Medical chemistry; or, a compendious view of the various substances employed in the practice of medicine, that depend on chemical principles for their formation; designed for the use of medical students. To which is appended, a discourse on the medical character / By Thomas D. Mitchell.

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MEDICAL CHEMISTRY;

OR, A

COMPENDIOUS VIEW

OF THE

VARIOUS SUBSTANCES

EMPLOYED IN THE PRACTICE OF MEDICINE,
THAT DEPEND ON CHEMICAL PRINCIPLES
FOR THEIR FORMATION;

DESIGNED FOR THE USE OF MEDICAL STUDENTS.

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A DISCOURSE

ON THE

MEDICAL CHARACTER.

BY THOMAS D. MITCHELL, *M. D.*
OF PENNSYLVANIA.

1819.

To

The Students of Medicine,

In the United States of America,

This little Volume

Is respectfully dedicated,

By the Author.

Introductory Remarks.

HOWEVER lamentable be the fact, it is nevertheless a truth, that students of medicine very rarely devote much study to the science of CHEMISTRY: *They regard it not only as being non-essential, but as almost superfluous in a medical education. It is for this reason, chiefly, that I have been induced to collect within a small compass, what I deem, not merely important, but absolutely indispensable to the practitioner of medicine, who would discharge the duties of his profession in a conscientious manner: And I cannot but indulge the hope, that students of medicine, on perusing these pages, and discovering how largely their profession is indebted to chemical science, will thenceforth place a higher value on that science, and be led to investigate the principles and the phenomena which it embraces. That man is far*

from being an accomplished physician, who is not familiar with the fundamental principles of chemical science. But still further removed from this enviable character, is he who has little or no acquaintance with that branch of science, which has been so fitly styled, MEDICAL CHEMISTRY.

The performance now presented to the public, lays but little claim to originality. The writer was of opinion, that such a work was necessary, as nothing exactly similar has ever appeared from the American press.

In collecting and arranging the matter, of which this volume is composed, I have endeavoured to be as concise as possible; as it was my intention to form a manual that would be suitable for the student to carry in his pocket, as a book of reference on all proper occasions.

I have but one apology to make for omitting to name the authors, from whose writings I have taken the liberty of making so many extracts; it is, that I had proceeded to a considerable extent in the prosecution of the undertaking, before the idea of noting my authorities occurred to me as a matter of pro-

priety. For the errors that may be discovered by the reader, I must offer the excuse of professional men generally, viz. the impracticability of devoting to a subject of this sort, that attention which its importance demands. How far I have succeeded in the accomplishment of the object, public opinion will determine.

MEDICAL

CHEMISTRY.

BY medical chemistry may be understood, that branch of science which investigates all those substances employed in the practice of medicine, that depend for their formation on the principles of chemistry. The number of those substances is very considerable: And, although we find among them a few that are only occasionally used, and by some physicians never employed, yet by far the greatest number must be regarded as indispensable to the practitioner of the healing art.

In enumerating the various objects of medical chemistry, it has been thought advisable to pursue as far as practicable, some such arrangement as that adopted by most writers on elementary chemistry. This plan will be most likely to fix the attention of the student, and so assist him in the prosecution of his studies. With this view, I shall observe the following order, as a guide in the present work. I shall consider,

Chapter I.

CHAPTER I.

PART I.

Of the Gasses employed in Medicine and their mode of preparation.

The records of medicine furnish numerous facts, favourable to the pneumatic practice, formerly pursued by many respectable physicians. That practice had its origin in the highly diffusible and penetrating quality of gasseous bodies. And it may be questioned, whether the practice was not too hastily discarded, and whether it might not now be re-

vived with considerable advantage. At present, physicians seldom, if ever, administer the gasses in a separate state, though some of them are frequently employed in a state of combination, with very beneficial effects.

It will not perhaps be deemed superfluous, to notice briefly a few of those bodies, which, from their known properties, promise to be productive of considerable effects in the animal machine. Of these the first is,

Oxygen Gas.

This gas has been employed with a view of increasing the excitability of the system, and has sometimes been tried for this purpose in cases of suspended animation. I do not know, however, that an experiment of the kind, has ever been fairly made; and it is certainly one that deserves attention, and should be performed whenever a suitable opportunity presents. A difference of opinion has prevailed in relation to its mode of operation, many physicians advocating its stimulant, others its sedative power; nor can the question be decided in any other way, than by repeated experiments to ascertain the effects of its agency on the systems of living animals. Dr. James Stuart, formerly of Philadelphia, in the notes to his edition of "White's Essay on Colds," has endeavored

to prove that the gas is directly sedative, and it must be confessed that his arguments have at least plausibility to support them.

There cannot be a doubt, but that oxygen gas might be so administered, as to be productive of the happiest effects in many cases of disease, for it is unquestionably an agent that is capable of operating powerfully on the animal machine. Indeed the fact of its absolute indispensability to health very naturally suggests the possibility of its efficacy in subduing the irregular actions attendant on, and productive of, disease.

"I have been," says the truly scientific Chaptal, "a witness of the most wonderful effects of this gas, in a case of confirmed phthisis. Extreme weakness, profuse sweats, diarrhæa, and in short every symptom announced the approach of death. The patient was immediately put on a course of oxygen gas. He respired it with delight and asked for it with all the eagerness of an infant at the breast. During the time of respiring the gas, he felt a considerable heat which distributed itself through all his limbs. His strength increased rapidly, and in six weeks he was able to take long walks. This state of health lasted for six months, but being no longer able to get a supply of the gas, he soon after died."

An agent capable of producing such happy consequences in a disease so generally regarded as incurable, certainly merits our most careful attention. We know that some of the forms of disease that affect the viscera of the thorax, do depend on an imperfect oxygenation of the blood, and it is perfectly reasonable to suppose that the administration of this gas in such cases, might be a source of relief and perhaps eventuate in a complete restoration to health.

For the purposes of medical practice, this gas may be prepared from the black oxyde of manganese, by exposure to a pretty strong heat. Introduce into a retort, a quantity of manganese in coarse powder, and having poured in about half its weight of strong sulphuric acid, apply the heat of an Argand's lamp, and the gas will be driven off rapidly.

There are other modes detailed in the books of chemistry, some of which yield this gas more plentifully and with greater rapidity; but from none of them can it be obtained in a state of greater purity, than from the substance above mentioned.

To collect the gas, have in readiness a glass vessel similar to a stoppered half-gallon bottle, open entirely at the bottom. To the stoppered end of this vessel fit a piece of cork perforated so as to receive the end of a stop-cock.—

Procure also an ox bladder, with a stop-cock fastened to it, for the purpose of inhaling the gas. As soon as the gas begins to come over, invert the glass vessel filled with water over a vessel containing that fluid, having previously adapted the stop-cock of the bladder to the cork placed in the mouth of the glass vessel. Then place the beak of the retort under the bottom of the glass vessel and the gas will rise in it and displace the water. The vessel being now filled with gas, turn the stop-cock and the gas will pass into the bladder and fill it, after which the stop-cock must be again turned. The bladder may now be taken for the purpose of administering the gas, which may be inhaled by means of the stop-cock.—If it be desirable to have the gas quite pure, it will be necessary to evacuate the bladder entirely of its contents, previously to adapting it to the glass vessel; but if it be deemed proper to dilute the gas, the bladder may be partially compressed, by which means, a portion of atmospheric air will remain in it, sufficient to reduce the strength of the gas to a proper degree.

Oxygen gas is a compound of oxygen, and caloric or the matter of heat, and enters into the composition of water and of the air we breathe. It was discovered by Scheele and Priestley, in different countries about the same time, and was by them called *dephlogis-*

ticated air, or air deprived of phlogiston. It is also known by the name of *vital air*.

In the oxyde of manganese, the oxygen exists in a solid form. By the agency of heat it is separated from the man ganese and is converted into gas.

Nitrogen gas was formerly administered with some success in cases of increased excitability, as in inflammations; but physicians have now entirely laid it aside.

It is usually obtained by the decomposition of atmospheric air, by means of some substance that is capable of absorbing its oxygen and carbonic acid. These being absorbed, there remains in the vessel employed in the process, nothing but nitrogen, that being the other ingredient in the constitution of atmospheric air. The absorbing substance usually employed is a mixture of iron filings and sulphur, moistened with water.

Of Nitrous Oxyde Gas.

This gas has been introduced in a partial degree into the practice of medicine, and there is some reason for believing that it might be rendered highly useful to the medical practitioner. From its well known effects of exhilarating the spirits, it was supposed, that the nitrous oxyde might be useful in most

cases in which stimulants are administered, as it is undeniably a direct stimulus.

One of the most extraordinary properties of this gas is exhibited by its action on the human body, when received into the lungs. When thus employed it does not prove fatal to life, because, in respiration it is mixed and diluted with the atmospherical air contained in the lungs. To administer the gas, it may be introduced into a bladder or oiled silk bag, furnished with a stop-cock, and may be inhaled, as long as any remains in the bladder. The sensations produced vary greatly in persons of different constitutions; but, in general, they are highly pleasurable and resemble those attendant on the pleasant moments of a fit of intoxication; differing from the latter however, in their failure of producing subsequent depression of the nervous system.

To prepare the nitrous oxyde gas, proceed in the following manner: Take nitric acid diluted with five or six parts of water and add carbonate of ammonia until the acid is completely saturated. Then evaporate the solution; and to supply the waste of alkali, add, occasionally, a little more carbonate of ammonia. The salt obtained, when the solution has cooled, is next to be put into a glass retort, and distilled with a sand heat, not exceeding 440° Fahrenheit. The heat of an

Argand's lamp is more than sufficient, and requires cautious regulation, but with proper management it will answer the purpose sufficiently well. The salt will shortly liquify, and must be kept gently simmering, avoiding, however, violent ebullition. The gas may be collected over water in the manner mentioned when speaking of oxygen gas, and may, in a similar manner, be transferred to the gas bladder.

In procuring this gas, the nitrate of ammonia is decomposed. The nitric acid of the nitrate, is resolved into oxygen and nitrogen; and the ammonia into hydrogen and nitrogen. Part of the oxygen combines with the hydrogen and forms water, while the remainder of the oxygen combines with the nitrogen and forms an oxyde of nitrogen. And as these substances are in the state of gas, the product is the gaseous oxyde of nitrogen.

This gas was discovered by Dr. Priestley in 1776, and called by him *dephlogisticated nitrous gas*. It is a compound of oxygen, nitrogen and caloric, and has been called the gaseous oxyde of nitrogen.

Carbonic Acid Gas.

Notwithstanding the highly deletorious quality of this gas, it has been employed by

some physicians as an internal medicine, and in this way has been found of considerable utility. It fails to exhibit deleterious properties when applied to the nerves of the stomach, or to any other part but the lungs. On the contrary, we have daily experience that it is grateful to the stomach, and has a most agreeable, refreshing and cooling effect, when applied there. This appears, both from the effects of acidulous waters on the stomach, and from that of very brisk fermented liquors, as mead, &c. which are very grateful in hot climates. Even to the lungs, fixed air or carbonic acid gas may be applied, not only with safety, but even with advantage, as we learn from practitioners who have tried it in cases of ulcerated lungs: But it must be diluted with at least four or five times its bulk of atmospherical air, for it could not be respired in a greater degree of purity, without imminent danger to life.

Physicians were led to administer this gas in consumptive cases, from observing the happy effects resulting from its use in very bad ulcers of the extremities, where it proved a happy stimulant, and a powerful corrector of the foul effluvia which such ulcers often emit.

Several medical men have published the result of their practice in relation to the use of fixed air in consumptive diseases and in

old, ill conditioned ulcers; and the general opinion appears to be much in favor of its administration.

To procure carbonic acid gas, we introduce into a vial supplied with a perforated cork, a quantity of powdered chalk and sulphuric acid. The gas instantly begins to escape, and may be collected in the gas bladder, as in the former cases, by adapting the stop-cock to the cork affixed to the vial.

In this process, the chalk, which is a carbonate of lime, is decomposed. The sulphuric acid combines with the lime and falls down in an insoluble powder, while the carbonic acid gas escapes.

This acid was discovered by Dr. Black, and by him called *fixed air*. It is a compound of carbon, oxygen and caloric.

It will not, perhaps, be foreign to the object of this work to notice a particular form in which carbonic acid gas is advantageously administered in medical practice. My allusion is to the article so common in domestic economy, known by the name of *yeast*. In low states of fever, as for instance in the cases of typhus that formerly prevailed so generally in our country, the carbonic acid gas, in the form of brewers' yeast has been eminently serviceable. Given in the dose of a

table spoonful every half hour, its agency in raising the pulse and exhilerating the system, has been truly astonishing. There is, perhaps, no mode of exhibiting this gas that is calculated to be productive of such obvious benefit as that of which I have just spoken.

Of the long list of gasses commonly noticed in chemical books, there are none in use among physicians, besides those on which the few preceding remarks have been made; and yet, from the known properties of many of those gasses, it is perfectly reasonable to believe, that under proper modifications and restrictions, they might richly merit a place in our books of Materia Medica.

PART II.

Of the waters used in medicine, natural as well as artificial.

Water is a substance of almost unlimited utility in the practice of medicine. As a vehicle or menstruum, it is of the greatest importance, since, without it, the physician would be unable to proceed in his professional business: Nor, is it thus simply that water is important; but it is frequently used in a separate state, with evident advantage.

When internally employed, it may, in consequence of decomposition, produce many effects of which we are ignorant—and when externally applied in the various forms of ablution, affusion and immersion, its agency is so obvious, as to be denied by no one.

Perfectly pure water is insipid and inodorous, and yields to analysis, nothing but oxygen and hydrogen gasses in the proportion of 85 of the former and 15 of the latter, in every 100 parts.

Water is never presented to us by nature in a state of absolute purity. Even when collected as it descends in the form of rain, chemical tests detect in it, a minute proportion of foreign ingredients: And, when it has been absorbed by the earth, has traversed its different strata, and is returned to us by springs, it is found to have acquired various impregnations.

Waters, in their native state, very frequently contain earthy, akaline or metallic matters in solution; and it is from the predominance of one or other of these articles, that the water generally derives its particular name. Thus we have a variety of *Chalybeate* waters, whose medicinal properties are dependant on the iron they hold in solution. We have also waters,

whose characteristic qualities are owing to the presence of carbonic acid gas, as, for example, the *Seltzer* water.

All the natural waters have been closely imitated by art, and hence we have a variety of waters called *artificial*. In addition to these, there are very many medicinal waters noticed in dispensatories, some of which are formed chemically and others not so. Of this sort, the French systems of medicine enumerate a great variety, of which, however, but few deserve the smallest notice.

The *artificial Seltzer water*, made by means of an apparatus which causes simple water to absorb a large quantity of carbonic acid gas, is extensively employed in medicine. The water thus prepared, sparkles on being drawn from the vessel containing it, and has a sharp, moderately acid, and, upon the whole, a pleasant taste. It is extremely grateful to the stomach, and on this account is much esteemed as a delightful beverage.

The *artificial Soda water* is made in a way similar to that in which the Seltzer is prepared, with the addition of carbonate of soda to the process. This water is better adapted than the other to weak stomachs, and is very useful in allaying symptoms of

dyspepsia. The soda contained in it tends to neutralise any acid matters in the stomach, and thus to favor healthy digestion. Of late, soda powders have been manufactured for the purpose of making soda water more expeditiously. One of these powders, thrown into a glass of common water, makes a sparkling glass of soda water, though by no means as lively as that drank immediately from a mineral water fountain. These powders are, most probably, a super carbonate of soda, or soda combined with an excess of carbonic acid. On being thrown into the water, a decomposition takes place, by which the carbonic acid gas is suddenly evolved. The water must be quickly drank, or the gas will be lost.

Soda water is a very useful article in the hands of the medical practitioner. It is eminently successful in allaying vomiting, and in composing the stomach when disposed to evacuate its contents. It is likewise very considerably diuretic, and somewhat sudorific. It is a very convenient menstruum for the administration of glauber's salts or nitre, or indeed almost any of the salts. It lessens considerably the unpleasant taste of glauber's salts, an object of some importance in the treatment of persons who take medicines with difficulty.

This water is sometimes called *aqua alkalina ærata*, or alkaline water containing air.

Water of pure ammonia, called also *aqua ammoniæ puræ*, was known to the ancients by the names of *hartshorn*, *spirit of urine*, *spirit of sal ammoniac*, *&c.* It is water, containing a large quantity of ammoniacal gas, which gas water absorbs with rapidity. To obtain this gas, mix two parts of well burnt quicklime and one of powdered muriate of ammonia, in a retort, and apply a gentle heat. The lime will unite with the muriatic acid of the sal ammoniac and form muriate of lime, while the ammonia will escape in form of gas. If, by means of a glass tube, the gas be conveyed from the retort to a bottle containing water, the gas will be rapidly absorbed, and the water of ammonia will be obtained.

From any of the salts of ammonia we can, in like manner, obtain the ammoniacal gas, by effecting a decomposition of the salt.

Aqua Phagedenica.—This is another medicinal water, that owes its formation to chemical principles; and though formerly much employed, has been, of late, pretty generally laid aside. It is formed, by adding a solution of corrosive sublimate to lime water. The mixture thus made, pro-

duces a compound of a yellow color, which is no doubt the result of decomposition. The corrosive sublimate (muriate of mercury) is partially decomposed, a portion of its muriatic acid uniting to the lime, and forming muriate of lime, to which product we may, with propriety, attribute the yellow color of the mixture, at least to a great degree.

The *aqua phagedenica* was formerly employed as a lotion to old and obstinate ulcers, in which cases it acted as an escharotic. Some physicians still employ it as a lotion in eruptive diseases, especially in some cases of tetter, in which its salutary effects have been very apparent.

We might go on to speak of the *eau de luce*, the *eau medicinale*, and many other waters that were once in high repute with the physicians of France; but it does not seem necessary to enumerate further under this division of our subject. Physicians have learned that most medicines can be administered to more advantage in the solid form, than in the shape of watery or fluid mixture. Hence, we find, that medical men, almost universally, in this country, prescribe powders, pills or tinctures, and the latter less frequently than the former. Nor is it at all improbable, that in a few years, the

solid form of administering medicines will be generally adopted, excepting perhaps a few articles that cannot be given in that way owing to their peculiar nature. The number of tinctures now employed by American physicians, contrasted with the long list to be found in dispensatories, does not perhaps bear a greater proportion than one to ten.

PART II.

Of Acids.

This class of bodies presents to the medical practitioner but few articles of importance. In the simple state, that is undiluted and uncombined, the acids are never administered, excepting occasionally as external applications.

Of Nitric Acid.—This acid was some time ago highly extolled as a remedy for venereal and hepatic disease. It was generally prescribed in combination with water, a little sugar being added to render it pleasant to the taste. Two drachms of the acid in eight ounces of water constituted the ordinary formula, of which a table spoonful every hour or two was the customary dose. It was adapted particularly to those cases of venereal and hepatic disease, which might be re-

garded as the remnants of those diseases, rather than the diseases themselves. It was proper only in cases of reduced excitement, and then operated as a stimulant and tonic.

Nitric acid is prepared from the nitrate of potash or salt-petre, by the following process: Put an ounce or two of salt-petre into a retort, and pour upon it some strong sulphuric acid; apply heat and receive the product in a glass receiver, previously adapted to the retort. In this process, there is a decomposition effected. The sulphuric acid separates the potash from the nitric acid with which it was combined in the salt-petre, and unites with it forming sulphate of potash, while the liberated acid passes over into the receiver. The acid, however, as generally sold in the shops, is the *nitrous*, and not the *nitric* acid. These differ in their degree of oxygenation, the latter being more highly oxygenated than the former.*

Nitrous acid is further employed by physicians, to correct the fætor of ulcers; and, particularly, the odious effluvia arising from gangrene. For this purpose the acid, moderately diluted, will fully answer. It is, also, occasionally used as an escharotic, though this practice is by no means a general one,

* I am aware that many chemists think otherwise.

since medicine furnishes the practitioner with several substitutes that are much better suited to the purpose. As a gargle, it is peculiarly advantageous in ulcers of the throat and fauces, induced by venereal action; for this end, it is commonly combined with honey or something of that sort. Two drachms of the acid in four ounces of water, with a tea-spoon-full of honey, constitute an excellent gargle in such cases.

This acid was first obtained by a celebrated alchemist, and has received the different names of *water of nitre*, *aqua fortis*, *spirit of nitre*, *&c.*

Of Sulphuric Acid.—This substance is never employed as a remedy for disease, in its pure or concentrated state, excepting now and then as a caustic, though, so far as I know, it is used thus, chiefly by surgical empirics.

Diluted with water, this acid has been frequently employed as a tonic, and it is undeniably a tonic of no small value. In cases of profuse menstrual discharge, it is said to be highly beneficial, and may probably be serviceable in leucorrhæa, dependent on general as well as local debility. In these cases, from 3 to 5 drops in a wine glassfull of water, with the addition of a little sugar, may be taken twice or thrice a day.

Sulphuric acid is exhibited, most frequently, in the form of elixir of vitriol, which is simply a pleasant mode of administering the acid. The elixir is prepared by dropping, gradually, into two or three pounds of rectified spirit of wine, six ounces of sulphuric acid. The mixture is to be digested in a gentle heat in a close vessel for three days, after which an ounce and half of cinnamon and an ounce of ginger are to be added.—The whole is then to be digested for six days and afterwards filtered for use. The dose of the elixir thus prepared, is about twenty drops in a tumbler of water, sweetened so as to be agreeable.

Sulphuric acid is made by burning sulphur in atmospheric air, or in oxygen gas; in the latter case, the combustion goes on more rapidly, and, of course, the acid is sooner formed than when atmospheric air is used. There are various modes of effecting this combustion and consequent formation of sulphuric acid; but all of them depend on the union of sulphur with the base of oxygen gas.

This acid was first obtained by Dr. Priestley in a separate state. It has been called oil of vitriol, spirit of vitriol, vitriolic acid, &c. It was called vitriolic, because great quantities were prepared by distillation from the sulphate of iron, or green vitriol.

Of Acetous Acid.—This acid, usually known by the name of vinegar, is most frequently employed to form gargles, in union with honey and other substances. It is also used as an external application. It is the well known product of fermentation, a process that is entirely chemical. The substances employed to form the acetous acid, undergo a decomposition, and their several constituent parts are afterwards recombined, though under a different arrangement of particles from that which existed previously to the fermentative process. Oxygen, hydrogen and carbon, constitute, in a great degree, the different substances employed in the formation of vinegar; but the act of fermentation causes the hydrogen and carbon to combine with a larger portion of oxygen, and thus to acidify the compound.

Some persons have thought that acetous and acetic acids differed only in the latter being rendered purer by distillation: But, it is most probable that there is a true chemical difference, and that it depends on a higher degree of oxygenisement.

Acetous acid enters into the formation of some important articles. Thus we have the *extractum saturni*, formed by digesting litharge in vinegar. It is in reality an *acetate of lead.*

By digesting squills in vinegar we obtain the vinegar of squills, from which is made the useful article called syrup of squills.

Prussic acid has lately acquired some celebrity as a palliative medicine in the treatment of pulmonary consumption. It is employed in very small doses, which are gradually increased. It is usual to begin with three drops a day, and to add to each dose one drop daily, until the dose amounts to ten drops. It is prepared by the following process: take of prussiate of iron, (Prussian blue) two parts; of sulphuric acid (oil of vitriol) and water, each one part. Mix these in a retort, and distil with a moderate heat. The product is tolerably pure prussic acid, and is the result of simple decomposition. —The sulphuric acid seizes the iron of the prussiate of iron, and forms sulphate of iron, (copperas) while the prussic acid is driven off by the heat. It is said to be a compound of carbon, hydrogen and nitrogen. To preserve it in good condition, it must be kept in a well stoppered glass bottle and be excluded from the light, otherwise it will be decomposed. The pure acid is colorless; but as soon as decomposition commences in it, a tinge of blue is perceptible, which advances rapidly to a brownish black. This is owing to the presence of a small portion of iron, it

being a very difficult matter to free the acid entirely of that substance.

Benzoic acid enters into the composition of the *camphorated tincture of opium*, commonly called *paregoric elixir*. It is generally known by the name of *flowers of benzoin*.

To prepare this acid, reduce to powder some gum benzoin, and put it into an earthen pan, having a paper cover attached to it.—Then expose the whole to a sufficient heat in a sand bath, and the benzoic acid will be sublimed in the form of flowers, and will be found adhering to the paper. It is a soft white substance, and somewhat aromatic.

PART IV.

Of Simple Combustibles.

Under the head of simple combustibles, we shall discover but few articles of importance in medical practice. There are some, however, and of these we shall say a few words in the following order.

Of Sulphur.—In mentioning sulphur under the head of simple combustibles, we simply conform to the knowledge of the day in which we live. And without stopping to

dispute whether a substance be really simple or compound, we shall take it for granted, that all are simple bodies that are not known to be compound.

Sulphur, in the form of an oxyde, is much used in medical practice. In that state, it is commonly known by the name of the *flowers of sulphur*. The *flowers of sulphur* are prepared by heating sulphur in close vessels, by which process it is volatilized or sublimed, and adheres to the top of the vessels in form of flowers. To free it from any portion of sulphuric acid, formed in the process, it must be well washed with pure water.

The flowers of sulphur, (called also sublimed sulphur) in the quantity of one or two drachms, well mixed with molasses, constitute a suitable dose. It operates as a laxative, and is often administered to children affected with eruptive complaints.

It may not be amiss to mention, that the roll sulphur is sometimes employed in medical practice. A pound of this article, with a gallon of boiling water poured on it, constitutes a common formula, for the cure of rheumatism. The dose of this *sulphur tea*, as some call it, is a half pint tumbler full, once, twice or thrice a day. It has, in some instances, had the desired effect.

The production of sulphur is the result of a chemical process. It is usually procured from sulphur ores, iron pyrites, &c. These are subjected to a degree of heat, sufficient to separate the sulphur and cause it to ascend to the top of the vessel in which the process is conducted. It is afterwards melted and poured into round moulds, by which means the roll sulphur is formed.

Of Carbon.—This is never employed in medical practice. It is the oxyde of carbon with which physicians are familiar, and in that state is known by the name of *charcoal.*

Charcoal is used by the practitioner to correct the fætor of the breath in consumptive patients; an end to which it is admirably adapted. The mode of employing it in such cases, is, to mix a tea-spoon-full of the powder of charcoal, with a sufficient quantity of molasses, to render it palatable. This dose may be repeated three or four times in 24 hours.

Charcoal is also administered in intermitting fevers, and we are told with advantage: But, perhaps, its beneficial properties are exhibited most advantageously, when it is used in the shape of poultice, to arrest the progress of gangrene and to obviate the unpleasant smell attendant on that process. For this purpose, the powder of charcoal is intimate-

ly mixed with bread and milk or boiled Indian meal.

Charcoal is prepared by burning wood covered in such manner as to exclude the air, further than is necessary to the support of combustion. This process must be kept up until all the water and oil of the wood are driven off; after which, the fire is extinguished by shutting up all the air holes. By this process all the principles of the wood are dissipated, excepting the vegetable fibre, and that is slightly changed. Charcoal most commonly preserves the form of the vegetable which afforded it. The primitive texture is not only distinguishable, but serves likewise to indicate the state and nature of the vegetable from which it was procured.

In making charcoal, the wood employed loses about three fourths of its weight and one fourth of its bulk.

The charcoal made as above stated, may be readily prepared for medical use, by pulverising it in an iron mortar, and passing the powder through a fine sieve.

The other simple combustibles have never been employed in practice, excepting, occasionally, *phosphorus*, the use of which is confined almost exclusively to the French physicians. From its high price and the uncer-

tainty of its mode of operation, it is not probable that American practitioners will ever add it to their list of medicines.

PART V.

Of Compound Combustibles.

The first article to be noticed under this head, is the *spirit of wine*, or *alcohol*. This is used very largely in the formation of tinctures, and is indispensably necessary in making good solutions of resinous matters and essential oils. If, to a solution of resinous matter, or essential oil in alcohol, we add water, the substance dissolved will be precipitated, because insoluble in water.

Alcohol is employed as an external application, in the form of embrocation, and is thus of considerable utility. It is prepared by the distillation of brandy, by means of a moderate heat.

Subsequent distillations render it purer and stronger, and in this way we obtain the pure spirit of wine. It appears to be formed by the intimate union of much hydrogen and carbon, according to the analysis of M. Lavoisier. That chemist obtained eighteen ounces of water by burning a pound of alcohol. This arose from the great quantity of

hydrogen which alcohol contains, uniting with the oxygen of the atmosphere. Carbon and hydrogen, with now and then some oxygen, are the constituent principles of all the products of the vinous and acetous fermentation. When wine is subjected to distillation, in order to obtain brandy, these constituent principles are separated, and then recombined in a newly arranged order. The product of brandy from wine is really chemical, but the distillation of alcohol from brandy may be regarded as the separation of a substance already formed, from others with which it was lately diluted.

When, by means of an acid, we combine oxygen with the constituents of alcohol, we form a liquor nearly insoluble in water.—This is known by the name of *ether.*

Of Sulphuric, or Vitriolic Ether.—This, in common with the other ethers, is powerfully antispasmodic. It is well known to physicians as a remedy for the pains of cholic, which it mitigates as if by enchantment. A celebrated character (we are informed by Chaptal) accustomed himself to drinking ether for so long a time, that he took at last two pints per day; a rare example of the power of habit on the constitution.

To make sulphuric ether, a certain quanti-

ty of alcohol is put into a retort, and an equal weight of concentrated sulphuric acid is gradually added. The mixture is agitated frequently to prevent the retort from breaking by the partial effect of the heat arising from the mixture. The retort is then placed on a heated sand bath, a receiver is adapted, and the mixture made to boil. Alcohol first passes over, soon after streams of fluid appear upon the neck of the retort and within the receiver, which denote the rising of the ether. Vapors of sulphurous acid follow and the receiver must be taken away the moment they appear. If the distillation be continued, sulphurous ether is obtained, and the oil called *ethereal oil*, or the sweet oil of wine; the residue is a bitumen.

In this operation, the sulphuric acid is decomposed; its oxygen, by combining with the hydrogen and carbon of the alcohol, has formed three states or compounds, viz. *ether*, *ethereal oil* and *bitumen*. Ether may therefore be considered as an oxyde of hydrogen and carbon.

The mixture of two ounces of ether, two of alcohol and 12 drops of ethereal oil, constitute the *anodyne liquor of Hoffman*.

Ether has been applied to a useful purpose by the surgeon, in the solution of *elastic gum*,

for the manufacture of catheters. It dissolves this gum completely, as it does most of the oils, resins and balsams.

Next in importance to the sulphuric ether, is that medicinal article, usually called *sweet spirit of nitre*. This is, in reality, an ether, though far less volatiie, than the sulphuric. It is styled in dispensatories, the *spirit of nitrous ether*, and, although this application be more correct than any other, yet I shall speak of it under the name by which it is best known.

The *sweet spirit of nitre*, or *spiritus nitri dulcis*, is made from spirit of wine and nitrous acid. Having a capacious glass vessel, placed in another vessel, full of cold water, pour into it three pounds of rectified spirit, and then add, gradually, one pound of nitrous acid, constantly agitating the mixture. Now cover the vessel, and set it by for several days in a cool place; then distil the liquor with the heat of boiling water into a receiver kept well cooled, until no more spirit comes over. The product thus obtained, is the *sweet spirit of nitre*.

The chemical agency of the acids employed to form ethers, appears to be exerted, simply, in effecting an oxydisement of the carbon and hydrogen of the alcohol; this is true of all the ethers.

The other compound combustibles, as the oils, need not be spoken of in this place, as it is not usual to consider them, particularly, as chemical products, although they are, no doubt, the result of chemical operations. They are all composed of oxygen, carbon, hydrogen, and, occasionally, some earthy matters.

PART VI.

Of Metallic Preparations.

This branch of medical chemistry is of great importance to students of medicine, and to the profession generally. From it we derive our most useful preparations; and perhaps it is not too much to say, that from it alone, with the exception of a single article, the practitioner might obtain a sufficient number of remedies, to answer all the purposes of medical treatment. The first of the metals, of whose preparations we shall speak, is *gold*.

This metal is never employed in its pure or metallic state. It is its solution in *nitro-muriatic acid* or *aqua regia*, with which physicians are acquainted, as an article of the materia medica. This preparation was introduced into medical practice, as a substi-

tute for mercury, in the treatment of syphilis; but its celebrity was of short duration, and it is now almost totally discarded.

It may be made, by adding gold leaf to any quantity of a mixture of equal parts of nitric and muriatic acids, and evaporating the solution thus effected. The product, though frequently termed nitro muriate of gold, is, in reality, a *muriate*. The nitric acid oxydises the gold, and the muriatic acid combines with the oxyde thus formed, and produces a muriate of gold. This medicine has been administered in the dose of one sixteenth of a grain, three times a day, in form of pill.

In the fifteenth century gold was a fashionable remedy, and the quality of the medicine, was always rated in proportion to its cost. It is hardly necessary to state, that it was gold that gave birth to that celebrated class of men, known by the name of alchemists. The proposed end of their labors was, to convert all the other metals into gold.

Mercury is, in itself, a host in assisting the physician to vanquish the power of disease. It has been aptly styled the Herculean remedy, on account of its efficiency in curing many forms of disease that attack the human system.

This metal has been employed in its fluid state, as a remedy for *volvulus;* and it has never been known to produce bad effects, when thus used. It acts, in this instance, altogether mechanically, overcoming the intestinal obstruction by its weight.

It has been discovered, that water, in which mercury has been boiled, possesses a vermifuge property; and yet experiments have rendered it certain, that the mercury does not thereby lose any of its weight.—But, although chemical tests do not detect the presence of mercury in the water, it seems highly probable, that a chemical combination has taken place. Of the nature of this combination we are not well satisfied; and, indeed, it is of little importance.

The precipitatum per se, is a preparation of some value, and shall now be noticed.—It is made by exposing mercury to the joint action of heat and air. Thus exposed, the mercury gradually loses its fluidity; and at the end of several months, forms a red oxyde, which the alchemists called precipitate per se. It is a true oxyde of mercury, and may be shown to be nothing else, by the simple experiment of exposing it to heat, in such a manner, as to collect the gas that escapes. The product will be fluid mercury, and oxygen gas. It is necessary, in making this precip-

itate, to expose the mercury to the air in order that oxygen may be absorbed; and the heat is indispensible, to overcome, by its repelling power, the attraction of cohesion subsisting between the mercurial particles, in order that the latter may combine with the oxygen.

This medicine is usually given in the dose of ½ of a grain in the form of pill, twice a day. It has been employed in all the forms of disease, in which the other mercurial medicines are exhibited; but is, perhaps, best adapted to cases of syphilis, of long standing.

The *precipitate by nitric acid*, commonly called *red precipitate*, is formed from the fluid mercury and nitric acid. Dissolve an ounce of fluid mercury in two ounces of nitric acid, with the assistance of heat. An oil flask, well cleansed, will answer the purpose sufficiently well. Take the substance thus formed, which is an oxy-nitrate, and expose it to a strong heat in an oil flask for several hours; it will be changed into a red substance, which is the precipitate in question. Nearly all the acid is driven off by the heat, so that the product is almost a pure oxyde, though frequently there is present a portion of nitric acid, sufficient to constitute a sub-nitrate.

This article has been employed, chiefly, as an external application. It is moderately escharotic, and for this end, the powder may be sprinkled over the diseased surface. It is also combined with lard, and other fatty matters, to form an ointment; hence, we have the *ointment* of *red precipitate*. This is prepared of various degrees of strength, according to circumstances, and is often adulterated with red lead.

Here it may be proper to notice another form of mercurial medicine, which is probably effected, in some degree at least, by the process of oxydation. I mean the *blue pill mass*, made by rubbing mercury with a little honey and powder of rhubarb, until all the globules disappear. Two drachms of mercury, half a tea spoon-full of honey, and a scruple of rhubarb, will form the preparation of which we are speaking. This quantity must be so divided into pills, as that each pill may contain a grain of mercury. It is customary to give one of these pills three times a day.

The mercurial ointment is also prepared, in a measure, by the agency of oxygen. The friction employed, has, partially, the effect of oxydating the mercury; and the presence of oleaginous matters, rather accelerates, than retards the process.

The first of the salts of mercury which we shall notice, is the *corrosive sublimate*, sometimes called muriate of mercury.

If equal parts of red oxyde of mercury and muriatic acid, be exposed together to a pretty strong heat, the product will be corrosive sublimate. If equal parts of dry sulphate of mercury, and dried muriate, of soda (common salt) be mixed, and sublimed by means of heat, the product will be corrosive sublimate. Here a double decomposition ensues: The sulphuric acid of the sulphate of mercury, seizes the soda of the muriate of soda, and forms sulphate of soda, (or glauber's salts) while the muriatic acid of the muriate of soda, combines with the mercury of the sulphate of mercury, and forms a muriate of mercury, or rather an oxy-muriate.

This substance is soluble in water, and partially in spirits. It is extremely poisonous, and is sometimes employed in this character to destroy life. In order to determine whether corrosive sublimate has been the cause of death to an individual, it is necessary to collect, carefully, the contents of the stomach, and to preserve whatever may settle in form of powder, in the vessel in which those contents have been placed. The powder is known to be corrosive sublimate, by the following characters.

1st. Expose a small quantity of it without any admixture, to heat, in a coated glass tube. If there be any of the sublimate present, it will rise to the top of the tube and line the inner surface, in form of a shining white crust.

2d. To a solution of the powder in water, add a little lime water. A precipitate of an orange color will instantly follow.

3d. To a similar solution of the powder, add a single drop of a diluted solution of carbonate of potass: A white precipitate will appear; but, on a still further addition of alkali, an orange-colored sediment will be formed.

4. Sulphuretted water throws down a dark colored sediment, which, when dried and strongly heated, is wholly volatilised, without any odor of garlic, as is the case with arsenic.

These are the principal tests by which the presence of arsenic has been detected, and, where they produce their effects in an obvious manner, there is little reason to doubt their accuracy.

Corrosive sublimate is seldom employed in medicine in any other mode, than as an external application. Mixed with lime water,

it constitutes the *aqua phagedenica* of ancient writers, and is then used as a lotion to old ulcers and obstinate eruptions.

Dissolved in spirits, it has long been in use among venereal quacks, as a remedy for syphilis. They dissolve from ten to twenty grains in a quart of ardent spirits, of which solution a wine glass-full is to be taken every morning.

Calomel, or the *sub-muriate of mercury*, called also *mercurius dulcis*, *hydrargyrus muriatus mitis*, &c. is a most invaluable medicine. It is prepared by subliming a mixture of four parts of corrosive sublimate, and three parts of mercury, previously triturated in a mortar. The sublimate, thus obtained, is *calomel*.

The corrosive sublimate, or oxy-muriate of mercury, is mercury combined with an excess of acid: And, when a sufficient quantity of mercury is added, not only to neutralise the acid, but to overbalance it, then a sub-muriate is formed, or a salt, with an excess of mercury. This is the difference between corrosive sublimate and calomel. The former contains an excess of acid, the latter an excess of base.

Calomel, thus obtained, is always combined with some portions of corrosive subli-

mate, which have not been reduced to the state of a sub-salt, by the process of sublimation: But, as the calomel is insoluble in water, and the corrosive sublimate readily dissolved, the former may be easily freed of the latter, by repeated washings, until the water used for this purpose comes off tasteless. In this way the calomel of the shops is prepared.

It is not unusual to combine calomel with calcined magnesia, for the diseases of children. If we mix the medicine with molasses, there will, probably, be no apparent decomposition; but, if it be thrown into water, and stirred, a gray precipitate will be seen. This is a gray oxyde of mercury, and is the result of decomposition.

Calomel, from its very extensive use in medical practice, is liable to frequent adulteration. To test the purity of the article, we must determine whether the muriatic acid be completely saturated with mercury. This may be ascertained by boiling, for a few minutes, one part of calomel with 1-32d part of muriate of ammonia, (sal ammoniac) in ten parts of distilled water. When carbonate of potash is added to the filtered solution, no precipitate will ensue, if the calomel be pure. This preparation, when rubbed in an earthen mortar with pure ammonia,

should become intensely black, and should exhibit nothing of an orange hue.

White precipitate of the shops, is an article of some note in medical practice. It is prepared by the following process: Mix equal parts of oxy-muriate of mercury (corrosive sublimate) and muriate of ammonia, (sal ammoniac) in solution, and a triple salt will be formed, viz. muriate of mercury and ammonia. Add to this mixed solution, another of carbonate of potash, and a precipitate will be thrown down, which is the submuriate of mercury and ammonia, or the *white precipitate.* In this process, the potash of the carbonate, robs the muriate of part of its acid, and reduces it to the state of submuriate.

This preparation is employed, chiefly to form an ointment, that is sometimes used in cutaneous eruptions.

Turpeth mineral is a medicine, that, formerly, obtained some celebrity as an emetic, and, by many physicians is still highly esteemed. It is regarded by some chemists as a sub-oxy-sulphate, by others, as a sub-sulphate, and by a few, as an oxyde. Chaptal thinks it has been proved, satisfactorily, not to contain a particle of acid.

It is made as follows: When three parts

of sulphuric acid are boiled on two parts of mercury, the whole, by continuing the heat, is converted into an oxy-sulphate of mercury, which crystallises in small prisms. If water be poured on this oxy-sulphate, it is converted into super-oxy-sulphate which dissolves, and sub-oxy-sulphate which remains in a state of a beautiful yellow powder, called *turpeth mineral.*

The water causes a partial decomposition of the oxy-sulphate, by abstracting a portion of the oxygen, sufficient to produce a sub-oxy-sulphate; the oxygen thus abstracted, then combines with the remaining oxy-sulphate and forms a super-oxy-sulphate, which, being soluble, is held in solution by the water.—This is the most generally received account of the formation of this article, though there is reason to doubt its correctness. If it be really true, as Chaptal thinks, that the turpeth mineral contains no acid, the above rationale must be unfounded.

The dose of this medicine, is from two to eight grains.

Acetate of mercury, was once considered a medicine of some importance, and was the chief ingredient in *Keyser's pills.* It is prepared by adding acetate of potash to nitrate of mercury, both in solution; a double de-

composition takes place, by which nitrate of potash and acetate of mercury are formed.

Ethiops mineral has had some repute in medical practice. Its chief use, however, is in cases of disease from worms. It is prepared by rubbing equal weights of sulphur and fluid mercury in a mortar, until the globules disappear. The product is a blackish powder, sometimes called the *black sulphuret of mercury*. In the dose of from 5 to 15 grains it proves anthelmintic.

Silver adds but little to the resources of the physician. The chief article formed from this metal, is the *lapis infernalis, lunar caustic*, or *nitrate of silver*.

When silver is dissolved in nitric acid, and the solution concentrated by evaporation, crystals of *nitrate of silver* will result. If these be fused and poured into cylindrical moulds, the product will be the *lunar caustic* of the shops.

The chief use of this article, is in surgical practice, where it is found to be an excellent escharotic. It is also sometimes used internally, though only in a few forms of disease.

Nitrate of silver is the most powerful antiseptic, or preservative against putrefaction, of which we have any knowledge. Meat,

impregnated with it, so as to acquire a sensible taste, though never so slight, will not putrefy, even in a warm place. In 12,000 times its weight of water, it will preserve meat from putrefaction forever; and it will separate in a few minutes by throwing in a pinch of common salt (muriate of soda.) The reason why the common salt causes the separation of the nitrate of silver, is as follows: the nitrate is soluble, and of course held in solution by the fluid in which the meat is immersed; the muriate of soda causes a decomposition of the nitrate, by which muriate of silver and nitrate of soda are formed. The muriate of silver thus formed, is insoluble, and falls down in the state of powder.

Copper furnishes several articles of considerable importance. Of these, the *blue vitriol* is, perhaps, the most useful. This is made, by effecting a combination of sulphuric acid and copper, by means of heat.

Two methods are practised to make the *sulphate of copper*, which is met with in commerce. The first consists in calcining pyrites of copper, (sulphuret of copper) and causing them to effloresce, in order to develope the salt, which is then extracted by lixiviation. The second consists in forming this pyrites artificially, burning it, and lixiviating it, to extract the salt.

The blue vitriol, (called also blue copper and cyprian vitriol) may likewise be made by the direct union of sulphuric acid and copper. In the modes above mentioned, sulphuric acid is actually formed by the process of calcination, the sulphur of the pyrites uniting with the oxygen of the atmosphere for that purpose. But, when we take the acid ready formed, and expose copper to its action, it is necessary to apply a strong heat, otherwise there would be no combination.

In making blue vitriol from the direct union of its component parts, the following circumstances occur: the sulphuric acid is in part changed into sulphurous by the loss of a portion of its oxygen, which is attracted by the copper, so as to convert the metal into an oxyde. The metal thus oxydated, seizes on the rest of the acid, and is changed into a salt, which is the *blue vitriol.*

This medicine has been employed by some physicians, in the treatment of intermitting fevers; and the practice is still continued.—Its dose is ½ of a grain three times a day in form of pill. It is also used in surgery, as an escharotic. When exposed to heat and thus deprived of its water of crystallization, it is considerably caustic, and in that state is combined with simple cerate to form an ointment.

Cuprum ammoniacum, ammoniacal copper, or the ammoniuret of copper, is made by rubbing together in a glass mortar, two parts of blue vitriol or sulphate of copper and three parts of prepared ammonia, until effervescence ceases. A violet colored mass is thus formed, which must be placed on blotting paper, and afterwards dried with a gentle heat. The product must be kept in a glass vial, well stoppered, to prevent the absorption of moisture.

This preparation was much used formerly in epilepsies and other convulsive diseases. Half a grain, twice a day, in form of pill, is the usual dose.

Verdigris is sometimes employed in medical practice, but generally as an escharotic, or lotion. It is made by corroding copper, by means of acetous acid, the process being conducted in various ways.

In some parts of France, it is common to ferment the refuse of grapes with sour wine, and then place the refuse in alternate layers with plates of copper, six inches long and five broad. In this state, they are left for a certain time; after which, they are taken out and placed edgewise in a cellar, where they are sprinkled with sour wine; the verdigris swells up and is afterwards scraped

off, put into sacks of leather and exported to foreign countries.

The object of this process, is, first to produce acetous acid by fermentation, and then, by means of this acid, to oxydate the copper in such a manner, as to cause the acid to unite with it, and thus form *verdigris*.

In some places, ready made vinegar is used, and the copper plates are sprinkled with, it as often as may be requisite. By some persons, it is called an acidulous oxyde of copper; by others, an acetate.

Iron contributes not a little to the resources of the medical practitioner. Of its various preparations that are formed chemically, the *rust* or *carbonate* is the most useful. This is prepared in the following manner: to a solution of sulphate of iron, (or copperas) add a solution of carbonate of potash, and a precipitate will be obtained, which is the *rust of iron* (*rubigo ferri*) of the shops. In this process, there is a double decomposition: the sulphuric acid of the copperas combines with the potash and forms sulphate of potash, while the carbonic acid of the carbonate of potash, seizes on the iron of the copperas, and forms carbonate of iron.

Rust usually implies nothing more than

simple oxydation; but the rust of iron, of which we are now speaking, is not simply an oxyde; it is properly speaking a carbonated oxyde, or as most chemists would say, a carbonate of iron. It is this combination of iron, to which most chalybeate waters are indebted for their medicinal properties.

The rust of iron is employed in medicine as a tonic, either alone or in combination with aromatics and bitters. The usual dose is from five to ten grains, three times a day. It is justly esteemed one of the best tonics in the whole materia medica.

The green sulphate of iron, or *sal martis*, is sometimes employed as a tonic medicine. It is nothing but copperas in a state of purity, and is made by dissolving iron in diluted sulphuric acid and then evaporating the solution. Crystals are thus formed, which are the salt in question. For the purpose of making *sal martis*, iron filings may be used, as the acid will sooner affect a solution, than if the solid metal be employed in the process.

In the large way, the sulphate is prepared from iron pyrites (sulphuret of iron) by calcination and subsequent lixiviation; in which process, the sulphur of the pyrites is converted into sulphuric acid by the absorption of oxygen, after which, the acid unites to the rion, forming sulphate of iron.

Red sulphate of iron, or *colcothar of vitriol*, is sometimes exhibited as a tonic. It is made by exposing copperas to a heat sufficiently strong, to cause the escape of its sulphuric acid; after which, a martial earth or metallic oxyde of a reddish brown colour remains, known by the name of *colcothar*. This preparation has been administered in obstinate cases of leucorrhœa, with obvious advantage.

Tinctura muriati ferri, called also tinctura martis, tincture of steel, muriated tincture of iron, &c. is a very excellent preparation of iron. It is formed by dissolving iron filings in muriatic acid by means of heat, and adding to the solution a certain proportion of alcohol. It is, therefore, a diluted solution of iron in muriatic acid. Its dose is from ten to twenty drops, three times a day.

In whatever form iron is administered, its effects appear to depend on its efficacy in giving tone to the stomach. It has been questioned, whether it ever enters into the circulation, so as to be discoverable by the ordinary tests. We are assured, that M. Lorry, a French physician, observed, "that the urine of a sick person, to whom he administered iron in a state of extreme division, was manifestly colored with the nut-gall;" by which he certainly meant, that the usual bluish or black color was produced.

Lead furnishes the medical practitioner with several valuable articles. Of these, the most important is the *acetate of lead*, called also *saccharum saturni, sugar of lead, &c.*

The acetate of lead may be formed by exposing lead in a vessel containing vinegar, to a considerable degree of heat. The vinegar acting on the lead, and combining with it, loses its acidity; and if the fluid be poured off and evaporated, crystals of the sugar of lead will be formed. The vinegar first oxydates the lead, and then combines with the oxyde to form a salt. This preparation of lead is sometimes employed internally in hemorrhage, epilepsy, &c.; but its more general use is as an external application.

The *extractum saturni*, or *vegeto-mineral water* of Goulard, is prepared by digesting litharge (which is an oxyde of lead) in vinegar, with the aid of a pretty strong heat. It is, really, nothing more than an acetate of lead, and is employed only as an external remedy.

Litharge is an article that is sometimes used for the purpose of making plasters, particularly the *emplastrum lythargyri*, or *commune* of the shops. It is an oxyde of lead, and is manufactured from the metal, by exposure to heat in open vessels. It absorbs

oxygen from the atmosphere, and is thereby converted into an oxyde.

White lead is sometimes employed in medical practice. It is prepared by a variety of methods, all of which consist in the exposure of sheet lead to the vapors of vinegar, by which the lead is oxydated. The oxyde thus formed on the surface of the lead, attracts carbonic acid from the atmosphere, and so becomes a carbonate of lead.

Zinc contributes also to the resources of the healing art.

The most useful article prepared from this metal, is, the *white vitriol* or super sulphate of zinc; called also *white copperas, vitriol of zinc, sulphate of zinc, &c.* It may be made by the direct union of its component parts; that is, by dissolving zinc in diluted sulphuric acid, and then evaporating the solution. It may also be prepared from the sulphuret of zinc by calcination. The sulphur in the latter process, is converted into sulphuric acid, which, combining with the zinc, forms sulphate of zinc.

Lapis calaminaris is sometimes employed in medical practice. It is the basis of the ointment sold in the shops, under the name of *Turner's cerate.* When the sulphuret of zinc is exposed to such a degree of heat, as to

drive off the sulphur, without forming an acid, the zinc combines with atmospherical oxygen and forms an oxyde of zinc. This is *lapis calaminaris*, or calamine stone. It has been sometimes called a carbonate of zinc, and it is not improbable, but that the oxyde may absorb a portion of carbonic acid from the atmosphere. Lapis calaminaris may also be prepared, by adding a solution of carbonate of potash to a solution of white vitriol; a precipitate falls down of a whitish color, which is the article under consideration. In this process, there is a double decomposition, and sulphate of potash and carbonate of zinc are formed.

Lapis tutiæ, or *tutty stone*, is also an oxyde of zinc. When zinc is calcined in the open air, it becomes covered with a gray powder, which is a true oxyde, or the *tutty stone*.— If it be heated to redness, it takes fire, emits a blue flame, and white flocks issue from it, which are called *philosophical wool*, *nihil album*, *pompholix* and *flowers of zinc*. This, like the tutty, is an oxyde of zinc. The former is employed, chiefly, to make an ointment, viz. the tutty ointment. The latter is exhibited internally, in some spasmodic affections.

Bismuth presents us with but one medicinal

article, and that is, the *white oxyde of bismuth*, called also, *pearl* or *flake-white*.

It is made, by dissolving bismuth in nitric acid, and pouring water on the solution. A powder is precipitated, which must be repeatedly washed to free it of acid. This powder is the white oxyde of bismuth. It has been administered in cases of dyspepsia, in the dose of 5 grs. three times a day, with considerable advantage.

Antimony is a metal of considerable importance to the physician. It was regarded very highly by the alchemists, and was described by them under the names of the *radical principle of metals, sacred lead, &c.* It was at one time, at the solicitation of the faculty of Paris, prohibited by a parliamentary decree. A skilful physician and chemist was degraded by the faculty of medicine, for having employed it in 1609. Not many years afterwards, popular sentiment experienced a change, and in 1624, this metal (or as some call it semi-metal) was re-established, as an article of materia medica. Since that period, volumes have been written in favor of, and against the preparations of antimony; but some of them have continued, and will continue in use, and are perhaps, justly ranked among the best medicines.

The most important of the antimonial me-

dicines is the *emetic tartar*, called also, *stibiated tartar*, the *antimoniated tartrite of potash*, &c. It is, properly speaking, a tartrate of potash and antimony, and may be formed by digesting the crocus of antimony, (which is an oxyde) in the solution of the super tartrate of potash (cream of tartar). A pound of the crocus, two pounds of cream of tartar and two gallons of water, are about the proportions. The excess of acid in the super tartrate of potash, combines with a portion of the antimony, and the new compound thus becomes a *tartrate*, or a neutral salt, having neither the acid nor base in excess.

This medicine is the most general emetic now in use. It is sometimes given alone in powder, and sometimes dissolved in wine and water, in the form of *wine of tartarised antimony*.

The *vitrum antimonii*, or *glass of antimony*, is used, chiefly, for the purpose of forming antimonial wine. Many druggists use it thus, to save trouble. A given quantity of this glass will impregnate wine repeatedly, so that nothing is requisite, further, than to pour in fresh wine, as soon as the bottle is emptied. It is said, that emetic wine may thus be formed from the same glass of antimony, for several years.

The *vitrum antimonii* used for this pur-

pose, is nothing but an oxyde of antimony, exposed to a degree of heat sufficient to melt it, and thus reduce it to the appearance of glass.

The *butter of antimony* was formerly used as a caustic; but it is now laid aside. It is a *muriate*, and may be made by the double decomposition of muriate of mercury and sulphuret of antimony.

Arsenic.—When the ores of arsenic are sublimed by means of strong heat, a white mass is produced, which is the *white arsenic* of the shops. This is called by many chemists the *arsenious acid;* by others, *an oxyde of arsenic.* It is, in this state, frequently administered in form of pill, in the dose of 1-16th of a grain, three times a day.

This *white arsenic*, or *arsenious acid*, combined with potash, constitutes the *arsenite of potash*, or *Fowler's solution of arsenic*, a medicine of considerable importance.

To make this solution, proceed as follows: put into a florence, or oil flask, well cleansed, 64 grains of white arsenic in powder, the same quantity of carbonate of potash, and eight ounces of water. Boil the whole for several minutes, and then set the flask aside to cool, after which, add as much spirit of lavender, as will make the whole equal to a

pint. This solution is used, chiefly, in periodical affections, in the dose of six or eight drops, three times a day.

Part vii.

Of the Earths and Alkalies with their compounds.

Of the different earths spoken of in chemical books, four only are exhibited in medical practice, and some of them only in combination. They are *magnesia*, *lime*, *barytes* and *alumine*.

Of Magnesia.—The sub-carbonate of magnesia, or the *magnesia* of the shops, is formed by adding a solution of sub-carbonate of potash, to a solution of sulphate of magnesia, or Epsom salts. Here a double decomposition ensues, and sulphate of potash and sub-carbonate of magnesia are formed. The latter falls to the bottom and may be easily separated. This preparation of magnesia is of extensive use, and is well adapted to the ends to which it is usually applied.

Magnesia calcinata, or calcined magnesia, is made by exposing the carbonate of magnesia to a heat sufficiently powerful, to drive off the carbonic acid. It is necessary, in order to prevent the absorption of carbonic

acid gas from the atmosphere, to keep the calcined magnesia in close bottles.

Epsom salt is a compound of sulphuric acid and magnesia. It exists ready formed, in a spring near London, whence it derived its name. It may be made likewise, by digesting sulphuric acid upon magnesia, by which means we effect a direct union of its component parts. This salt is sometimes called *sal catharticus amarus*, (*bitter purging salt*,) on account of its taste. Its operation is very gentle, and for this reason, it is esteemed by many persons, an excellent cathartic.

Of Lime.—If limestone be exposed to a strong heat so as to drive off all its carbonic acid, pure lime will be obtained, called also *quick lime*. This is used in medicine, to render the caustic potash more active, which it does, by absorbing any portion of carbonic acid it may contain.

The *creta preparata*, or prepared chalk of the shops, is a tolerably pure carbonate of lime; and is made by repeatedly washing the powder of common chalk. It is used, chiefly as an absorbent.

Muriate of lime, is sometimes employed in medical practice. It may be made, by adding chalk to muriatic acid, until no more can be dissolved; or, in other words, until

the acid is saturated. It has been used chiefly in scrophula.

Of Barytes.—This earth yields but one medicinal preparation, and that is now seldom exhibited: It is the *muriate of barytes.* To form it, expose to a strong heat, a mixture of sulphate of barytes and charcoal, in order to obtain the barytes in a separate state.—The heat causes a decomposition of the sulphate, the sulphuric acid of which is also decomposed; the charcoal taking up its oxygen, and thus forming carbonic acid, which, with the sulphur of the sulphuric acid, is driven off, leaving the barytes behind. To this barytes, we add muriatic acid, and the filtered solution yields, by evaporation, crystals of muriate of barytes. This article is administered, chiefly, in scrophulous affections.

Of Alumine.—This is an *alkaline earth*; those before spoken of, being called *earths proper.* The only chemical article formed from alumine, that is used in medicine, is the well known substance *alum.* This is a triple salt, or a salt in which an acid is combined with two bases, and is denominated, *super sulphate of alumine and potash.* It is usually obtained from aluminous earths containing iron pyrites (sulphuret of iron) by roasting, exposure to the air, the addition of potash ley, evaporation and crystallisation.

The process causes the acidification of the sulphur contained in the pyrites; and the sulphuric acid thus formed, combines with the alumine of the earth or clay employed, and also with the potash added. The acid being in excess, or in greater quantity than is necessary for the neutralisation of the alkaline and earthy matters, a super salt is the result, viz. a *super sulphate of alumine and potash.* The potash added, is partly for the purpose of precipitating any oxyde of iron that may be present and partly to saturate a portion of superfluous sulphuric acid. There are various processes in use for the manufacturing of alum, but they are essentially the same, and require, in all cases, the presence of sulphur, or sulphuric acid, alumine and potash.

Alumen ustum, or burnt alum, is made by heating the common alum. By this means it swells, boils and dries, parting with its water of crystallisation and becoming easily pulverulent. It is employed as an escharotic to reduce protuberent granulations.

The *alkalies* mentioned in chemical works, are all employed in medical practice, and constitute an important branch of the materia medica. They are *potash*, *soda* and *ammonia.*

Of Potash.—When the carbonate of potash is deprived of its carbonic acid by means of quick lime, (pure lime) caustic potash is procured. The *common caustic* is thus made, and is simply potash, freed of foreign matters; in other words, it is potash nearly in a state of purity. The quick lime used in this process, combines with the carbonic acid, and becomes a carbonate of lime.

Sal tartari, or *salt of tartar*, is a *sub-carbonate of potash*. It is usually made by burning cream of tartar among live coals. In this process, the cream of tartar is decomposed; its tartaric acid being resolved into its constituent elements, is driven off, while the carbonic acid, formed by the combustion of the coals, unites with the potash and forms sub-carbonate of potash, that is, carbonic acid combined with an excess of potash. The whole mass is to be dissolved in warm water and filtered. The filtered liquor, on evaporation, yields the sub-carbonate of potash. This salt must be kept in tight vessels so as to exclude the air, otherwise it will deliquesce; that is, absorb moisture from the atmosphere. Salt of tartar is sometimes sold under the name of *salt of wormwood* (sal absynthii); it received this name from the practice which some persons adopted, of adding to salt of tartar, a few drops of the oil

of wormwood, which communicated to it a yellowish tinge and a peculiar odor.

Salt of tartar is a medicine of considerable importance. It is used, chiefly, for the purpose of forming the neutral and saline mixtures.

Salt-petre, or the *nitrate of potash*, is an article of great value to the physician. It is obtained in large quantities from different parts of the world. In China and India it is procured from the vegetable mold, or superficial soil in particular places, called *salt-petre grounds*, which have generally a loose, open and marly appearance. In a manner very similar, nitre has been obtained in this country and elsewhere. The origin of nitre is, notwithstanding, very obscure; for it is well known that plants will yield nitre, even when made to grow in water, entirely freed of saline matter. It would appear, therefore, that some plants at least, have the property of producing nitre, by virtue of some principle, that is altogether unknown.

Most of the nitre prepared in this country, is formed from artificial composts, to which lime and other substances are added. By exposure to air and the operation of internal heat, nitrogen and oxygen gases are generated and then combined to form nitric acid. This

acid seizes upon the lime and forms nitrate of lime, which, by the addition of potash is decomposed; the nitric acid of the nitrate of lime, combining with the potash and forming *nitrate* of *potash* or *salt-petre*.

In whatever way it is prepared, the mode of getting it pure, is to dissolve the whole mass in boiling water, and then to filter.—On becoming cool, the nitre crystallises in the bottom of the vessel, while the other salts remain in solution. This salt is very largely employed in American practice, in febrile diseases, and is regarded as one of the *indispensable* articles of the materia medica.

Cream of tartar is the *super tartrate of potash*, or potash combined with an excess of tartaric acid. It is made by boiling in water, the red or crude tartar of the shops, filtering the solution and then evaporating. This crude tartar consists of the super tartrate of potash, (cream of tartar) and some foreign matters, which last are separated by filtration.

The use of cream of tartar in medical practice, is well known; and therefore, it is not necessary to say any thing on that point.

Soluble tartar is a *tartrate of potash*, or potash combined with tartaric acid, in such proportion as to constitute a neutral salt.—

It is made by adding to cream of tartar, a sufficient quantity of potash, to neutralise its superabundance of acid. This salt, as its name denotes, is readily soluble in water, while the super-tartrate dissolves but slowly. They are both used as aperient medicines.

Rochelle salt, called also *sal seignette*, *tartarised natron*, &c. is a *tartrate of potash and soda*. It is made, by adding to cream of tartar, in solution, enough of carbonate of soda, to neutralise its excess of acid. The excess of tartaric acid, combining with a portion of the soda, produces, in union with the tartrate of potash, the triple salt, called *tartrate of potash and soda*. This is likewise employed as a cathartic, and by the French is esteemed very highly.

Of the combination of potash with the arsenious acid, we have spoken already, and shall not notice it again. There are several other salts of potash that were in use among physicians many years ago; but as they have been very properly laid aside, we shall not trouble the reader with a detail of them.

Of Soda.—The only salts of soda employed in medical practice, are the *muriate*, *carbonate*, *sulphate*, *phosphate*, and *borate*. The muriate of soda (common salt) has been known from the earliest ages. It has been called *common salt*, *salt*, *rock salt*, *bay salt*,

sea salt, salt gem, &c. It is obtained, in some places, from mines, where it is found in large quantities; also from sea water, by evaporation. It is a compound of muriatic acid and soda, both of which, when pure, are highly corrosive; but when chemically combined, yield the mild and useful article, familiarly called *salt.* It is employed, frequently, to arrest hemorrhage, and with great success.—It is also used, occasionally, as an anthelmintic.

Carbonate of soda is a compound of carbonic acid and soda, and may be obtained from barilla, or from the decomposition of sulphate of soda, by means of carbonate of potash. In mixing sulphate of soda and carbonate of potash, a double decomposition ensues; the carbonic acid quitting the potash to join the soda, produces carbonate of soda.

For all the purposes of medical practice, to which this article is adopted, carbonate of potash will answer equally well.

Sulphate of soda is a salt of very general use, and is an excellent medicine. It has been called *vitriol of soda, sal mirabile, glauber's salt, &c.*

It may be formed by the direct union of its constituent parts; and the *tamarix gallica* which grows on the sea coasts, contains so

large a quantity, that it may be extracted to advantage. Nothing more is necessary for this purpose, than to burn the plant, and lixiviate the ashes.

But a more common mode of procuring it on the large scale, is as follows: bones are calcined, until they are reduced to a friable state, after which, they are pulverised, and subjected to the process of distillation, which separates the ammonia from them. To the ammonia thus produced, sulphuric acid is added, to form sulphate of ammonia. This last is then mixed with muriate of soda (sea salt) both in solution. Heat is then applied, by which a double decomposition is effected and muriate of ammonia and sulphate of soda are produced. The heat is increased to such a degree, as to cause the muriate of ammonia to be driven off, while the sulphate of soda remains at the bottom of the vessel; the muriate of ammonia being sublimed in solid cakes.

Sulphate of soda may be produced in a variety of ways, it being essential, however that sulphuric acid and soda be present in some form or other; in all cases. This salt has the double advantage of being, not only a good medicine, but a cheap one.

Phosphate of soda has been exhibited in medical practice. It is said to be much

more agreeable than either glauber or Rochelle salts.

If phosphate of lime be decomposed by carbonate of soda, the precipitate separated, and the fluid evaporated and crystalised, phosphate of soda will be the product. The carbonic acid of the carbonate unites with the lime, forming carbonate of lime, while the phosphoric acid combines with the soda, to form phosphate of soda. In the shops of the apothecaries it is seldom found pure, but is adulterated with sulphate of soda. It is a good cathartic.

Borax is occasionally employed in medical practice; chiefly however, as the basis of a lotion. It may be formed by the direct union of boracic acid and soda; but, as it exists ready formed in nature, it is seldom prepared artificially. It is brought from the East Indies, where it is obtained in an impure state. Long exposure to ebullition, and subsequent filtration and crystallisation, render it sufficiently pure for medical purposes.—It is, properly speaking, a *sub-borate of soda.*

Of Ammonia.—The only salts of ammonia in use, are the *muriate, carbonate, nitrate* and *acetate.*

The muriate of ammonia, called also *sal ammoniac,* derived its name from a circum-

stance of its having been found native, near the temple of *Jupiter Ammon*, in *Africa*.—It has been frequently found in other places in solid masses; but it is prepared, largely, by the process already mentioned for obtaining sulphate of soda in the large way. It may be made also by the direct union of muriatic acid and ammoniacal gasses, in which union the gasses, parting with their caloric, enter into a solid state. The most common mode of using *sal ammoniac*, is, in combination with oleaginous matters, to form ointments.

Carbonate of ammonia, called also *volatile salt*, *prepared ammonia*, *mild volatile alkali*, &c. is composed of carbonic acid and ammonia; and may be formed by the direct combination of its constituents, in the gasseous form. It may also be formed by mixing sal ammoniac with carbonate of lime, and subliming the mixture. We thus form muriate of lime and carbonate of ammonia, the latter being sublimed on the top of the vessel.

Carbonate of ammonia is usually kept in glass, stoppered bottles, as it is necessary, in order to preservation, to prevent the access of moisture.

Nitrate of ammonia is never used in medicine, except it be to form the *nitrous oxyde gas*, and that but rarely. We have

treated of its formation, under the head of the *gasses*.

Acetite of ammonia was formerly much employed in medical practice, and is still in considerable estimation with some physicians. It has been called *acetous ammoniac*, *vegetable ammoniac*, and *spiritus mindereri*. It may be made, by adding to carbonate of ammonia enough of strong vinegar to saturate the alkali. The acetous acid (or vinegar) in combining with the ammonia, causes its carbonic acid to escape, and so forms *acetite* of *ammonia*. This medicine is employed chiefly as a sudorific, an end to which it is well adapted.

PART VIII.

Of Chemical mixtures employed in medical practice.

It is of some importance to the student, to be able to compound medicines with accuracy. For want of this knowledge, he will frequently mix substances of an opposite quality in such a manner, as not only to have a bad appearance, but also to fail, in a degree, of producing the desired effect.—There are several oleaginous prescriptions, that cannot be rightly prepared by a person ignorant of chemical principles; except, in-

deed, it be by some one, who, having served an apprenticeship to the business of compounding medicines, has learned the art mechanically.

For example, we will state a prescription, as follows:

Oleum Ricini—two ounces.
Pulv. G. Arab.—half an ounce.
Sacch. Alb.—two drachms.
Aq. Menth.—half an ounce.
——Fontis, three ounces and a half; mix according to art.

Now, if I put the waters into a mortar, and add the sugar and then the gum arabic, and rub them well together, and after that, pour in the oil, I shall in vain attempt to make a neat mixture. But if I first rub together the sugar and the gum, and then triturate the oil with the powder thus formed, I will obtain a mixture, which may be easily incorporated with the waters, and so form a compound, almost entirely homogeneous.

So with the spermaceti emulsion, which is usually made as follows:

Spermaceti—one ounce.
Sacch. Alb.
Pulv. G. Arab.—of each, half an oz.
Aq. fontis—four ounces.
Tinct. Opii.—one drachm.
Mix to make an emulsion.

If I attempt to incorporate the spermaceti, with the water and laudanum, by means of trituration, I will inevitably fail. Nor can I succeed, by rubbing together, the sugar, the gum, the water and the laudanum, and then adding the spermaceti. I must first rub the spermaceti with the sugar and the gum, and having combined these intimately, the water and laudanum may be gradually added, and by a little more rubbing a good mixture will be obtained.

The principle involved in all mixtures of this sort, is contained in that law of chemical affinity, by which we are taught, that some substances cannot unite, without the intervention of a third, which acts as a bond of union between the other two. This law is sometimes termed the law of disposing affinity.

As this volume was not designed for a treatise on pharmaceutical chemistry, it will not be expected that I should enlarge on this subject. It was deemed necessary to say something under this head, with a view, chiefly, of exciting the student to investigate the principles of chemistry, generally.

Table of Medical and Chemical synonims.

Names modern.	*Names that are occasionally used.*
Oxygen gas, or	Vital air. Deplogisticated air. Fire air. Empyreal air. Pabulum vitæ.
Nitrous oxyde gas, or	Gaseous oxyde of azote. Dephlogisticated nitrous gas. Exhilarating gas.
Carbonic acid gas, or	Fixed air. Acidulous gas. Aerial acid. Gas sylvestre. Mephitic acid. Cretaceous acid.
Aqua ammoniæ puræ, or	Spirit of hartshorn. Spirit of urine. Spirit of sal ammoniac.
Nitric acid, or	Aqua fortis. Spirit of nitre.
Sulphuric acid or	Vitriolic acid. Oil of vitriol. Acid of sulphur. Universal acid. Spirit of vitriol. Glacial acid.
Acetous acid, or	Vinegar. Acid of fermentation.

Sulphur, or } Mineral sulphur. Sulphur vivum.

Oxyde of carbon, or Charcoal.

Alcohol, or } Spirit of wine. Lamp spirit. Ardent spirit. Rectified spirit. Vinous spirit.

Sulphuric ether, or } Ether. Vitriolic ether.

Spirit of nitrous ether, or } Sweet spirit of nitre. Spiritus nitri dulcis.

Red oxyde of mercury by heat, or } Precipitate per se. Mercurius calcinatus.

Red oxyde of mercury by nitric acid, or } Red precipitate.

Oxy-muriate of mercury, or } Corrosive sublimate. Sublimate of mercury.

Sub-muriate of mercury, or } Mercurius dulcis. Calomel. Hydrargyrus muriatus mitis. Sweet sublimate.

Sub-muriate of mercury and ammonia, or } White precipitate.

Sub-sulphate of mercury, or } Turpeth mineral. Yellow oxyde of mercury.

Black sulphuret of mercury, or	Ethiops mineral.
Nitrate of silver, or	Lunar caustic. Lapis infernalis. Lunar nitre.
Sulphate of copper, or	Blue Vitriol. Vitriol of copper. Cyprian vitriol.
Ammoniuret of copper, or	Cuprum ammoniacum. Ammoniacal copper.
Acetate of copper, or	Verdigris. Crystallised verdigris. Crystals of venus.
Carbonated oxyde of iron, or	Rust of iron. Rubigo ferri.
Green sulphate of iron, or	Sal martis. Copperas. Green vitriol. Vitriol of iron.
Red sulphate of iron, or	Colcothar vitriol. Saffron of Mars.
Tinctura muriati ferri, or	Tinctura martis. Tincture of steel.
Acetate of lead, or	Saccharum saturni. Sugar of lead. Salt of saturn. Vinegar of saturn.

Extractum saturni, or } Vegeto mineral water of Goulard.

Oxyde of lead, or } Litharge.

Carbonated oxyde of lead, or } White lead. Cerusse, White calx of lead.

Super sulphate of zinc, or } White vitriol. White copperas. Vitriol of zinc. Sulphate of zinc.

Carbonated oxyde of zinc, or } Lapis calaminaris.

Oxyde of zinc, or } Lapis tutiæ.

Do. or } Philosophical wool. Nihil album. Pompholix. Flowers of zinc.

White oxyde of bismuth, or } Pearl white. Flake white.

Tartrate of antimony & potash, or } Stibiated tartar. Emetic tartar. Antimoniated tartar.

Oxyde of antimony, or } Vitrum antimonii. Glass of antimony. Calx of antimony.

Muriate of antimony, or	Butter of antimony. Antimonial caustic. Pulvis algarothi. Mercurius vitæ.
Arsenious acid, or	White arsenic. Oxyde of arsenic.
Arsenite of potash, or	Fowler's solution of arsenic.
Sub-carbonate of magnesia, or	Magnesia.
Magnesia or	Magnesia calcinata. Magnesia usta. Magnesia pura.
Sulphate of magnesia	Epsom salt. Sal catharticus amarus.
Carbonate of lime, or	Creta preparata.
Super sulphate of alumine and potash, or	Alum.
Alumen ustum,	Burnt alum.
Potash, or	Vegetable alkali.
Sub-carbonate of potash, or	Salt of tartar. Salt of wormwood.
Nitrate of potash, or	Nitre. Salt petre.

Super-tartrate of potash, or	Acidulous tartrate of potash. Cream of tartar.
Tartrate of potash, or	Soluble tartar.
Tartrate of potash and soda, or	Rochelle salt. Salt of Seignette.
Soda, or	Mineral alkali. Fossil alkali.
Muriate of soda, or	Salt. Common salt. Rock salt. Bay salt. Sea salt. Sal gem.
Sulphate of soda or	Vitriol of soda. Sal mirabile. Glauber's salt.
Ammonia, or	Volatile alkali.
Muriate of ammonia, or	Sal ammoniac.
Carbonate of ammonia, or	Volatile salt. Prepared ammonia. Mild volatile alkali.
Acetite of ammonia, or	Acetous ammoniac. Vegetable ammoniac. Spiritus mindereri.

In the above table are given, only, the sy-

nonims of articles noticed in this work; for a more extensive view of the synonimous terms of chemistry, the reader is referred to the different elementary treatises on that science.

APPENDIX.

A DISCOURSE

ON THE

MEDICAL CHARACTER.

On no topic whatever is popular sentiment more erroneous and ill-judged, than with regard to the true importance of the medical character. This mistake originated in the too prevalent custom of estimating persons and things, not according to their intrinsic value, but in proportion to what they seem to be worth. Thus, the man who talks incessantly, though to no good purpose, not unfrequently acquires a character of consequence, from no other consideration, than his volubility; while the man of sterling sense, who seldom speaks but as occasion requires, never rises above mediocrity, except in the estimation of the few who know how to appreciate real merit. In this way, the popular regard of the medical character is founded on some contingent, and not always laudable

quality, rather than on the solid sense and respectable acquirements of the individual. This evil is daily increasing, not only to the injury of the community, but also to the sore mortification of many young physicians of more than ordinary worth. How are their generous sensibilities wounded, and every finer feeling of their souls blunted, on beholding arrogant ignorance, occupying the native seat of intellectual excellence, simply because the one is decorated with some tinsel glare, which the other has not. Why are these things so, and how may the evil be remedied? These are questions of considerable importance, and shall now claim our attention.

The evil alluded to has its origin in the ignorant or erroneous judgment of parents and guardians, in the disposal of those who are placed under their care and direction.—A man in affluent circumstances, who has several sons, determines, without any reference to mental capacity, that one of them shall be a divine, another an attorney at law, and a third (for they must all be professional men) a physician; thus establishing professional disgrace, by parental law. Far better was the mode practised by the Chinese, to ascertain the peculiar mechanical fitness of their children. They, in the first place, in-

toxicated them, and then placing before them the tools of the different trades, observed what tools they preferred, allotting them a trade in agreement with their particular preference. In this way there was at least a chance, that the boy and his trade might be adapted to each other; and it was, beyond all doubt, quite as rational a mode, as that which is pursued among us at the present day. I have known two young men of the same family, sent to professional studies, the one to the ministry, the other to medicine, with no other qualifications, than the most profound ignorance, and a large stock of assurance, who beyond all controversy, were never destined to a higher honor than that of tilling the ground. And such men, let it be remembered, are the very persons who most readily gain the popular favor: For, if they are without mind, they can assume a sort of manners, which although destitute of any definite quality to recommend them, receive the appellation of *agreeable;* as fools may, and frequently do possess, what are styled agreeable or accommodating manners. Let it not be imagined, that these remarks are designed to depreciate the importance of an affable deportment, of gentleness and modesty of demeanor, in short, of any quality that can endear a physician to his patients. All these are necessary, and without them, no man, however great

his professional skill, ever arose to eminence and true respectability. But the error lies in mistaking these as the medical character itself, instead of regarding them as mere appendages to it.

It would seem, that many persons consider the science of medicine, as, of all other kinds of knowledge, the most easy of attainment. Hence it is, that so many worthless creatures have been patronised as physicians, who never knew any thing of the profession. So infatuated are the people generally, as to suppose it a matter of no moment, to ascertain whether a man who calls himself a doctor, has ever received a medical education or not. Nay, further, some are so willfully perverse, as to countenance quackery in all its forms, with the fullest evidence of that quackery before their eyes. This then is surely an evil of alarming magnitude; an evil that robs the worthy of their due, to bestow favors on those who merit nothing but contempt; an evil, that strikes at the very foundation of good order and the happiness of mankind. These remarks necessarily lead to the point next to be considered, viz. How may this evil be remedied?

I know of but one mode, by which to effect so desirable an object, and that is, by forming one universal standard, by which to

judge of the medical character correctly. This can best be done, by delineating the qualifications of a well instructed physician, and by pointing out the importance of the profession to the community at large. I shall, therefore, endeavor to state, briefly, what we are to understand by a good physician; to shew the importance of medical men in some of the most interesting concerns of life, and thereby to exhibit the folly of those who patronise quackery, and thus bring disgrace on an honorable profession.—I trust, that in this undertaking, I am influenced by no other motive than a love of truth. It is to the end that correct opinions on so interesting a subject, may gain the place of error, and by being generally inculcated, restore medicine to its legitimate seat, that I am impelled to stand up and assert the honor of my profession. And is not this a motive sufficiently laudable to warrant me in the attempt? Does the poorest mechanic look with contempt on the man, who would ignorantly and impudently usurp authority in his vocation, and stand forth the champion of the rights and principles of his business? and, shall the weak, the ignorant, the base, yea, the very outcasts of society, present themselves to the public as fair representatives of the medical character, and pass into notice and favor, fearless

of censure, harmless from the shafts of truth? No; they shall not. Long as the memory of Sydenham, and of that man who on this side the Atlantic, was Sydenham's brightest image, shall be cherished and loved, so long shall quackery be lashed naked through the world, and its deformities exhibited to public contempt.

The great variety of character discoverable among those, who offer themselves as practitioners of the healing art, has led to the inquiry, what constitutes a real physician? And as this inquiry can be most satisfactorily answered by a reference to individual character, and as, in my opinion, Dr. Sydenham stands pre-eminent as a model in the profession which owes so much to his labors, I shall point out the ingredients which are essential to form a physician, by a survey of the character of that great and excellent man.

Those who knew best what the facts were in relation to the disputed question concerning the education of Sydenham, testify, in the plainest terms, that it was perfectly regular, both in medicine and academical instruction. He was one of Oxford's pupils, and from the university of Cambridge he received his medical passport. These facts are necessary to be repeated, in order to overturn the

opinion so often intruded by ignorant and idle practitioners, that this illustrious physician acquired his information in the visionary fields of chance, rather than in the temple of science. No man ever became illustrious accidentally in any branch of science; though it be a truth, that some illiterate persons, by exerting the native powers of their minds, have made great attainments. "Men," says Dr. Rush, "may become wise and distinguished, by meditation or observation, in the science of morals and religion, but education and study are absolutely necessary to constitute a good physician." And herein lies the grand distinction, between the scientific physician, and the man who merits the title of a quack. The one pursues an avocation, the nature of which he has learnt by long application to its principles; the other presumes to understand the rules and practice of what he calls his profession, without any previous study, or what is worse, without either talents or industry to investigate. Most of the pretenders in medicine, have originally pursued some other business or calling, for which they possessed no talent; and supposing as most people do, that any one may cure diseases, they have fled to the healing art as the last refuge of their hopes: But, the man whose claims to the medical character are well founded, owes his pre-

tensions, not to an arrogant assumption of a profession, for which nature never intended him, but to a long and attentive study of the facts and principles which form the basis of all good sense in medical science. How opposite then the qualifications of the true physician and the pretender, to practice with propriety, that noblest of all arts the art of healing! One would suppose, that a rational man could not, for a moment, countenance the ignorant, yet bold, pretensions of the quack. But how often are we called, with painful emotions, to witness such conduct! To hear an enlightened, literary character, proposing to an aged, learned and experienced physician, to call in consultation an illiterate creature, whose only claim to public notice was, that he performed all his cures, "free of charge and with herbs," is enough to sicken the heart of any man who possesses a particle of sensibility. Yet such a case has occurred in the city of Philadelphia, and that too in so important and so frequently fatal a disease as pulmonary consumption. I have stated in general terms, the character of the man now selected, to set forth the true medical practitioner. His professional excellence has been acknowledged in all countries where medicine has been scientifically cultivated; and for this reason, especially, that his conduct as a phy-

sician was never tributary to chance, *but always rested on the solid basis of observation, guided by just principles.* This is the grand line of division, and it must continue to be the separating wall between regular medicine and daring quackery. And if any one is at a loss to determine who is or who is not a quack, let him come to this touchstone, for it will infallibly decide in all doubtful cases. Without this trait of character no matter how many colleges may have been visited, how many books consulted, nor how many diploma received. In this respect, our profession resembles that which of all others is most sacred; I mean the ministerial calling. For, who is there that esteems any one in the light of a gospel minister, simply because he has acquired a profound knowledge of the dead languages, and been ordained to his high office? Does all this entitle him to the rank to which he aspires, so long as he is destitute of piety? By no means; and in this respect, popular opinion is generally correct. Why then, I ask, should any man receive public patronage as a physician, who, so far from acting under the influence of principles in medicine, totally disclaims them, or else discovers to every one, that he knows nothing about them?

But it is not always the medical character of a quack, that occasions the least injury to

society, such men are generally devoid of moral rectitude, further than relates to their exterior deportment. They evince, by the fact of undertaking a most important business for which nature never intended them, a total want of moral principle and virtuous sentiment. Very different from this was the excellent Dr. Sydenham. "He was," says an eminent writer, "a man of the most exemplary morals, and benevolence was his predominating virtue. He loved the whole human race and sympathised with every species of human misery. He thought it was not acting the part of a *good* man to convert to his private advantage, what might prove eminently serviceable to the public; nor of a *wise* man to deprive himself of the blessing he might justly expect from heaven, by endeavoring to promote the public good." But his benevolence was not confined to the age in which he lived. He included posterity in all his efforts to advance human happiness, and instead of concealing any thing from the public view that was calculated in his estimation to benefit mankind, he was ever forward in developing the treasures of his mind. That he was pre-eminently a man of candor, is evident from the frequent acknowledgments made in his own writings, of erroneous views in relation to several diseases. And so far was he from

being led by avaricious motives, that he declares in the most public manner, " he had rather discover a certain method of curing the slightest disease, than to accumulate the largest fortune." The purity of his motives was so great, that he ever preferred the life of a fellow creature to his own reputation and interests, and thought no man in a condition to do justice to his patients, who was not influenced by similar feelings. I need not add to all this, what every one must believe—that Sydenham was a Christian. He was so, truly, if virtuous conduct be a just criterion by which to judge in such a case.

For a moment, let us compare some of the traits of Sydenham's character with the prevailing disposition of the quack. The medical difference between the two has been already noticed, and it remains to contrast their morality. In attempting this, what shall we say of the candor of quacks? If we would say truly, we must declare, that their entire dispositions are the very reverse of candor. What! can that man be possessed of candor, who dares to approach the sick bed of one who has a large and helpless family dependent on his exertions, with the full conviction (if he examines his own heart) that he is wholly unqualified by art to do that for which no man was ever fitted by nature? Candor in such a breast! it cannot

be. It may be said, however, in extenuation of guilt, that such a man may act under an impression that he is qualified, while he is really not so, and thus remain innocent, free of evil designs. This, however, will not serve as an excuse, nor will it be sufficient to adduce some qualifications to justify the want of that essential part of the medical character, without which all others are worse than useless. Ignorance, instead of palliating guilt, enhances its enormity, if the person who claims extenuation on that ground has the means of removing that ignorance, either in whole or in part. The candor, benevolence, gratitude, amiable deportment, and other moral qualities of Dr. Sydenham, did not make up the whole of his medical character, and would have failed altogether of gaining him that reputation he so justly acquired: And yet, how many are there, who would not relish the epithet of quack, whose only hope of gaining popular favor rests on a pleasing address, a certain whining of the voice, or something of the "graceful" in their movements; all of which are so truly contemptible, when made the basis of medical popularity, that no better evidence of quackery need be adduced, than the fact of such means having been resorted to, in order to get business.*

* While on the subject of medical candor, I

It cannot be matter of astonishment, that

would not pass by (without becoming notice) the amiable ingenuousness of the American Hippocrates. When the contested question of the contagiousness of yellow fever first engaged the attention of the physicians in this country, Dr. Rush stood foremost in the list of the advocates of contagion. He maintained that sentiment, no doubt, from a deliberate conviction of its truth. Subsequently, however, when the subject presented itself to his view in a more correct light, he discarded his error, fearless of the accusation of instability, which he would most probably incur. The medical world now beheld in him the most formidable opponent to the doctrine of the contagion of yellow fever—he was himself a host. Nor did he, as some have done under similar circumstances, attempt to rid himself of the erroneous opinion clandestinely; he came forth boldly, with all the candor of honest integrity, and published to the world his own recantation. Had he possessed the unbending spirit of proud philosophy, that dares to sacrifice truth on the altar of self-gratification, he would have persisted in his error, and gloried in his obstinacy. But such was not the character of Rush—he was a lover of the truth, and had a soul that scorned to build systems on any other basis. But, what shall we say of the libel on his character, that has lately received publicity in a celebrated French dictionary? It is there declared, that, on his death-bed he again recanted, and avowed his belief in the doctrine of contagion. Daring arrogance! thus to trifle with the memory of departed greatness! The allegation is false; the assertion is a vile slander, and we repel it back indignantly to the source whence it came. Arise, ye sons of Esculapius, in whose breasts (by the ardor of the immortal Rush) was kindled the flame of science, and hurl back on his calumniators the foul reproach.

the medical character has been highly honored in almost all ages of the world; I mean the medical character, as exemplified in such men as Dr. Sydenham. It has received the encomiums of kings and emperors, and what is better by far, the respect of truly good men. An eminent divine, in a letter addressed to Dr. Percival, thus expresses himself: "I have been long in the habit of reading on medical subjects; and the great advantage I have derived from this circumstance, is, that I have found opportunities for conversation and friendship with a class of men, whom, after a long and attentive survey of literary characters, I hold to be the most enlightened professional persons in the whole circle of human arts and sciences." And Mr. Pope, the celebrated poet, writing to a friend says, "there is no end of my kind treatment from the faculty. They are in general, the most amiable companions and the best friends, as well as the most learned men I know."—Such is the respect that has been deservedly paid to a profession, whose benevolence embraces the whole human family.

Even those who sometimes bring the greatest reproach upon the medical character, do, occasionally, give the most decided acknowledgment of its excellence and importance: For, who is there among those who inconsiderately countenance quackery in their families,

who would not gladly prefer the professional testimony of a regularly educated physician, in matters before a court of justice? Indeed the testimony (on a medical subject) of a man who was known to a court and jury, to be an uneducated practitioner, would, in most cases, be regarded as of no consequence. Nor, would any person, who wished to establish a will, on the ground of the testator's sanity, ever think of producing a quack's testimony in the case, but would far rather be able to offer the evidence of the most enlightened physician, if that were in his power. Is not this the case also in relation to the testimony of medical men, in suits which involve life? Who would, on such occasions, risk an existence to the ignorance of quackery? But, property and life are not all the important circumstances that are capable of being affected by medical testimony. Character, that most sacred possession, dearer than all the possessions of earth beside; without which man is nothing superior in importance to a beast, is liable to be blasted by the evidence of a physician. There lives not an individual, however blinded by error in relation to quackery, who would confide in the testimony of a pretender in medicine, where that testimony, through ignorance, might totally ruin the reputation of a friend.

The evidence of physicians in cases where

life is involved, has been already noticed; but, it will be proper to state a most important instance of this kind, now in the writer's recollection. Two men were condemned for the crime of high treason against the laws of the United States, under the administration of the great and good Washington. These men were confined in the Philadelphia prison, and one of them was reported to be mentally deranged. In consequence of the rumor, the president commissioned three eminent physicians to examine the prisoners, with the view of deciding the point in question. The persons commissioned were the late venerable Dr. Shippen and Rush, and Dr. Samuel P. Griffitts, who is still living. They entered upon the important duty assigned them, and were finally so completely satisfied of the insanity of one of the prisoners, as to sign a report to that effect, for executive inspection. In consequence of the report thus made, the president was induced to grant a respite to both prisoners; and at the end of the period for which the respite was granted, popular clamor had so far subsided, that a full pardon to both met with but little opposition. But let me ask one question, naturally arising out of the above narration. Suppose the president had selected three notorious quacks, or three indifferent persons who pretended to be physicians,

with a view to an investigation of this case, Would a pardon, or even a respite, founded on the report of such men, have failed to excite public clamor? I am bold to aver, that it would not; and this single circumstance is amply sufficient to condemn, altogether, every species of encouragement afforded to quacks. Men will not countenance quackery in the smallest degree in matters of public notoriety, which involve property, life or character, and yet they feel no scruples in giving it admittance within the family circle. How strange is it, that mankind allow themselves to be deceived in a matter of such momentous concern; but, however strange, it is awfully true. Their apathy might induce the supposition, that life was a thing of inferior importance, of less value than houses or lands. If a man has a property of trifling value at stake, he does not apply to a mechanic to defend his cause before a court and jury, but goes to a lawyer who has been regularly educated to his profession, and in so doing he acts wisely. But how is it when life is the subject of hazard? Do we not often find him, at this momentous crisis, acting the most foolish part? Instead of entrusting his case to the care of a physician who is master of his profession, he seeks relief from a creature who is as ignorant of the human structure as is a savage of

the mechanism of a watch. *O tempora, O mores!* when will the people learn wisdom, and get understanding?

Having thus briefly noticed some of the cases in which the importance of the medical character has been duly appreciated, I shall now endeavor to point out a variety of persons who are not entitled to the name of physician, in the true sense of that term.—And here, it must be confessed, not a little difficulty presents itself, and yet propriety demands an explicit view of the case. Who, then, are we to regard as not entitled to any just claims on the medical character? I answer, generally, by naming three classes, viz. *Mongrel graduates, uneducated practitioners* and *impudent impostors.*

First, *Of mongrel graduates.*—To some persons this epithet may appear rather objectionable. By it, however, we mean to designate a certain peculiarity of persons, who, while they carry about them a diploma, give no other evidence of their claim to the medical character; but who, nevertheless, rise into favor, and, occasionally, into eminence. A mongrel graduate is a mixed character; for, although he be not a physician in the true import of that term, he cannot be regarded as being, in all respects, a quack. It seems to me, however, that no term can better con-

vey to the mind the idea of a graduated doctor, ignorant of his profession, or so illiterate in other respects as to be scarce able to write, and, at the same time, degrading the profession to a level with the mere dealer in merchandize. Such men there are in every town in the United States; but in Philadelphia, more than any where else, is this non-descript character prevalent. The late Dr. Rush very aptly styled the persons of whom we are now speaking, "traders in medicine;" and no man had a more contemptible opinion of such doctors than the late professor. These traders are, in most instances, possessed of no qualification by nature to act in the treatment of diseases. They are, in other words, such creatures as would probably have rendered themselves much more useful, by wielding the plough and other implements of husbandry. The texture of their brains has ever been so unimpressible by the terms and principles of science, as to have made it a matter of no small surprise, that they ever obtained a degree. And, indeed, it is generally by dint of most laborious exertion, that a stock of knowledge forces its way into the brains of such persons, sufficient to enable them to squeeze through the forms of an examination.

The mongrel graduate is always an illiterate man, and never procures more informa-

tion on medical subjects, than will barely suffice to screen him from the degrading dilemma of being rejected by those who examine him, with a view of conferring a degree: For, no man possessed of respectable talents, would content himself with the reception of a diploma as a matter of favor.—His ambition would unavoidably lead him to seek an honorable dismissal from collegiate duties, and he would therefore endeavor to *merit* a degree, and so obtain it as a matter of right. Ignorance, however, is never associated with modesty in these mongrel gentry: They are always forward in their dispositions, and seldom, if ever, gain the respect and affection of good men, notwithstanding their attempts to impose, by assuming a sort of manners totally foreign to their native characters. They are ever acting the part of public intruders, by forcing themselves into notice every where, and on all occasions.

If a vacancy occur in any of the medical charities, the man of modest merit finds, in this class of practitioners, perhaps half a dozen rivals obstructing his course in pursuit of the prize. Indeed, such is the assurance of these men, that truly deserving physicians have often been deterred from attempting to rise into notice, lest by failing, they should experience the mortification of

beholding ignorance and arrogance elevated to an eminence which should be occupied only by talents and respectability.

It may sound strangely, but it is nevertheless a truth, that of all quacks, the mongrel graduate is the most injurious to the profession. He is so, because the common people invariably suppose such an one to be, indeed, what he professes. He, therefore, doubly deceives, and is, of consequence, doubly mischievous. Of the avowed impostor, every one is aware, and the individual who is injured by his nostrums, can blame no person but himself: Whereas, when the mongrel is employed to treat a disease, the patient supposes himself to be in the hands of a man, who is master of his business, and he thus innocently jeopardises his life. Nor is it the patients only of such practitioners who are injured by them. The regularly educated physician, whose talents are obscured by modesty, is the greatest sufferer. He beholds a man recognised and encouraged as a physician, who has no other evidence of qualifications, than that he is a graduate, and who, if justice had been awarded him, would not have received even the exterior insignia of the profession: For, it may be asked, and with great propriety, how can the community distinguish between men who wear

the same professional badge? This, it must be granted, is a difficult case, and we know not how to prescribe a satisfactory rule. But with men of good sense and polite education, the distinction must be perfectly easy, and therefore to point out a rule for them, were useless. Such persons discover at first sight, that the mongrel graduate is by no means a scientific man; that he is not an observer of nature; or, if an observer, that he is none the wiser for it, as he knows not how to derive advantages from that source. It will not, however, be in the power of the community at large to guard against this species of practitioners, and we must despair of ever seeing the evil remedied, until the regulations of universities shall have been so far rectified, as to exclude every man from medical honors, who is not properly qualified to discharge the duties of so important a profession.

The next class of persons to be spoken of, as not entitled to the appellation of physicians, are all such men as presume to practice medicine, without any, or with but little preparatory study. They are not unfrequently possessed of some literary acquirements, though there are among them, many very illiterate creatures. If we inquire into their history, we discover that they have ori-

ginally pursued almost all the avocations common among mankind. From the smiter of the anvil, up to him who was intended by his parent or guardian for the duties of the clerical order, there have been found not a few, of all trades and descriptions, who have arrogated to themselves the right of practising physic. There are some to be met with, whose original employment was the manufacturing of shoe-blacking; and some, probably, who were esteemed dexterous in the use of that necessary article, and who might still, as shoe-blacks, have ranked above mediocrity. There are others, who, if we may credit their story, were educated for the ministry; but having neither talents nor dispositions suited to that calling, and presuming that any man might be a doctor, resolved to enter the lists with the sons of Esculapius. And I have known another of these pretenders to the healing art, who, but a few years ago, was respected as a mechanic; but interest rising superior to virtuous principle, and, he, no doubt, anticipating a day not very remote, when he would be engaged in the more honorable business of a doctor, chose to cut short his affairs, by winding up his accounts in the debtors' apartment. On procuring a release from the iron grasp of injured creditors, this aspiring gentleman made his escape to an eastern town, where he commenced the

practice of medicine, and very soon afterwards had the unblushing effrontery to advertise a popular course of lectures.

But, it may be asked, (and yet facts make the inquiry needless) do such men ever succeed in obtaining business? I answer, by a reference to such characters, wherever they are to be found, and that is, every where. —Facts are stubborn things, and we cannot easily lose the remembrance of them, where they have occurred within our personal notice, so as to excite feelings of disgust. I will detail one of this species in as brief a manner as possible. When I was a student of medicine, and an attendant on the practice of the Philadelphia alms-house, I frequently observed a man, who came there for the purpose of learning how to perform the operation of venesection. He was not suspected by any one of having any other object in view, than to become a bleeder. In a few months after this, I observed his name on the door of his dwelling, as Dr. ——, and before a year had elapsed, a horse and gig were provided for the expedition of the doctor's business. This gentleman, forsooth, was a practitioner of surgery, as well as of physic; and the following case may suffice to show his talents in that capacity. He was called to see a man who had received a large incised wound in the back of the neck, made

with a broad sword. He went to work, by "stuffing it to the bottom" (as a writer terms this sort of practice) with lint. This being done, our surgical hero poured in as much Fry's balsam as the lint was capable of absorbing, after which he bound the whole with a bandage as firmly as was practicable.

This may be regarded as a pretty fair sample of this "riding doctor's" skill; and notwithstanding his ignorance, I can say, without exaggeration, that for ten patients I have had, he has attended at least one hundred.—He acquired business, by what the common people style "condescending manners"; that is, a readiness to act in any capacity, however menial, with a view to serve his patients; and by a sort of deportment which means any thing or nothing, and yet effects the purposes of the quack most completely.

It would be an endless task to enumerate all the arts practised by these uneducated pretenders to gain a living. One induces a belief, that he is very wise, by making fifty enquiries that are totally unnecessary, and altogether irrelevant to the case. Another begets confidence by enumerating a host of hob-goblin cases of desperate character, that never occurred, but which, notwithstanding, were cured by his unequalled skill. Thus, every expedient is resorted to by the quack,

for the purpose of appearing to be skilled in a profession of which he is radically ignorant; and his artifices, base as they may appear, are crowned frequently with success.—While the well-informed physician lives in obscurity, and almost without the means of defraying ordinary expenses, these ignorant intruders rise into notice, and often grow rich, even to independence.

The third class of persons which we designated as having no claims to the medical character, are *impudent impostors.* Of these it is needless to say much: They are so well known, that no person can plead any excuse for injury received from them. The man who intrusts his life to their hands, and so falls a victim to their baseness, ought to be regarded in no other light than a self-destroyer: He is justly chargeable with suicide.

Impudent impostors are all those miscreants generally known by the name of cancer doctors, wen doctors, &c. There are numbers of them in every large city, who profess to be particularly successful in the treatment of "a certain disease." Some of them possess *infallible* remedies for deafness, loss of sight, and similar complaints. Fortunately for those who do not wish to be deceived; these creatures bear about them full evidence of their dishonesty, and can always be known at first sight.

Having thus remarked, at some length, on the different characters who are not entitled to the name of physician, we shall close this discourse by offering a few observations on the probable tendency of well digested college regulations, combined with proper legislative proceedings, to give to the medical character its legitimate importance.

And, first, *Of University Regulations.*— No person, whatever, should be admitted to the preliminary studies of an university with a view to receiving a medical degree, who had not previously submitted to the examination of the faculty to decide in relation to his fitness for the study and profession of medicine. I would have this matter adjusted precisely in the way in which boys are usually dealt with, previously to becoming apprentices to learn a trade. For example— No master workman would be so mad as to take an apprentice to learn the trade of making and repairing watches, whose vision was confessedly very imperfect. Nor would he be deemed a suitable person to learn a trade, requiring an erect position of the body, whose inferior extremities were so deformed, as to render the act of standing, constantly, altogether impracticable. Nevertheless, there are trades to which such persons might be well adapted, and in which they might become perfect masters. So in medi-

cine—a man whose mental vision is grossly obscure, ought, for no consideration, to be admitted to the study of a science, a proper acquaintance with which requires the constant exercise of vigorous powers; yet, he might, by diligent application, become a respectable mechanic, or an useful instrument in causing the earth to bring forth its fruit in due season.

The education a young man has received, previous to his entrance on medical studies, is a matter of great moment, and should be more scrupulously noticed by universities.—Herein college regulations are lamentably deficient, and, until reform takes place, the evil can never be remedied. It is true, that candidates for degrees are required to exhibit their inaugural essays correctly spelt; but, it is equally true, that many persons have received medical honors who did not write a line of their dissertations. So undeniable is the fact, that I have known men who passed through the ordeal of examination, with tolerable ease and some credit, whose private letters of correspondence, and the original manuscript of their theses in their own hand-writing, would be regarded as highly disgraceful to the profession. This remark applies not only to the crudity of the matter, but also to the spelling of commonplace words, and the most glaring gramma-

tical errors. I am not anxious to compel every man who wishes to study medicine, to acquire a classical education in the full sense of that term. But the least that ought to be expected and required, is such an acquaintance with the English language, as would enable the individual to appear before the public, whenever he might find it convenient to do so, with credit to himself, or, at least, in such a dress as not to disgrace the profession whose badge he wears. "Every professional man," says lord Bacon, "is bound to contribute something to the improvement and advancement of his profession." This, in medicine, is to be effected by the communication of interesting facts, or ingenious speculations, for the benefit of medical men generally. But, how can a man thus contribute to the advancement of the profession, whose essays (were he to write any) would necessarily involve himself, and, in some measure, his brethren, in disgrace? Such men would act wisely were they never to write.

Let it then be regarded as a *sine qua non* of admission to the study of medicine, that a man shall give satisfactory proofs, that he is, at least, an English scholar. I need not point out a way to obtain those proofs, because it is obvious that no mode can so well ascertain any fact of this nature, as a personal examina-

tion. This preliminary point having been adjusted, it should next be enquired if any, and what, unfavorable traits of character attach themselves to the individual. Then the difficulties under which young physicians labor in acquiring business, together with the other perplexities incident to a medical life, should be faithfully delineated; and if the resources of the applicant should appear insufficient to maintain him decently for several years, subsequently to receiving a degree, he ought by all means to be discouraged from entering upon medical studies. This I conceive to be a matter of immense consequence; for the pecuniary embarrassments under which many young physicians labor, often paralise mental exertions, and arrest the tide of usefulness, or stop its course altogether.

Although a diploma carries with it presumptive evidence, that its possessor was fairly entitled to it, still the conclusion is not always founded in fact. Nor is it to be taken for granted, in all cases, that he who never received a diploma, is, on that account, an ignorant pretender. But it is possible to establish and enforce such regulations in a university, as shall give to diplomas their full force in all cases. A man may, by dint of a retentive memory, pass a good examination, and procure a degree,

who is very unfit to practice medicine. But if every candidate for medical honors were required to produce satisfactory testimonials of assiduity during the term of years prescribed for study; if he were obliged to give sufficient evidence of punctual attendance on the practice of hospitals; and if, in addition to these pre-requisites, he were called upon for good proofs of moral character, a diploma conferred under such circumstances, might be justly esteemed good evidence of qualifications to practice medicine. We might further remark, that all candidates should be required to study under the direction of a regularly educated practitioner.

The last point to be noticed under the head of university regulations, is, to require of every person on receiving a medical degree, some sort of obligatory declaration in the nature of an oath, or affirmation, for the faithful performance of professional duties. And, so soon as a physician would violate this declaration, he should be reprimanded by the authority of the university which conferred upon him his degree; and if that failed of reforming him, he should, at a limited period, be denounced as having forfeited all claims to the medical character.—I conceive this to be an important regulation, and it is one of the remnants of ancient usage, which it had been well to have retained in

every code of university regulations. Attornies at law are obliged to submit to a similar regulation, and even ministers of the gospel are pledged for the faithful discharge of their trust, in a way that is considered equally binding with the solemnity of an oath.—But I would insist upon it in the profession of medicine, because there are occasional temptations to act unjustly, which do lead some physicians astray, and thus cause them to bring reproach on the name by which they are characterised. Were such men bound by an oath to act with justice and impartiality, and were they conscious that the violation of that engagement would be the forfeiture of their standing and character, there would soon be less of mercenary trading in medicine, and fewer instances of regular-bred quackery. There are some men, who, from their natural dispositions, are led to act honestly in their profession; and, if others are not so inclined (and experience has evinced this to be a truth) it is highly proper to establish some rule by which they may be compelled thus to act. In my opinion, a noble independence of mind, a fixed determination to act agreeably to principle, rather than conform to popular caprice, so as to sacrifice that principle, are traits which naturally belong to the true medical character.—What said the illustrious Sydenham on a sub-

ject nearly allied to this? "Upon deliberate and equitable reflection," says he, "I find it better to assist mankind, than to be commended by them, and highly conducive to tranquillity of mind; popular applause being lighter than a feather, or a bubble, and less substantial than a dream." And again: "Provided I discharge the duty of a good citizen, and serve the public to the prejudice of my private interest, what matters it if I gain no reputation thereby? for, upon due consideration, my endeavoring to secure a character, who am now advanced in years, will, in a little time, be like providing for a non-existence; for what will it avail me after my decease, that the eight letters which compose my name, should be pronounced by those who will be able to frame no idea of me in their minds." This is the language of a man whose name will be revered by posterity, just in proportion as purity of motives and honesty of character shall predominate in society. He well knew, that to maintain his integrity, and to act the part of upright independence, was the direct road to public censure; but he regarded a "conscience void of offence" as far preferable to all the false friendship which the wiles of sycophancy might have procured for him. To every physician, the language of his conduct is, *go and do likewise.*

Of Legislative Agency.—As a means of establishing correct views in relation to the nature and importance of the medical character, legislative agency might effect more than could be accomplished in any other way; because, the force of law is felt by all classes of the community, and, therefore, must be acknowledged: And, in this enlightened era, (as it has been called), one would suppose, that a legislature would so far partake of the general illumination, as to adopt measures indicative of the boasted improvement of society. But what is the state of the case, in relation to Pennsylvania? I blush for the honor of my native state, when I think of her degradation, and I sigh for happier times; but, fear, alas! I sigh in vain.

Of what avail are the best regulations of an university, if they receive not the sanction and support of legislative authority? Of what consequence are its rules, if, by neglect of the legislature, those who are educated within its walls, shall be degraded to the same level, in public estimation, with the most ignorant and mercenary impostor? Can they give effect and respectability to the medical character, where public opinion is not properly regulated by the fostering care of those whose province it is, by their public acts, to furnish to the world an index

of the character of the people they represent? By no means.

Every man is a quack, in the full sense of that term, who cannot produce something more than his own *ipse dixit* to prove that he is not. For the simple act of calling a man a *doctor*, whether performed by an individual, or officially by any branch of government, is no more evidence of medical qualifications, than if he were called by any other title. He must have studied medicine to such an extent, as to have become acquainted with its principles and practice, before he can merit the appellation of a regularly educated physician. Independently of these pre-requisites, he cannot aspire to a better title than that of *quack*. The way to remedy the evil is, therefore, obvious: suffer no man to practice medicine who is not qualified for so important a business. Give to our medical colleges the privilege (and it is a legitimate one) of prescribing the qualifications which a man ought to have, in order to practice medicine with credit to himself, and advantage to the community.

But the question may be asked, ought young men to be compelled to travel many hundred miles, during several successive years, in order to attend the lectures of an

university? I answer, that notwithstanding all the difficulties in the way, this would be the safest and best course to adopt. But, if the measure should be deemed too rigorous, let universities have the power of appointing committees of examination throughout the country, with authority to decide on the merits and qualifications of those who may wish to become physicians. And this being done, let the arm of the law be extended against every man, who, instead of entering the medical profession by the regular door of admission, would seek to find his way thither by some other route. And to sever entirely every plea for irregularity, let it be an indictable offence, punishable with at least six months imprisonment, for any person to practice medicine as an occupation, who had not submitted, in some way or other, to the university regulations, thus supported by legal authority. Perhaps, even this rigor would not suffice; if so, let the quack, who should lose one or more patients by death, be liable to a prosecution for manslaughter, no further evidence of guilt being requisite, than the simple fact of the patient's death. This may be called *summary justice;* but I know of no justice too exact for men who are regardless of the lives and happiness of their fellow creatures.

A few remarks on the profession general-

ly, shall close this discourse. And first, I would observe, that it should be the pride of every physician who has been regularly educated, to conduct himself in a manner, becoming so honorable a profession. To gratify the peculiar notions, and even to indulge the prejudices of patients, may be admissible in some instances; but the practice should never be allowed, where it would necessarily oppose just and established principles. A reverence for religion should at all times characterise the profession; and no man will ever be the less respected, who not only has a regard for, but who practices, the duties which religion inculcates. The medical character is a compound of many parts neither of which, separately considered, ought to stand in place of that character. It includes not only a learned acquaintance with the science of medicine, but likewise all that is meant by the term virtue. According to my views, therefore, no man should be viewed as a just specimen of the medical character, whose habitual conduct furnishes perpetual evidence of dereliction from any one of the rules of morality. Intemperance, non-adherence to the truth, actual dishonesty, or baseness of any sort, in proportion to the extent in which they are practised, should lessen the claims of any, and every man, to the honor of the medical character; and as I have men-

tioned in a former part of this discourse, for all such vices, a physician should be subjected to the discipline of the university from which he received his degree.

These remarks are submitted, with a consciousness on the part of the writer that his views are imperfectly drawn; but at the present moment he is of opinion, that if the course above detailed, were adopted and carefully observed, the period would soon arrive, when popular sentiment would elevate the medical character from its degradation, and place it on that exalted eminence, which it can never cease to claim as its legitimate right.

THE END.

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