15.—Some blood appeared for the three last days, and she had shooting pains. Medicine continued in the above prescribed quantity. She persisting in taking it for a number of weeks. The symptoms of the disease gradually disappeared, and she regained tolerably good health.

In June, 1809, she became the mother of a healthy child, which she had carried nearly the full time.

ANALYSIS OF THE LABOURS OF THE IMPERIAL INSTITUTE OF FRANCE, FOR 1811.

Translated for the New England Journal of Medicine.

BY JOHN G. COFFIN, M. D.

NATURAL PHILOSOPHY AND CHEMISTRY.

WE know since the time of Blake and Wilke, that during the evaporation of bodies a great quantity of heat is absorbed, and that all evaporation cools the body from which it emanates, in proportion to its acceleration; on the other hand, that the pressure of the atmosphere retards evaporation, and that this change takes place in a vacuum the more readily, as the vacuum is more perfect.

Mr. *Leslie*, member of the Royal Society, London, supposed that he should still further augment the effect of the exclusion of air, by placing under the pneumatic machine, substances strongly attracting humidity, which seizing the vapour as it is formed, multiply its production indefinitely; in this manner he produced a degree of cold so rapid and violent as to freeze water in a few minutes, at any season. This is a means of having ice at pleasure, with little expense except the fire required to dry the substances employed to absorb the moisture.

Highly concentrated sulphuric acid and muriate of lime are the absorbents best suited to this purpose.

Two young chemists, Messrs *Clément* and *Désormes*, have attempted to determine the limits of this process, and the degree of economy to which it may be carried ; and, by calculating the quantity of caloric contained in the aqueous vapour, and the quantity of coal required to produce a given quantity of vapour, they have ascertained that little more than one part of coal will restore to its former state the absorbent which served to congeal 500 parts of water. Thus 100 pounds of ice would cost but one pound and a few ounces of coal. This effect may be increased by preventing the entrance of any heat from without, which may be done by rendering the receiver a non-conductor of heat ; for instance, by making it of two plates of polished metal, separated by a stratum of air.

From this acceleration of evaporation in a vacuum, augmented by the presence of absorbents, we derive a more obvious advantage when the object is merely to dry wet substances, for then we avoid their being subjected to the action of fire, which always alters them more or less.

Our fellow-labourer, Mr. *de Montgolfier*, had contrived completely to dry the juice of plants, particularly that of raisins, by means of the pneumatic pump ; and proved that this juice having been dried, on being diluted with a sufficient quantity of water, might be made to ferment, and to produce an excellent wine. But it cost too much labour ; while the addition of an absorbent is a substitute for the continued action of the pump.

It is however necessary to preserve the juices from freezing, an injury not less considerable than that arising from heat.

Messrs. *Clément* and *Désormes* have discovered a very simple method of guarding against the latter. They inclose the vessel containing the juice to be evaporated, with the absorbing material ; thus the heat which is disengaged from the steam at the instant of its absorption, returns to the juice which imparts it, and this circulation furnishes what the new vapour requires.

This process may be conducted with great economy, if we begin by reducing the juice to a syrup, by means of a ventilator, the discovery of Mr. *de Montgolfier*, and which Messrs. *Clé-*

ment and Désormes have described in the annals of chemistry, (October, 1810.) The pneumatic pump is not applied till the moment when this ventilator produces no further effect. Every one may conceive the utility for domestic purposes, especially for the navy and army, of this new art of preserving elementary substances, by greatly lessening their weight, and in transporting; in a small bulk, to distant regions, the fermentable matter which is to afford wine and alcohol. The same natural philosophers propose to apply evaporation in the vacuum, to the desiccation of gunpowder, which is done without danger, as it is done without fire. They have also attended to common evaporation by means of fire, and have found a method of doubling the effects of a given quantity of fuel on an aqueous fluid, such as a solution of a salt. It is only necessary to collect the vapour from the first portion of the fluid, and to force it to pass through a second portion of it.

This vapour of very high temperature gives out a great part of its caloric to the new fluid through which it passes, and thus performs half the work.

But of all the arts, that which has derived the most wonderful advantages from recent discoveries relating to heat and vaporization, is the art of distilling brandy; the process just mentioned is merely an imitation of those which have furnished a part of these advantages. This revolution which already exerts a most salutary influence over the prosperity of our southern departments, is due to the late *Edward Adam*, a distiller, of Montpellier. The ground of his process consists in heating a great part of the wine to be distilled, by the steam of brandy which rises from the copper, and to make this steam pass through a series of wetted vessels, in part, through cold water, which causes a deposition of its watery particles, so that the spirit of wine, in a very pure state, is condensed in the last cooler. Thus instead of applying heat at first to obtain brandy at 19 degrees, from which might be drawn afterward by successive heat, spirits of wine of different degrees of strength, we obtain at once spirit of wine of any desired proof.

Beside, the old alembic received but two applications of heat in a day, while this of Adam receives eight; the latter too ex-

tracts a sixth part more of spirit from the same quantity of wine, saves two-fifths of the fuel, and three-quarters of the labour ; lastly, the spirit of wine thus furnished has no empyreumatic taste. It is not surprising that these advantages have been promptly adopted by the distillers, for ruin would infallibly attend those who from obstinacy should pursue the ancient method. Mr. *Duportal*, a chemist, of Montpellier, has presented to the class a very exact description of this process, which has been printed, where he points out the improvements in it of Mr. *Isaac Berard*.

It is essential to remark here, that the first idea of heating by steam appertains to the Count of Rumford, foreign associate of the class, who published it in London, 1798. Thus a simple general proposition, which first appeared as a mere abstract truth without use, has enriched whole provinces. The Count of Rumford, who has made so many useful discoveries in natural philosophy, and who has attended particularly to every sort of advantage to be derived from fire, has, this year, presented to the class, many researches on light. After having described different kinds of lamps for decorating apartments, and to be used instead of candles, lamps, and watch-lights, without any of the inconveniences attending the lamps in common use, he has sought to solve this grand problem, on which natural philosophers have so long been divided, namely, whether light is a substance emanating from luminous bodies, or a movement communicated by these bodies to a fluid otherwise imperceptible, and diffused through space.

As a given quantity of a given kind of fuel gives out while burning the same quantity of heat, it ought also, says the Count, to disengage the same quantity of light, if light be contained in it in the same manner that heat is ; for those who do not consider heat as a substance, admit that it is a force, a quantity of motion which may be concentrated in a body, and which is evolved in the quantity in which it was retained ; as a bent spring expands itself. On the contrary, if light be a motion imparted to the air by burning bodies, its quantity will be proportionate, not to the quantity of fuel consumed, but to the vivacity with which the combustion shall be made, and especially to the time these particles remain heated to a degree suited to their moving the

particles of air. Having made his experiments in conformity to these ideas, both with lamps and wax candles, he found that the heat disengaged in a given time, was always in proportion to the quantity of oil or wax consumed, while the quantity of light furnished in the same time would vary to an astonishing degree, and very much depended on the size of the flame, a size which retards its cooling : a small wick of a night lamp, for example, gives sixteen times less light than a common wax candle, while burning as much wax, and heating the same quantity of water to the same degree. Thus, whatever can support the heat of flame, contributes to augment light, and we may obtain results truly surprising.

The Count of Rumford, who had ascertained by former experiments, that every flame is transparent for another flame, has combined his two discoveries ; having constructed some lamps with several flat smooth wicks, placed parallel to each other, mutually guarded each other against the cold ; he produced from them a light equal to forty wax candles ; and he thinks the intensity to which this may be carried is unlimited, which may be very important in ship lights ; because hitherto it has not been possible to carry their light beyond certain limits, for by enlarging the wicks too much with a double current of air, their light would diminish, from causes fully explained in the experiments we have just noticed.

What we said above on the cooling of bodies by evaporation, is a particular case of this law, that every body which dilates absorbs heat, which it gives out again while contracting.

To this law there are some exceptions, some of which have been long known and explained, as that of nitre, which retains in many circumstances, while condensing, a great proportion of heat, whose effects are sufficiently obvious in the combustion of powder ; but there are other exceptions whose causes are more obscure ; such as that which Mr. *Thillaye*, Prof. at the Imperial Lyceum, has made known.

The mixing of spirit of wine and water is always accompanied with an elevation of temperature, and there is generally a greater condensation than should result from the proportional density of

the two fluids, from which 'condensation this heat is explained. But Mr. Thillaye has found that when the alcohol is weak, the mixture is so far from being condensed, that it is in truth rarefied, and yet the heat is manifest.

From the tables of his experiments we see that alcohol at the density of 0,9544, begins to give rarefaction. The *maximum* of the effect is seen when the alcohol is at 0,9688 of density, and when it is mixed with once and a half its weight of water; the temperature is still raised two degrees.

The contrary case, that of condensation without extrication of heat, produces detonating substances; a well known instance we have just cited in gunpowder. One of the most terrible is that sort of powder in which is substituted for nitre the oxygenated muriate of potass; it is also one of the most dangerous, for it explodes by simple striking or rubbing.

Some however have thought of using it to prime fusils, for having no need of a spark of fire, its effects would never fail. Mr. Page, a gunsmith, has even invented locks suited to this use. But as the slightest rubbing inflames it, it is dangerous to employ it even in this way.

Messrs. *Bottée* and *Gengember* have endeavoured to find a powder which would retain the power of detonating by a blow or shock, without the hazard of a spontaneous explosion; and after many trials, they found one which answers every desired purpose.

It is compounded of fifty-four parts in a hundred of super-oxygenated muriate; twenty-one of common nitre; eighteen of sulphur, and seven of powder of lycopodium. It requires the stroke of the hardest bodies; and, what is very peculiar, that part only of the powder which receives the stroke, explodes; the contiguous particles are inflamed only by communication, but they cause no explosion, so that this powder is absolutely without danger. It is important as it renders easy a process otherwise dangerous.

VEGETABLE PHYSIOLOGY AND BOTANY.

Our fellow labourer, Mr. *Palisot de Beauvois*, has communicated to the class the result of an experiment calculated to extend our ideas relating to the motion of sap. Instead of raising merely a band of the bark round the branch, as is commonly done, he has completely separated a plate of it, by making a notch all round, and in such a manner that its fibres have no more communication with the rest of the bark, neither above, below, nor on the side. He has also removed the liber, and wiped very dry the *cambium*,* leaving nothing untouched but the wood at the bottom of the notch. The edges of this plate of bark, thus insulated, have not ceased to grow, as well as the bark of the external edge of the notch; the plate even has, on some trees, given rise to a bud, which has been fully unfolded. Nothing proves better the general communication of all the parts of the vegetable, and how they can supply each other's functions; for this slip of bark could not draw its sap, except from the wood concealed under it.

In our report of 1806, we made known the opinion peculiar to Mr. de Beauvois, on the fecundation of the mosses, and we noticed at the same time the objections which still prevent many botanists from adopting that opinion, which consists in regarding as pollen, or fecundating powder, the green powder which fills the urn of the mosses, and as seed, another powder which Mr. de Beauvois places under a capsule situated in the axis of this same urn, while *Hedwig* takes the green powder for the seed, and looks for the pollen in other organs; and some later botanists would not admit of sex in these sorts of plants, and consider their powder only as a collection of small bulbs, or buds. Mr. de Beauvois has this year made an observation which seems to him to confirm his opinion. Having examined with care an urn of the *Mnium capillare*, he found,

* The *Cambium* is a mucilaginous substance, placed between the bark and wood, in dicotyledonous plants. It is considered as the source, or at least the matrix of the new layers of wood and bark; and bears a close analogy to the coagulated lymph of animals. Eo.

first, that the green powder of the urn did not adhere to the central capsule, as it should do, if it were the seed, and if this capsule were a columella, as the followers of Hedwig say; secondly, that there were in the capsule some grains transparent, and larger than those of the green powder, or dust; thirdly, that in the green powder itself there were grains of two kinds, some green, opaque, angular, united by fibres; others, transparent, spherical.

Mr. de B. then examining the dust of the lycopodiums, found in them also two kinds of grains; some opaque and yellow, others round and transparent like bubbles of water, at most in the proportion to the first of one to thirty. Mr. de B. who regards the opaque grains as the pollen, thinks these transparent bodies blended with them, are a kind of buds or bulbs, fitted to produce new plants, and that these germinate: while Hedwig and other observers obtained young plants, from sowing the powder of the lycopodiums and mosses; thus these experiments can no longer be opposed to him. As to the true grains, according to him they are situated alike, both in the lycopodiums and mosses; the axillæ of the leaves of the inferior part of the spike conceal, in some plants of the first family, little capsules containing each some grains larger than the powder of the superior capsules, which have been considered as seeds, by Dillenius, and by all those who with him would regard the powder as a pollen.

Mr. Wildenow considers them as a kind of bulbs, and this is the common opinion of those who will not admit the idea of sexes among the mosses, lycopodiums, and other cryptogamous plants.

Mr. de Beauvois finds that these grains possess all the characters of organization assigned to seeds by the most accurate botanists, and that we cannot in consequence hesitate to view them as such, though they have not yet been discovered in all the lycopodiums; that he grants however that he could not make them grow, but thinks this arose from their not being fresh; but although they should vegetate, those who pretend that they are nothing but bulbs, would not acknowledge themselves to be defeated.

We have briefly pointed out in our reports of the two last years, the discussions of our fellow labourers, Messrs. *de Mir-*

bel and *Richard*, on the internal composition of the grains of certain vegetables. As these discussions tend to nothing less than to shake received systems, they assumed a degree of heat proportionate to their importance, and it has seemed to us necessary to give an account of the point to which the question has come. For this purpose we must go back a little. When a kidney bean is put into water, for example, it soon splits, and at the junction of the two lobes which form the greatest part of its mass, we observe, on one side, a little fleshy body, of a conical form; and on the other two small leaves, sufficiently evident.

When the bean germinates, the conical part descends into the earth and forms the root; the two small leaves ascend into the air, thus constituting the extremities of the plant; the two great lobes adhering at the point of union of the two other parts, after sustaining for a time the office of leaves, are shrivelled and disappear.

The little conical tubercle has in botany the name of *radicle*; the part opposite, in its progress forms the entire trunk of the plant, and is named *plumule*, the two lateral lobes are the *cotyledons*. Numerous experiments show that the function of the cotyledons is to furnish the substance necessary for the first development of the plumule and the radicle, till the little plant is sufficiently strong to draw from the earth and atmosphere the juices which are intended for its perfect growth and maturity.

Multiplied observations also teach us that plants with two cotyledons, which are most numerous in nature, have a great number of characters in common among them, and that they differ in their organization from those having but one cotyledon, and still more from those having none; in consequence, botanists have formed from this composition of the small vegetable embryo, the basis of their first division of plants.

Mr. Desfontaines, in a memoir, an analysis of which we gave at the time, seems to have established this division, by proving that the ligneous trunks of dicotyledonous plants have a different internal structure and a different manner of growing from those plants having but one, or no cotyledon. But as it often happens in natural history, especially when fundamental characters rest merely on empirical observations, whose rational affinity to other

parts of the organization is not duly regarded, it has been perceived by slow degrees that these rules were not without exception.

It has been discovered that the seeds of certain plants, which in their whole structure resemble dicotyledonous plants, have either no cotyledon, or more than *two* ; exceptions of a contrary kind have also been suspected, and these doubts have led to a more careful examination of the seeds of all plants. Accordingly in this research some have been found whose structure has appeared problematical, in which the same organ has received different names, according to the manner in which each has been inspected.

The *nélumbo* is one of the most remarkable of these uncertain species. It is a plant of the Indies which has a near relation to our *nénuphar* (*nymphaea* ;) its seed conceals a body divided into two lobes at two thirds at least of its height, and between these lobes is a small membranous sack, whence proceed the first leaves, and it is not till the stalk which bears the leaves is a little advanced, that it shoots forth any lateral small roots.

Messrs. *de Mirbel* and *Poiteau*, conformably to a resemblance, at least apparent, have asserted that the two lobes are the two cotyledons ; that the first leaves form the plumula, and the sack which envelopes them, a sort of sheath ; that the radicle remains inactive without unfolding, and that the fibres proceeding from the small stalk, are analogous to those roots which grow from creeping plants. Mr. *Mirbel*, in particular, believes he has found, within these lobes, an apparatus of vessels exactly similar to those of the cotyledons, in plants having two cotyledons. These botanists have accordingly ranked the *nélumbo* among the dicotyledonous plants.

Mr. *Richard* on the contrary maintains, that this little sack should be regarded as the only cotyledon, and that the two lobes appertain to the extremity of the radicle ; he compared these bodies to those observed in other embryos, and to which he has given the name of hypoblasts, the same which *Gaertner* called vitellus ; and this analogy seems to him the more certain, because the lobes in question, like other hypoblasts, do not increase at the time of germination, contrary to the generality of cotyle-

dons. The lateral production of the roots is a natural and general consequence of the presence of an hypoblast, which prevents the radicle from growing in a straight direction. In conformity to this reasoning, Mr. K. has classed the *nélumbo* among the monocotyledons. The discussion has then turned on the nature of these hypoblasts. Mr. de Mirbel compares what Mr. Richard thus names in the grasses, and which is the *scutellum* of Gaertner, with the cotyledon of the asparagi of the cannae and some other plants which have but one of them, and he concludes from this comparison, that the hypoblast of the grasses is precisely their cotyledon; which would place on his side all the analogies cited by Mr. Richard. Mr. Poiteau has also written a memoir on this question, in which he coincides with de Mirbel.

Mr. Richard replies, that there is a greater difference than Mr. Mirbel thinks; that the plumule of asparagus and the other plants mentioned is enveloped in the cotyledon; that it passes through it, in order to get out; that it is a character essential to all the monocotyledon plants; that in the grasses, on the contrary, the plumule is enveloped in a tunic, in the form of a cone, distinct from the hypoblast, and that this tunic, enveloping the plumule, ought to be considered as the real cotyledon.

CASE IN WHICH THE OIL OF TURPENTINE WAS EMPLOYED WITH SUCCESS IN TÆNIA.

COMMUNICATED BY DR. JOHN B. BROWN.

B. C. consulted me on account of his son, who had been afflicted with Tænia for six years, and had for that time occasionally discharged more or less of it. He was a lad of sixteen years of age, but considerably under the usual size. His general health appeared not to be materially affected by the disease. I recommended the Ol. Terebinth Rect. and gave him directions to take fasting $\frac{3}{4}$ ss. at 7 o'clock, and $\frac{3}{4}$ l at 9 o'clock the