a definite quantity is measured by weight and dried by heat from boiling water; the remaining powder is then put in cold water and heated. The soluble extract is then decanted off and the residue dried and weighed and the percentage calculated.

The process of diastatic fermentation is by hydration (Hoppe-Seyler), as will appear later on.

Liquid malt extracts are simply weak solutions of ordinary malt, and usually contain a variable proportion of alcohol, a small percentage of carbonic acid, with more or less solid extract, but for none of them can be claimed any distinct diastatic property. These preparations hold in solution the products of diastatic activity, dextrin and sugar, which renders them "sweet" and palatable, while the alcohol is not in sufficient amount to interfere materially with the proper performance of the digestive functions; indeed, in the case of elderly persons, it may prove a decided benefit. Carbonic acid is also acceptable to the stomach; but the percentage of "*solid extracts*" in these products furnishes no criterion as to their intrinsic value, as will be shown presently.

From an examination and analysis of thirteen different samples of liquid malt extracts, Leffmann (*Medical News*, January 28th, 1893) found that all save one contained alcohol in small proportion—none as high as eight per cent.,—and that the solid extract ranged from 5.1 gm. to 16.06 gm. for each 100 c.c. Moreover, three of the samples contained appreciable amounts of salicylic acid.

Adulteration.—The temptation to sophisticate malt arises from the great care required in the process of malting; if the diastatic power be destroyed by excessive heat, the malt possesses no nutritive or digestive value. Again, in sections of the country where malting is extensively carried on, manufacturers may employ "ungerminated" grain; *i.e.*, grain that has been subjected to "heating," and has thus lost its vitality. As a result of wet seasons, therefore, malt may be of a very inferior quality—possessing but slight diastatic power, yet showing a large percentage of insoluble matter.

Most serious objections are urged against the employment of salicylic acid as an antiseptic, since it is harmful if taken in too large quantities or too long continued, and besides, like all other antiseptics, it arrests or suspends diastatic activity. Now, while this is true in general, it may not apply uniformly to malt-takers and beer-drinkers, because we know that even in the absence of diastatic power this class generally present a rotund, florid, sometimes a bloated appearance—due to the deposit of fat from the absorption of sugar—and frequently suffer from rheumatic affections; hence the introduction of salicylic acid free from impurities may possess negative value: (1) by enacting the rôle of an antiseptic in the alimentary canal, (2) by lessening the diastatic activity, thereby preventing the rapid conversion of starch, and (3) by its influence upon the rheumatic diathesis. This leaves, then, for the liquid malt extracts containing salicylic acid, nothing of special value except the converted sugar and a small proportion of alcohol.

Incompatibles.—The following table (after Hermann Meyer and Brunton) is introduced to show the strength, in watery solution, of the different drugs which arrest the action of diastase, from which it will be observed that while chloroform and creosote, even in saturated solution, have very little or no deleterious effect, corrosive sublimate in a solution so weak as 1 to 50,000 destroys the ferment. Thus salicylic acid in the proportion of one grain to ten ounces (approximately) is sufficient to arrest the action of diastase:

Alcohol, 1 to 3.	Corrosive sublimate, 1 to 50,000.
Benzoate of soda, 1 to 100.	Creosote, no action in sat. sol.
Benzoic acid, 1 to 1,025.	Eucalyptus oil, acted only in excess.
Borax, 1 to 100.	Glycerin, 1 to 2
Bromine, 1 to 5,070.	Iodine, 1 to 4,125.
Carbolic acid, 1 to 90.	Mustard oil, only lessens action in sat. sol.
Chloride of lime, 1 to 6,613.	Salicylic acid 1 to 5,100.
Chlorine, 1 to 7,411.	Sulphurous acid, 1 to 8,600.
Chloroform, slight action in sat. sol.	Thymol, slight action in sat. sol.
Copper sulphate, 1 to 6,500.	

Physiological Action.—From the preceding remarks it will be apparent that there is comparatively little to add in regard to the physiological action of malt, either from the standpoint of the clinician or from that of the physiologist; and yet that little is of paramount importance. Malt performs a twofold action in that it is a digestive and nutrient, its virtues being augmented by hydration. Digestibility is the prime element in all foodstuffs, but concentration may seriously interfere with absorption; hence the importance of dilution by water, which is the most efficient medium for the transmission of pabulum through the secreting structures of the alimentary tract (endosmosis). Thus, while concentration is an important factor entering into questions relating to the manufacture and transportation of food products, the very opposite is essential to insure rapid absorption and easy assimilation. But the increased consumption of carbohydrates, while it increases the amount of fat, is at the expense of muscular structures which require nitrogenous material for the maintenance of their integrity, and therefore too much dependence must not be placed upon the apparent gain secured by the administration of malt and predigested foods of this character. Indications of their unfavorable effects will be manifested by acidity, hepatic and cardiac derangements, and constipation, along with mental hebetude and other evidences of imperfect metabolism.

Contraindications to the employment of malt preparations in the treatment of children's diseases, more especially those peculiar to summer and autumn, should be noticed, viz.: evidences of fermentation in the stools. When this condition is present, carbohydrates must be omitted and nitrogenous food substituted.

The dangers arising from the small percentage of *alcohol* in the liquid malt extracts have been unduly magnified, as we have ample evidence of its value as a reconstructive. In suitable amounts—*with meals*—alcohol improves the appetite, favors digestion, lessens the elimination of phosphorus, and promotes the excretion of urea, thus enhancing muscular capacity; but we must bear in mind also that alcohol *lessens oxidation*—a conservative process in certain wasting diseases,—although an effect to be avoided in health. Its obtunding influence upon the nervous system is likewise of medicinal importance, and in the administration of malt preparations we should never lose sight of the physiological functions of the organism, our sole object being to restore and maintain its integrity by the exhibition of remedies adapted to its wants.

There is still another important factor to be considered in connection with the physiological functions of malt. For example, a considerable percentage of cod-liver oil can be incorporated with it in such a manner that the compound is tolerably stable while freely miscible with water, and therefore readily assimilable by the digestive apparatus. Now, bearing in mind that malt contains more or less gluten, perhaps a little dextrin, together with some unconverted starch and *insoluble extract*, it is not unreasonable to believe that under normal conditions the contents of the intestine may approach the type of a mucilaginous substance, possessing cohesive properties, and whose viscosity will prove of value in preventing the absorption of poisonous products from the alimentary tract. Physicians readily appreciate the value of starch enemata in irritable conditions of the lower bowel, although but few understand the *modus operandi* by which these benefits are secured. Starch enemata are of service, not merely because they have a quieting effect upon the terminal filaments of sensory nerves in the mucous structures, but rather on account of their adhesive qualities, which enable them to lay hold of poisonous substances in the course of elimination, thus preventing them from coming into contact with the delicate and inflamed tissues. While the old idea has long been accepted as a clinical fact, it was nothing more than a temporary hypothesis or makeshift, and is promptly set aside to make room for the scientific fact upon which it depends.

And just here should be pointed out the marked similarity or analogy between the conditions which obtain in the small intestine when malt is administered and that of the lower bowel when a starch enema is introduced. This explanation not only sheds a new light upon the incidental physiological action of malt, but it puts the entire theory of the therapeutic action of emulsions upon a scientific basis, in keeping with the results of clinical observation. Heretofore the causes which were actually responsible for the wonderful improvement following the exhibition of comparatively small quantities of malt, cod-liver and petroleum oils, as well as other remedies in the form of emulsion, have been scarcely realized, because the physiological functions of the emulsionizing agents were overlooked or but imperfectly understood. Notwithstanding the fact of its being a negative virtue, it is, nevertheless, a factor of material significance.

Therapy.—The most important therapeutic application of malt consists in its employment for the relief of *intestinal affections* dependent upon imperfect intestinal digestion of starchy foods and subsequent fermentation. In this class of cases the carbohydrates should be restricted, bread only being allowed, and the patient instructed to masticate it thoroughly in order to incorporate with it the *ptyalin* of the saliva, which serves to break up the starch granules before entering the stomach.

Occasionally *amylopsin* may be added with benefit. This method of treatment will be found available in a very large number of cases of intestinal indigestion associated with *chronic disease*, especially *pulmonary affections*, because, as has already been shown, carbohydrates are fat-producers. They do not, however, increase the capacity of the muscular system, and may therefore do harm by lessening oxidation and obstructing elimination. Shortness of breath, cardiac weakness, or hepatic insufficiency with acidity of the stomach and diminished urinary excretion demand their prompt discontinuance and a complete rearrangement of the dietary.

Malt enjoys deserved popularity as an adjuvant in *convalescence* from protracted illness, as an auxiliary and digestive in the case of *nursing women*, and to a limited extent in the treatment of all *debilitated conditions* of the system; but its continuous or indiscriminate use will eventually result disastrously. Like all other remedial agents, its medicinal employment requires the discriminating judgment of the conscientious and intelligent physician.

In the treatment of *summer diseases*, in both adults and children, malt possesses a high degree of utility, but it is adapted only to the cases in which the stools are putrid and foul-smelling. When the stools are sour-smelling, due to starchy fermentation, malt and malted products are of secondary importance, as they have no influence upon the micro-organisms or other poisons associated with the intestinal disorder. Indeed, there is good reason to believe that the popular method of treating this class of affections by the exhibition of "*barley water*" has been productive of greater mortality rates than would have occurred had all treatment been abandoned. Science absolutely condemns the practice, and clinical observation emphatically indorses her teachings. The personal experience of Dr. Benjamin Ward Richardson, published in the *Asclepiad* some years ago, covering the untoward effects of oatmeal and barley water, should be critically studied by every general practitioner.

Administration.—Malt (U. S. P.) may be given in doses of *one or two drachms*, either with meals or two hours later. Liquid malt extract should be given *with meals*—one or two wineglassfuls.

To meet special demands in the case of malnutrition, malt may be combined with a number of reconstructive medicaments, as follows: Malt with quinine, iron, and strychnine; malt with hypophosphites; malt with peptone; malt with cod-liver oil—but not to exceed the proportion of *ten per cent.* *John Aulde.*

MALTA FEVER.—(Synonyms: Levant fever, Mediterranean fever, Neapolitan fever, Rock fever of Gibraltar, undulant fever, bilious remittent fever, etc.)

Definition.—A disease of long duration, characterized clinically by fever, profuse perspiration, constipation, frequent relapses, often accompanied or followed by pains of a rheumatic or neuralgic character, sometimes swelling of joints or orchitis; anatomically by enlargement and softening of the spleen, congestion of the various organs, no enlargement or ulceration of Peyer's patches or other intestinal glands, and the constant occurrence, in various tissues, of a species of micro-organism—the micrococcus melitensis.

Geographical Distribution.—It occurs most frequently in the countries bordering on the Mediterranean, but these limits are being gradually extended. It has been recognized in certain parts of India, in one or two parts of the British Islands, and in Porto Rico. Strong has reported (*Philadelphia Medical Journal*, 1900) a case in Manila, Philippine Islands. Brunner (*Wiener klinische Wochenschrift*, 1900) describes a case which occurred in South Dalmatia. It has been found in the islands of the Caribbean Sea, and in Hong-Kong.

Etiology.—The micro-organism was first discovered by Bruce in Malta in 1887. It is never transmitted directly from person to person. With our present knowledge it is impossible to say how the poison gains extrance into the organism.

Symptoms.—The period of incubation is not definitely known, but it extends probably from a few days to thirty. The onset is gradual, with feelings of malaise, constipation, headache, anorexia, perspiration, etc. This lasts for from one to two weeks, when the long and monotonous period of the fever begins. The patient is dull, apathetic, without delirium, and anæmic. Constipation is obstinate. The alternating febrile and afebrile periods which characterize the disease continue for from two months to two years. The temperature range shows intermitting waves or undulations of fever of a distinctly remittent type. These periods of fever last for from one to three weeks, followed by an apyretic period, or a period of abatement, lasting for from two to ten days. The daily curve may be intermittent or remittent. Profuse sweats attend the decline of the daily range. The spleen is very large. Although the temperature often ranges high, the patient has no delirium nor restlessness. Neuralgias occur in various parts of the body. The different joints of the body may become red, swollen, and tender, but suppuration in them does not occur. Orchitis may be troublesome and anæmia extreme. Vomiting is usually not marked but constipation is obstinate. Some bronchitis is almost always present.

Hughes divides the cases into four types: 1. The malignant type, which lasts for a week or ten days, and in which hyperpyrexia is marked. 2. The undulatory type, in which the fever goes in waves. This is the most frequent variety and the course of the disease is long. 3. The intermittent type, in which there is a daily rise of fever without other marked symptoms. 4. The irregular types.

Prognosis.—The prognosis, so far as life is concerned, is favorable. The mortality is about two per cent.

Diagnosis.—This can be positively made, according to Wright and later authors, by means of the serum agglutination reaction. Thus, in one case, on the tenth day of the disease, the blood serum showed a marked agglutination of the specific micro-organisms, in a dilution of 1 to 60, in the course of twenty minutes. Even higher dilutions than this have produced it. Aldrich states that the reaction first occurs on the fifth day. The serum of such a patient does not have any effect upon the typhoid bacillus nor upon other organisms. By puncture of the spleen with an aspirating needle one can obtain a clear colony of the micrococcus melitensis. Malta fever differs clinically from typhoid fever principally in being of longer duration, in the absence of the characteristic roseola, in constipation being the rule instead of diarrhœa, in the frequent presence of painful articular complications, in the much larger size of the spleen, in the absence of the diazo and Widal reactions, in the absence of the bacillus typhosus from the stools, in the free cerebrum, and

finally in the much smaller rate of mortality. Microscopical examination of the blood will exclude malarial and recurrent fevers. There are usually no symptoms which point to tuberculosis, malignant endocarditis, internal suppuration, or liver abscess. The urine and sputum are negative.

TREATMENT.—This consists principally in prophylaxis. All the sanitary arrangements of the house should be carefully gone over and put in healthy condition. Personal health should also be attended to. There is no specific medicinal treatment known for combating this fever and drugs are not of much avail. Quinine and the salicylates have been extensively used but with no beneficial influence. On the contrary, the effect has been deleterious when pushed as they have been. A careful diet and hydrotherapy are our main reliances.

Clarence Arthur McWilliams.

MALVA and **MALVACEÆ.**—This large family, of some thirty-three genera and nearly a thousand species, has yielded a large number of articles to the Materia Medica, besides *cotton* and *marshmallow*, which are elsewhere described. The most important of these substances are the leaves and flowers of the Hollyhock, *Althæa rosea* (L.) Cav., and of various species of *Malva*. All have been used chiefly as demulcents, for the mucilage with which they abound, the flowers also for their coloring matter, in coloring tinctures and other preparations. Their properties are thus of the simplest possible character and this brief mention is accorded them on historical, rather than on any practical grounds.

Henry H. Rusby.

MANACÁ.—*Mercurio Vegetal.* Preferably the root, but also the stem, of *Brunfelsia Hopeana* Benth. (fam. *Solanaceæ*).

It contains resin, gum, tannin, and probably an alkaloid, in small amount.

Manacá is a well-accredited drug throughout Brazil in the treatment of syphilis, but this repute is apparently due, for the most part, to erroneous diagnosis. It is also credited with antirheumatic properties. Several attempts have been made to develop its use in this country, but with little permanent result. There is, however, a small steady sale for it and its preparations. Certainly, when given in large quantity it has very active properties, being purgative, diaphoretic, and narcotic. Its continued use by those who have had experience with it at least justify a credence in some alterative virtues. The dose is 0.45 to 2 gm. (gr. viij.–to xxx.).

Henry H. Rusby.

MANGANESE.—I. GENERAL MEDICINAL PROPERTIES OF COMPOUNDS OF MANGANESE.—In their medicinal relations the compounds of manganese divide into two distinct groups, the one in which the metal is the basic radical of the compound, the other in which, on the contrary, it is the acid radical. The compounds of the former group, after absorption, probably affect nutrition after the general manner of the heavy metals, tending in small dosage to improve blood quality and quicken general assimilation, and, in large, to derange the nutritive processes, leading to emaciation and nerve-poisoning. Locally, the effects differ with the individual compounds according to their solubility. Therapeutically, the constitutional influence of manganese has been sought as an adjuvant to that of iron, largely upon theoretical grounds, because of the alleged presence of manganese, in small quantity, in association with iron in the composition of hæmoglobin. Doubtless the influence in cachectic states is good so far as it goes, but doubtless also it is, in degree, insignificant as compared with that of iron, with which medicine manganese is, for the present purpose, almost invariably prescribed. Physicians generally have, therefore, failed to see the necessity for combining a salt of manganese with their chalybeates. Locally, the therapeutics of the compounds of manganese are individual to the compounds, and will be detailed below.

The second division of the manganese compounds, where the metal occurs in the acid radical, is represented in medicine by but a single salt, namely, *potassium permanganate*, whose virtues inhere mainly in the property of permanganates to act as oxidizing agents, as will be set forth further on.

II. THE PREPARATIONS OF MANGANESE USED IN MEDICINE.—These are, of manganese as basic radical, *manganese dioxide* and *manganous sulphate*, and of the metal as an acid radical, *potassic permanganate*.

Manganese Dioxide: MnO_2. This compound, commonly known as *black oxide of manganese*, is a native mineral, and of a quality representing at least sixty-six per cent. of the pure oxide, is official in the United States Pharmacopœia under the title *Mangani Dioxidum*, Manganese Dioxide. The mineral differs a good deal in appearance according to the source from which it is derived. It occurs sometimes in metallic-looking lumps, sometimes in fine shining crystals—the form in which it is purest—but yet is most commonly found in the condition of powder. This powder is heavy, grayish-black in color, more or less gritty and without odor or taste. It is insoluble in either water or alcohol. At a red heat it gives off oxygen gas. Manganese dioxide, as usual with the insoluble metallic oxides, is locally bland, and in the stomach tends to allay irritability of that organ. Continuously given, it is capable of absorption, with constitutional effects of manganese. Medicinally, the oxide has been applied in skin disease, in ointment (twenty-five per cent. strength), and has been given internally in gastric irritation; but its grittiness makes it an unpleasant medicine to take in form of powder. The average dose is 0.65 gm. (gr. x.) three times a day. Much more important than any medicinal application is the use of the dioxide in the laboratory, in the preparation of oxygen gas, chlorine, and also of iodine, when the latter is obtained from kelp.

Manganous Sulphate: $MnSO_4.4H_2O$. The salt is official in the United States Pharmacopœia as *Mangani Sulphas*, Manganese Sulphate. This salt occurs in colorless or pale rose-colored transparent prismatic crystals, which may contain variable proportions of water of crystallization according to the temperature of the mother solution. The Pharmacopœia recognizes crystals containing four molecules of water of crystallization. The salt dissolves in less than one part of water, cold or boiling, but is insoluble in alcohol. It effloresces slightly in dry air and should be kept in well-stoppered bottles. Manganous sulphate is sharply irritant and specifically purgative, and has the reputation of being also specifically cholagogue. This latter reputation is based largely on an old assertion of C. G. Gmelin, that in experimenting with animals with the salt, a considerable outpouring of bile was determined. Rutherford's later and careful experiments, however, failed to produce a like effect. In large dose, manganous sulphate is an irritant poison. Medicinally, the purgative and alleged cholagogue action have been utilized by some prescribers, but since the salt is harsh in action and disagreeable to the taste, its use as a medicine has not found much favor. From 0.65 to 1.30 gm. (gr. x.–xx.) is a full purgative dose, not to be exceeded.

Potassium Permanganate: $K_2Mn_2O_8$. The salt is official in the United States Pharmacopœia as *Potassii Permanganas*, Potassium Permanganate. It occurs in deep purple-violet, or nearly black, needle-shaped, rhombic prisms, of a metallic lustre, without odor, but with a sweet, afterward disagreeable, astringent taste. It is permanent in the air; dissolves in 15 parts of cold and in 3 parts of boiling water, and is decomposed by alcohol. Weak solutions of potassium permanganate are of a delicate rose color, which should be free from tinge of green. Strong solutions are of deep purple, and have the troublesome property of staining, not only fabrics, but the skin; and even porcelain-ware will be colored a rusty purple under sufficient contact. Potassium permanganate in strong application is irritant and even caustic, but its medicinal application hinges mainly on its peculiarity

of being a powerful oxidizing agent, because of the ready disengagement, in presence of oxidizable matters, of a portion of the oxygen of the permanganic acid. By virtue of this property the salt promptly destroys fetor and fetid materials as such, and is one of the most efficient agents known for such purpose. Its disadvantages are its comparative costliness and proneness to stain. Because of its oxidizing tendency, it is necessary to keep the compound in well-stoppered bottles, and to avoid admixture with it of organic or other easily oxidizable matters. Trituration of the crystals with inflammable substances may even determine explosions. Potassium permanganate is a valuable detergent for foul surfaces, as of sloughing wounds, ulcerated cancers, etc., and is applied in aqueous solution ranging from one-fifth per cent. to four per cent. in strength. The weaker solutions are used where a mere deodorizing is sought, the stronger where a vital action also is desired, as in the case of gangrenous ulceration. To sweeten foul drinking-water a solution of the salt may be added to the water gradually, so long as the color is discharged on stirring, a circumstance that will continue as long as any organic matter remains unoxidized. So soon as the coloration persists, even in faintest shade, further addition is to be discontinued. The small percentage of permanganate then remaining in excess will neither be perceived in taste, nor will it do any harm. Solution of the permanganate is an excellent disinfectant by which to cleanse and sweeten water-closet traps, etc. For this purpose the impure salt, which is much cheaper than the pure, may be used. A drachm or so of the impure crystals may be dropped into the water of a water-closet trap and allowed to remain for a few minutes, when the trap should be flushed. Care should be taken not to leave a strong solution in contact with marble or porcelain for any length of time, lest staining occur. Potassium permanganate has been used internally in zymotic diseases, presumably with the idea of chemically assaulting the virulent essence of the same; but inasmuch as any allowable dose of the salt must inevitably exhaust its oxidizing capacity while *en route* through the organic matters of the alimentary canal to the vascular system, the practice has not even a sound theoretical basis to justify it. The doses given are from 0.015 to 0.06 gm. (gr. ¼ to i.) three times a day, taken in solution in distilled water. More recently, Ringer and Murrell have announced success with the internal use of potassium permanganate as an emmenagogue, giving the medicine in doses of a grain, increased to two grains, three or four times a day. Similar success has since been reported by a number of other practitioners, and success also with certain cases of menorrhagia and metrorrhagia, as well as of amenorrhœa (F. H. Martin). The medicine is best borne in pill form, but even when so taken occasionally produces a good deal of gastric distress. Because of the powerful oxidizing property of the permanganate, care must be taken in the selection of excipients for making the medicine into pills. The following has been recommended as an excipient: "Vaseline, two parts; paraffin-wax, one part; melt, stir till cold, and add kaolin, three parts; mix well." The pills, after being made, are to be dusted with kaolin.

The permanganate decomposes alkaloids, by oxidation, and has been recommended, accordingly, for internal giving in cases of alkaloidal poisoning, in order to destroy such of the poison as may still be present in the stomach. Similarly it has been recommended to inject a solution of the permanganate into the tissues of a part bitten by a venomous snake, if the application can be made soon after the infliction of the bite.

Edward Curtis.

MANGANESE SALTS, TOXICOLOGY OF.—The salts of manganese are in general feeble poisons, though some of them have decided toxic action. After subcutaneous injection, excretion occurs chiefly by the kidneys and mucous membranes of the stomach and intestines. Manganese compounds have been found in traces in the hair, urinary calculi, and gall stones.

Manganese oxid (MnO), in doses of 6 to 8 mgm. per kilogram, administered to dogs proved fatal in two days; 13 to 24 mgm. per kilogram caused death in twenty-four hours.

Manganese dioxid (MnO_2), used in paints, has caused paralysis of the arms and legs and of the organs of speech that either disappeared after several years or not at all.

Manganese sulfate caused vomiting in dogs, and paralysis in rabbits, and after being injected into the veins, it produced vomiting, loss of appetite, and tetanic cramps. Four grams caused death in rabbits.

Manganese-sodium basic citrate caused symptoms similar to those due to the sulfate, with paralysis of the vaso-motor centres, icterus, loss of motor power and sensibility, and coma.

Manganese carbonate, from experiments on rabbits, appears to be non-poisonous.

Potassium permanganate, in a quantity of from 15 to 20 gm., caused death in twenty-four hours in a case of suicide. After the internal medicinal use there have been observed pain in the mediastinum extending to the stomach, vomiting, and abortion. The application of a four-tenths-per-cent. solution to the mucous membranes caused inflammation, hemorrhage, and suppuration. In cases of poisoning by manganese salts, evacuation of the stomach, intestines, and kidneys by emetics, purgatives, and diuretics, and the use of heart stimulants when indicated, offer the best treatment.

To recover manganese from the tissues, these are treated as in the method of Fresenius and Babo, and after the removal of any metals whose sulfids are insoluble in acid solutions the filtrate is rendered alkaline with ammonium hydroxid and the manganese precipitated with ammonium sulfid as flesh-colored manganese sulfid. Re-solution and reprecipitation will doubtless be necessary to remove the last traces of organic matter.

Curtis C. Howard.

MANHATTAN ARTESIAN WELLS.—Riley County, Kansas.

POST-OFFICE.—Manhattan. Hotel.

These wells are located in a hilly country, eleven miles southeast of the town of Manhattan, and at an elevation of about 800 feet above the sea level. The wells are two in number, and discharge about 24,000 gallons of water daily. This is of the sulphated-saline variety, and has a uniform temperature of 55° F., summer and winter. The following analyses were made by Professor Failyer of the Kansas Agricultural College:

WELL NO. 1 (MINERAL WATER).

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium oxide { (as bicarbonate)	5.27
Calcium oxide { (as sulphate and chloride)	33.36
Magnesium oxide (as sulphate)	5.65
Iron oxide (bicarbonate)	.18
Sodium (as chloride)	.51
Potassium	Trace
Sulphuric acid (anhydrous)	61.36
Chlorine	1.46
Bromine	Trace
Silica	10.00
Lithium	Trace
Total	117.88

WELL NO. 2.

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium oxide { (as bicarbonate)	6.07
Calcium oxide { (as sulphate)	14.69
Magnesium (as sulphate)	6.58
Iron (as bicarbonate)	.24
Sodium (as chloride)	.86
Potassium	Trace
Sulphuric acid (anhydrous)	33.11
Chloride	1.79
Silica*	10.18
Total	73.52

*According to United States Geological Reports Well No. 2 contains 1.19 grains of Silica per United States gallon.