



LIII. On a substance to which the name of inuline has been given

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has worn, until they have been disinfected. The only method is the fumigation No. 4, for clothes, utensils, &c.

For wards filled with patients, the fumigation No. 1, with the modifications alluded to in No. 2.

For empty wards which have been occupied by typhus patients, the fumigation No. 1; afterwards the walls and floors ought to be scraped, white-washed with lime and water, the furniture washed, &c.

In the article of the precautions for preventing the origination of typhus and arresting the contagion in its very outset, the instructions recommend the scrupulous employment, and several times a-day, of the same methods used in disinfecting wards. And finally, all the physicians, surgeons, nurses, &c. are to undergo fumigations every time they quit the ward. This precaution ought to be strictly attended to, in order to preserve them from infection, and that they may not spread it when they leave the hospital.

LIII. *On a Substance to which the Name of Inuline has been given.* By M. GUALTIER DE CLAUDRY*.

M. ROSE a few years since† made known a substance which he extracted from the root of the elecampane (*inula helenium*), and which he regarded as a peculiar matter, which might hold a middle place between starch and sugar.

No person, so far as I know, has repeated the experiments of M. Rose; but chemists have ventured various opinions as to the nature of this substance. M. Funcke, in a note on the analysis of the elecampane, speaks of the *inuline*, but does not say a word as to its properties‡.

Dr. Thomson regards it as a particular matter, and classes it among the number of the immediate materials of vegetables. He proposed to give to it the name of *inuline*. M. Tromsdorf also, regarding it as a peculiar substance, has called it *alantine*.

Dr. Henry, considering it on the contrary as a substance of doubtful existence, places it among those bodies the nature of which is not well known. He designates it by the name of *elecampane*. M. Thenard in his work on chemistry assigns the same rank to it.

Having had occasion to make some experiments on the substance discovered by M. Rose, I shall now detail them.

The name of *inuline*, given by Dr. Thomson to the substance

* *Annales de Chimie*, tome xciv. p. 200.

† Gehlen's Journal, tome iii. p. 217.

‡ *Annales de Chimie*, tome lxxvi. p. 98.

in question, seems well adapted to it: I shall therefore use that term.

M. Rose assigns the following properties to inuline :

It is in the form of white powder, insoluble in cold water ; it is suspended in it by agitation, and is deposited upon cooling ; boiling water dissolves it easily. A solution of four parts of inuline in one part of water is slightly mucilaginous, but passes through a filter easily: the greater part of the powder is extricated upon cooling.

Alcohol precipitates inuline from its solution in a short time.

When placed upon burning coal the inuline flows almost like sugar: a thick white pungent but not disagreeable vapour arises: the smell resembles that of sugar when burning.

- When we heat the inuline in an iron spoon, it melts, gives out a white smoke ; and when the spoon becomes red hot, the inuline burns with a brisk and lively flame, and leaves but a very small carbonaceous residue.

On distillation, the inuline gives out a brown acid without any trace of oil.

The nitric acid converts inuline into malic, oxalic, and acetic acids.

On repeating the experiments of M. Rose, I proved most of the properties which I have mentioned as having been discovered by him ; but I constantly saw the inuline burn on the simple hot charcoal without making it red hot in an iron spoon: it then presents a blue flame, and gives out a very strong smell of caramel.

The following are some properties which I observed:

Water at 60° dissolves four or five times its weight of inuline : we cannot bring the solution to the consistence of jelly, as with starch, but the liquor is viscous when it is highly concentrated.

The inuline which is deposited upon cooling retains a great quantity of water, in which it may be melted by raising the temperature. On continuing a gentle heat, we obtain scales which appear grayish, but which give an inuline of a fine white, when well pulverized.

When we wish to obtain inuline in a perfectly dry state, we must not attempt to dry it upon filters, for it adheres to them so strongly that it cannot be detached.

Iode forms with inuline a greenish-yellow compound, which is easily decomposed, partly at least, in a short time. The inuline remains slightly coloured yellow, and retains a small portion of iode.

The same thing takes place when we treat this compound with boiling water.

Potash dissolves inuline, but it does not form with it a magma as it does with starch: when we add water, the solution takes place completely, but the liquor is never perfectly clear.

Concentrated sulphuric acid precipitates inuline from this solution.

The inuline is dissolved in concentrated sulphuric acid, which becomes of a brown colour; ammonia precipitates the inuline from it; water and alcohol occasion no precipitate.

The nitric acid dissolves inuline in a cold state, and assumes a slight yellow colour. When heated we obtain, as M. Rose has observed, malic, oxalic, and acetic acids.

The water of barytes precipitates abundantly the solution of inuline; the precipitate is white; it is easily dissolved in nitric acid, and with difficulty in hydro-chloric acid.

The solutions of lime and of strontian form no precipitate in the solution of inuline.

The hydro-chloric acid is not sensibly dissolved in inuline, and does not form a jelly with it, as with starch.

When we boil 100 parts of inuline with four parts of sulphuric acid and a sufficient quantity of water, for twelve or fifteen hours, we obtain a small quantity of sweet matter, but which retains a bitter taste.

The infusion of gall-nuts precipitates the inuline from its solution in the state of a grayish matter, which is collected very speedily at the bottom of the vessels, and which appear slightly glutinous and elastic.

The solution of inuline does not precipitate any metallic solution; nor does it form any precipitate in silicated or aluminated potash.

In order to obtain inuline in a state of purity, we must boil elecampane roots in a great quantity of water; filter the liquor, evaporate it to the consistence of an extract, and treat this extract with cold water. A great quantity of inuline is precipitated, which we ought to wash several times, and always by decantation; we collect it afterwards and dry it slowly, but taking care not to place it on filters, as I have mentioned above.

Prepared in this way, the inuline has several peculiar properties. It resembles in a particular manner nothing but starch, and yet it is easy to distinguish it by the following properties:

The principal character of starch is to form a jelly with warm water, and not to be dissolved but in a very great quantity of water. Inuline on the contrary is easily dissolved in a small quantity of water, without giving any jelly, and it is deposited in a white powder upon cooling.

Distilled

Distilled starch gives pyro-mucous acid and oil.

Inuline does not afford the slightest trace of oil in this operation.

Iode forms with starch a compound of a very fine blue colour.

Inuline gives with iode a greenish-yellow compound.

The hydro-chloric acid as well as the alkaline solutions render starch gelatinous.

The inuline is dissolved without giving jelly.

Concentrated sulphuric acid carbonizes starch with extrication of sulphurous acid.

Inuline is dissolved in concentrated sulphuric acid without any smell of sulphurous acid, and ammonia can precipitate it from this solution.

As other substances, like starch, are susceptible of being converted into sugar by means of sulphuric acid, we cannot assign this as a character inherent in starch.

As to the property which Dr. Thomson regards as a distinctive character of starch,—that of forming with gall-nuts an insoluble compound,—it does not appear that it ought to be admitted, since Dr. Bostock has made experiments which contradict those of Dr. Thomson.

There remains only the property of forming with barytes an insoluble compound which inuline shares with starch; but this property does not seem of a nature to decide the identity of those substances.

We therefore think we may conclude, from what has been said, that inuline is a peculiar substance, that it cannot be confounded with any other known vegetable substance, and that it ought to be classed among the immediate materials of vegetables.

LIV. *Some further Particulars respecting Mr. WOOLF'S Steam-Engine.*

IN our last two numbers we laid before our readers regular Reports of the work performed by certain steam-engines employed on the mines in Cornwall, and which we have continued in our present number, showing the comparative advantage in point of œconomy of fuel possessed by Mr. Woolf's engine over any other in use. Some of our readers having expressed a wish to be made acquainted with the arrangement of the valves for the two cylinders in his engines, we have in fig. 1. (Plate V.) given a complete section of the nozles and valves of the engines of his construction now working on the Wheal Abraham and Wheal Var mines,—those mentioned in the Reports above alluded to.