the sulphur of these waters, it may be admitted that the sulphides are probably decomposed in the stomach and hydrosulphuric acid generated. That gas is probably a slight stimulant to the intestine. What hydrosulphuric acid reaches the blood is eliminated by the lungs. There seems to be no doubt that the gas is absorbed in small quantities by the skin.

It is in sulphur waters chiefly that glairin and baregin occur. This peculiar organic substance has been found both in American and in European springs. Cold sulphur springs are very widely diffused throughout the world. Thermal ones are not so common. Perhaps the largest though not the strongest group of the latter is to be found in the Pyrenees. We may remark again how very little hydrosulphuric acid there is in many of the most favourite sulphur springs, including the very popular White Sulphur ones of Virginia. There seems to be something peculiarly unsatisfactory in the analysis of sulphur waters, and there has been difficulty in constructing the following imperfect tables.

Some of the most powerful cold wells are those of Challes (with its very peculiar water), Leuk, and Harrogate. Uriage has a very large amount of chloride of sodium in its springs. Cold sulphur waters are on the whole more used in liver and indigestion than warm ones. The general effects of warm sulphur waters differ so little at the various baths as to make it difficult to mention anything special to particular localities. Schinzach has a reputation in skin complaints, Cantaretz, Eau Bonnes, and Challes in laryngeal affections, the two Aixes, Luchon, and Ardena in syphilis.

*Alkaline Waters* are such as contain carbonate (chiefly bicarbonate) of soda, along with an excess of carbonic acid. Of the action of these carbonates it is known that when taken into the stomach they are neutralized by the gastric juice, and converted into chloride of sodium. On their introduction into the stomach they produce an increased flow of gastric juice. If given during or immediately after meals in any quantity, they impede digestion. They slightly increase peristaltic action, but only feebly, unless assisted by other salts. They act slightly as diuretics. Of the connexion between the biliary system and alkalies, which undoubtedly exists, not much is known with certainty. The alkalization of the blood by them is assumed by many, but not proved. It is very doubtful whether they reduce the quantity of fibrine in the blood, and thus induce a

TABLE IX.—Alkaline Waters.

CLASS I.—Simple Alkaline.				
Locality.	Carb. Soda.	Therapeutic Uses.		
Vals, South France.....	7-1	{ Catarrh of stomach, gout, renal and biliary calculi, liver complaints, diabetes.		
Billin, Bohemia.....	4-2	Do. do. do.		
Vichy, France (105° F.).....	5-1	Do. do. do.		
Neuenahr, Rhineland (92°-97° F.)....	1-0	{ Mucous catarrh; diabetes specially. Do.; sedative effect on nervous system.		
La Malou, France (97° F.).....	...	{ Do.; gout, urinary affections.—"The Portuguese Vichy."		
Vidago, Portugal.....	...			
CLASS II.—With Chloride of Sodium varying from 4-3 to 1 in amount.				
Locality.	Height in Feet.	Temp. Fahr.	Carb. Soda.	Therapeutic Uses.
Luhatschowitz, Moravia.....	1,600	...	8-4	{ Springs rich both in carb. soda and chl. sodium.
Tönnisteln, Rhine Valley.....	...	...	2-5	{ Light antacid tonic to stomach.
Ema, Nassau.....	...	85-115	2-0	{ Special in female complaints and mucous membrane.
Ischia, Italy.....	...	upto170	2-0	{ Specially rheumatism and female complaints. Do. and some skin affections.
Royat, Auvergne.....	1,400	80-95	1-3	{ Asthma; chronic laryngitis.
Mont Dore, do. ....	3,800	100-114	...	{ Scrofula, rachitis, cutaneous affections.
Bourbonne, do. ....	2,800	107-125	...	
CLASS III.—With Sulphate of Soda varying from 5-2 to 2 in amount, and Carbonate of Soda varying from 3-55 to ·51 in amount.				
Locality.	Height in Feet.	Therapeutic Uses.		
Elster, Saxony.....	1,460	{ Action on abdominal organs, female complaints.		
Marienbad, Bohemia.....	1,012	{ Do.; special use in oesosty.		
Franzensbad, do. ....	1,293	{ Do.; specially a ladies' bath.		
Tarasp, Lower Engadine.....	4,000	{ Powerful action on abdominal viscera.		
Carlsbad, Bohemia (121°-124° F.)....	1,200	{ Gout, liver affections, biliary and renal calculi, diabetes.		

lowered state of the system, or whether they have any direct tendency to combine with fat and carry off a portion of superfluous adipose tissue. Their excess of carbonic acid, through its action on the stomach, favours the operation of alkaline waters. They have been classed as follows:—(I.) simple alkalines, where carbonate of soda is the main agent; (II.) waters containing in addition some chloride of sodium; (III.) waters containing sulphates of soda or of magnesia. All these classes may be said to be used in gout, lithiasis, affections of the liver, catarrh, and obstructions of the gall ducts, in dyspepsia, chronic catarrh of the stomach, and diarrhoea, in obesity, and in diabetes. Some of the waters of the second class are supposed to influence bronchial catarrhs and incipient phthisis, while the more powerful sulphated waters of the third class are especially useful in catarrh of the stomach, and in affections of the biliary organs; of these only one of importance (Carlsbad) is thermal. The rival cold waters of Tarasp contain twice as much carbonate of soda. The cold ones are chiefly used internally, the thermal ones both internally and externally. The latter, besides acting as warm water, slightly stimulate the skin when the carbonic acid is abundant, and the carbonate of soda has some slight detergent effect on the cutaneous surface like soap. These waters are unknown in England. They are most abundant in countries of extinct volcanoes.

Classes I. and II. of alkaline waters may be said to have a subvariety in acidulated springs or carbonated waters, in which the quantity of salts is very small, that of carbonic acid large. These table waters are readily drunk at meals. They have of late years been so widely exported as to be within the reach almost of every one. Their practical importance in aiding digestion is in reality much greater than one could expect from their scanty mineralization. They are drunk by the country people, and also largely exported and imitated. They are very abundant on the Continent, and, although some of the best-known ones enumerated below are German and French, they are common in Italy and elsewhere:—Heppingen, Roisdorf, Landskro, Apollinaris, Selters, Brückenaun, Gieshübel, all German; St Galmier, Pougues, Chateldon, French.

Associated with Class III. is that of the strongly sulphated waters known in Germany as bitter or purging waters, which have of late deservedly come into use as purgative agents. They are almost wanting in France and in America, and there are no very good ones in England. The chief supply is from Bohemia and Hungary. The numerous waters of Ofen are the best-known, and some of them are stronger than the Hunyadi, of which an analysis has been given in Table I. They are easily imitated. Some of the best-known are Ofen, Püllna, Saidschütz, Friedrichshall, Birmerstorf, Kissingen.

Two other classes of waters demand a few words of notice. The French have much faith in the presence of minute quantities of arsenic in some of their springs, and trace arsenical effects in those who drink them, and some French authors have established a class of arsenical waters. Bourboule in Auvergne is the strongest of them, and is said to contain  $\frac{1}{10}$ th of a grain of arseniate of soda in 7 ounces of water. Baden-Baden, according to Bunsen's latest analysis, has a right to be considered an arsenical water. It is, however, extremely doubtful whether the small amounts of arseniate of soda which have been detected, accompanied as they are by preponderating amounts of other salts, have any actual operation on the system. The following are among the most noted springs:—Bourboule, Mont Dore, Royat, Salies (Bigorres), Plombières, Baden-Baden.

Of late years lithium has been discovered in the waters of Baden-Baden; and various other places boast of the amount of that substance in their springs. Indeed a new bath has been established at Asmannshausen on the Rhine in consequence of the discovery of a weak alkaline spring containing some lithium. Not very much is known of the action of lithium in ordinary medicine, and it undoubtedly does not exist in medicinal doses even in the strongest springs. Among these springs are those of Baden-Baden, Asmannshausen, Elster, Royat, Ballston Spa, and Saratoga (U.S.).

AMERICAN MINERAL WATERS.—The number of springs in the United States and Canada to which public attention has been called on account of their supposed therapeutic virtues is very large, amounting in all to more than three hundred. Of this number comparatively few are in Canada, and of these not more than six (St Catharines, Caledonia, Plantagenet, Caxton, Charlottesville, and Sandwich) have attained general celebrity. The first three belong to the saline class, the Caxton is alkaline-saline, and the last two are sulphur waters. The St Catharines is remarkable for the very large amounts of sodium, calcium, and magnesium chlorides which it contains, its total salts (450 grains in the pint) being more than three times the quantity contained in the brine-baths of Kreuznach in Prussia. The Charlottesville and Sandwich springs likewise surpass the noted sulphur-waters of Europe in their excessive percentages of sulphuretted hydrogen, the former containing more than 3 and the latter 4.72 cubic inches of this gas in the pint.

The mineral springs in the United States are very unequally distributed, by far the larger number of those which are in high medical repute occurring along the Appalachian chain of mountains,

and more especially on or near this chain where it passes through the States of Virginia, West Virginia, and New York. The Devonian and Silurian formations which overlie the Eozoic rocks along the course of the Appalachian chain have been greatly fissured—the faulting of the strata being in some places of enormous magnitude—by the series of upheavals which gave rise to the many parallel mountain ridges of the Appalachians. In many places the springs occur directly along the lines of fault. The various classes of mineral waters are likewise very unequally represented, the alkaline springs, and those containing Glauber and Epsom salts, being much inferior to their European representatives. On the other hand, the very numerous and abundant springs of Saratoga compare very favourably with the Selters and similar saline waters, and among the many American chalybeate springs the subclass represented by the Rockbridge Alum is unequalled in regard to the very large percentages of alumina and sulphuric acid which it contains. Besides its greater amount of mineral constituents (135 grains per pint), the Ballston spring surpasses the similar saline waters of Homburg, Kissingen, Wiesbaden, and Selters in its percentage of carbonic acid (53 cubic inches). It is also remarkable for the very large proportion of carbonate of lithia, amounting to 0.701 grains. Thermal springs are specially numerous in the territories west of the Mississippi and in California. Those in the east mostly occur in Virginia along the southern portion of the Appalachian chain; in the middle and New England States Lebanon is the only important thermal spring. Subjoined is a list of thirty American springs, the design being to represent as many of the more noted spas as possible, while at the same time enumerating the best representatives of the classes and subclasses into which mineral waters are divided according to the German method of classification.

	Designation and Locality.	Therapeutic Application
Indifferent (Thermal).	Lebanon, Columbia Co., N.Y. (73° F.)	(Scrofulous ulcers and ophthalmia, ozæna, chronic diarrhoea and dysentery, secondary and tertiary syphilis.
	Healing, Bath Co., Va. (88° F.)	Chronic and subacute rheumatism, gout, neuralgia, nephritic and calculous diseases.
	Warm, Bath Co., Va. (98° F.)	Chronic rheumatism, gout, diseases of liver, neuralgia, contractions of joints.
Calcareous and Earthy.	Hot, Bath Co., Va. (110° F.)	Dartrous diseases of skin, functional diseases of uterus, chronic mercurial and lead poisoning.
	Paso Robles, San Luis, Obispo Co., Cal. (122° F.)	Calculus, gravel, catarrh of stomach or bladder, dyspepsia.
	Hot, Garland Co., Ark. (93°-150° F.)	Gravel, dyspepsia (diuretic, diaphoretic).
	Gottysburg, Adams Co., Penn.	Neuralgia (restorative).
	Sweet, Monroe Co., W. Va. (74° F.)	Purgative, diuretic.
	Berkeley, Morgan Co., W. Va. (74° F.)	Diabetes mellitus, gravel, inflammation of bladder, dropsy, albuminuria (diuretic).
	Alleghany, Montgomery Co., Va.	Apertient and alterative.
	Bethesda, Waukesha Co., Wis.	Do. do.
	Lower Blue Lick, Nicholas Co., Ky.	Dartrous skin diseases, diseases of the bladder, jaundice, dyspepsia.
	Sharon, Schoharie Co., N.Y.	Do.; scrofula and syphilis.
Epsom Salt.	White Sulphur, Greenbrier Co., Va.	Anæmia, gravel, calculus (strongly diuretic).
	Salt Sulphur, Monroe Co., W. Va.	Rheumatism, gout, scrofula, neuralgia.
Common Salt.	Bedford, Bedford Co., Penn.	Rheumatism, gout.
	St Catharines, Ontario, Canada.	Dyspepsia, jaundice, abdominal pletthora.
	Caledonia, Ontario, Canada.	Do. do. do.
	Hathorne, Saratoga, N.Y.	Ulcers, diseases of the skin, passive hemorrhages, atonic diarrhoea (has 10 grains of free sulphuric acid in the pint).
Iron.	Ballston, Saratoga Co., N.Y.	Chlorosis and anæmia generally; tonic.
	Oak-Orchard Acid, Genesee Co., N.Y.	Do. do. do.
	Rawley, Rockingham Co., Va.	Scrofula, chronic diarrhoea.
Glauber Salt.	Sweet Chalybeate, Alleghany Co., Va.	Anæmia, chlorosis, chronic diarrhoea, dropsy.
	Rockbridge Alum, Rockbridge Co., Va.	
Alkaline.	Cooper's Well, Hinds Co., Miss.	
	Crab Orchard, Lincoln Co., Ky.	
	Midland, Midland Co., Mich.	
	Bladon, Choctaw Co., Ala. (carbonated alkaline).	
Congress, Santa Clara Co., Cal. (saline alkaline).		
St Louis, Gratiot Co., Mich. (simple alkaline).	Dyspepsia, neuralgia, chronic and subacute rheumatism.	

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MINERVA (*i.e.*, *menes-va*, endowed with mind) was the Roman goddess who presided over all handicrafts, inventions, arts, and sciences. She was probably an Etruscan deity, but her character was modified on Roman soil through her identification with the Greek Pallas Athena. (see ATHENA). No legend of her birth is recorded; the Roman deities were abstractions, not distinct persons with an individual history. Her chief worship in Rome was in the temple built by Tarquin on the Capitol, where she was worshipped side by side with Jupiter and Juno. This foundation may be assigned to Etruscan influence. She had also an old temple on the Aventine, which was a regular meeting-place for dramatic poets and actors. The dedication day of the temple and birthday of the goddess was March 19, and this day was the great festival of Minerva, called *quinquatrus* because it fell on the fifth day after the Ides. The number five was sacred to the goddess. All the schools had holidays at this time, and the pupils on reassembling brought a fee (*minerval*) to the teachers. In every house also the *quinquatrus* was a holiday, for Minerva was patron of the women's weaving and spinning and the workmen's craft. At a later time the festival was extended over five days, and games were celebrated. This feature is evidently due to the Græcizing conception of Minerva as the goddess of war. To this same Græcizing tendency we must attribute the *lectisternium* to Minerva and Neptune conjointly after the battle of the Trasimene Lake. The 23d had always been the day of the *tubilustrium*, or purification of the trumpets, so that the ceremony came to be on the last day of Minerva's festival. Trumpets were used in many religious ceremonies; and it is very doubtful whether the *tubilustrium* was really connected with Minerva. There was another temple of Minerva on the Cælian Hill, and a festival called the lesser *quinquatrus* was celebrated there on June 13-15, chiefly by the flute-players.

Minerva of the Cælian temple was called *Capta*; June 19 was the foundation day of this temple and the birthday of the goddess. The *palladium*, an archaic image of Pallas, was brought from Troy to Lavinium, and thence to Rome by the family of the Nautii; it was preserved in the temple of Vesta as a pledge of the safety of the city. There are some traces of an identification of Minerva with the Italian goddess Nerio, wife of Mars; it is probable that March 19 was originally a feast of Mars.

Besides Preller, *Röm. Myth. and Hartung, Relig. d. Römer*, &c., see Jordan, *Ephem. Epigraph.*, 1. 238; Mommsen, *C. I. L.*, 1. 888; Usener, *Rhein. Mus.*, xxx. 222.

MINGRELIA, a former principality of Transcaucasia, which became subject to Russia in 1804, and since 1867 has constituted three circles of the government of Kutais—Letchgum, Senakh, and Zugdidi. The country corresponds to the ancient Colchis; and Izgaur or Iskuriah on the Black Sea coast, which was the capital during the period of Mingrelian independence under the Dadian dynasty, is to be identified with the ancient Dioscurias, a colony of Miletus. The Mingrelians (still almost exclusively confined to the Mingrelian territory, and numbering 197,000) are closely akin to the Georgians. See CAUCASUS, vol. v. p. 257, and GEORGIA.

MINIATURE is a term which by common usage has come to be applied to two different branches of painting.

Derived from the Latin word *minium*, the red pigment used in the primitive decoration of MSS., in the first place it is the technical word employed to describe a painting in a MS.; and, from the fact of such pictures being executed on a reduced scale, it has its secondary and modern signification of a small, or miniature, portrait. In the latter sense it belongs to the general subject of painting. Here it is proposed to trace the development of the miniature in MSS. of the different schools of Europe.

The rise of the art of ILLUMINATION, in which the miniature plays so important a part, has been described under that heading; and something has been said in that place about the earliest extant specimens of miniature painting. Unfortunately we cannot with any certainty reach farther back than the 4th century for the most ancient of them; and all remaining examples between that period and the 7th century in Greek and Latin MSS. can be counted on the fingers. The two famous codices of Virgil in the Vatican Library stand pre-eminent as the most ancient Latin MSS. decorated with paintings. The miniatures in the first of them, the *Codex Romanus*, are large and roughly yet boldly executed paintings, which have no pretension to beauty, and are simply illustrations; but they are as old as the 4th century, and are of the highest value in enabling us to appreciate the debased style to which classical art had descended, and which no doubt was more largely employed than we might think. The second MS., the *Schedæ Vaticana*, which may also be assigned to the 4th century, is far more artistic and retains a good deal of the grace of classic art. Of the same kind, but of rather later date, are the fragments of the *Iliad* in the Ambrosian Library at Milan, the miniatures of which are generally of excellent design. Next comes the Dioscorides of the Imperial Library at Vienna, with its semiclassical portrait-miniatures executed at the beginning of the 6th century. Of a rather later period are the paintings which illustrate the Greek MS. of Genesis in the same library. A far finer and older MS. of the same book of the Pentateuch once existed in the Cottonian Library, but was almost totally destroyed by fire. The few fragments of the miniatures which once filled this volume, and which were of the 5th century, are sufficient to show what excellent work could be done in the capital of the eastern empire, from whence the MSS. most probably came. The late interesting discovery of an illustrated MS. of the Gospels in Greek, of the latter part of the 6th century, at Rossano in southern Italy, adds another number to our scanty list of early volumes of this class, which is closed by the Latin Pentateuch in the library of the earl of Ashburnham. This last MS., however, is not older than the 7th century. It was executed in Italy, and is adorned with many large miniatures, not of high artistic merit, but of great interest for the history of painting and of costume.

Coeval with the MSS. which have just been enumerated are the beautiful mosaics and wall-paintings which are seen at Rome, Ravenna, and in other parts of Italy, serving as standards of comparison and carrying on the history of art where MSS. fail us. The strong and ever-increasing Byzantine element which appears in these works prepares us to find the predominance of the same influence when we again pick up the broken thread of the history of miniature painting. We may then, at this point, turn for a moment to the east of Europe and state briefly what remains of Greek art in MSS. Of Greek miniatures there are still many fine examples extant, but, excepting those which have been noticed above, there are few which are earlier than the 11th century. At this period the miniature appears in the set form which it retained for the next two or three hundred years; and the connexion between its