III. On the colouring matter of vegetable juices and the action exercised on it by metallic substances and their oxyds, with a new process for obtaining lakes of more intense and solid colours

Cit. Guyton

To cite this article: Cit. Guyton (1798) III. On the colouring matter of vegetable juices and the action exercised on it by metallic substances and their oxyds, with a new process for obtaining lakes of more intense and solid colours , Philosophical Magazine Series 1, 2:6, 126-129, DOI: [10.1080/14786449808676893](https://doi.org/10.1080/14786449808676893)

To link to this article: <http://dx.doi.org/10.1080/14786449808676893>

Published online: 18 May 2009.

Submit your article to this journal [↗](#)

Article views: 2

View related articles [↗](#)

in a fœtus, and which no one hitherto has been able to explain.

Diseases of the liver, such as schirrous tumours, &c. generally attack people who are more or less corpulent. The blood of persons very plethoric, or very fat, is commonly of a darker colour and more viscous than that of lean people, which is generally very florid. The means of cure afford a very strong argument in favour of this hypothesis; for, though obesity be rarely the subject of medical treatment, yet some physicians have treated it like the scurvy, with vegetable acids, pulse, &c. as affording more oxygen. It has been remarked, that people who habitually drink cyder are more meagre than those who use beer, porter, or other liquors of the same kind.

There are some countries, the inhabitants of which are in general corpulent, as is the case in Holland, and some parts of England; while in others, as France, for example, the greater part of the inhabitants are thin. Does this arise from the difference of food, or is it not rather owing to the greater or less purity of the air? that is to say, to a greater quantity of oxygen contained in the atmosphere? The above facts appear to explain the different causes of obesity, and to throw great light on the means of curing various diseases, which have hitherto baffled all the efforts of medicine.

III. *On the colouring Matter of vegetable Juices and the Action exercised on it by metallic Substances and their Oxyds, with a new Process for obtaining Lakes of more intense and solid Colours.* By Cit. GUYTON. Read in the National Institute 15 Vendem. An. 6.

LINNÆUS, the great naturalist of the north, said, that the red colour of vegetables announced in them the presence of an acid. It had been long observed, that the juice of the flower

flower of the violet acquired in tin vessels a beautiful blue shade, and the use of it was recommended in pharmacy for the preparation of syrup of violets. The original colour of syrup which had been changed was upon this principle restored by long digestion in tin; but few philosophers paid any attention to inquire into the cause of these phenomena, and my colleague Berthollet mentioned only as a probability in his *Elements of Dyeing*, that this effect resulted from a combination of the acid with the oxyd formed at the surface of the tin. Such was the state of our knowledge on this subject, when, struck with the difference in the colour of two preparations of the same fruit, I undertook a continued examination of the circumstances in which these changes took place.

I shall omit giving a detailed account of the comparative experiments to which I successively subjected almost all the acid coloured fruits, such as the cherry, the gooseberry, the plum, as well as the petals of flowers, turnsol, brazil wood, turmeric, &c. by treating them in vessels of glass, porcelain, metal, and metallic mixtures, or by holding them in digestion, either on plates of metal perfectly clean, or on metallic oxyds. I shall confine myself at present to results which may serve to throw some light on the theory of vegetable colours, or to furnish the means of applying them with advantage to processes in the arts.

My experiments proved that the red colour of fruits evidently arises from the reaction of their peculiar acid on their colouring matter. That tin, in reviving or restoring the colour of violets, only resumes by its greater affinity the acid which made it turn red. That it is not only tin or its oxyd, as has hitherto been supposed, which exercises this affinity; but that lead, bismuth, antimony and zinc produce the same effect; that it is still more rapid and complete with iron; and that the contact of all these metals inclines to violet very sensibly, infusions which otherwise would be of a bright and strong red. That the green and acid part of fruits does

not

not hold the colouring principle, disposed to become red with acids; and that the coloured part conceals the portion of the acid necessary for maintaining the state of reaction, which determines its shade. That if this colouring principle is modified in some vegetables so as to resist more or less acid or alkaline reagents, as brazil wood in regard to acids, and turnsol in regard to alkalis, it may be brought back to that condition; which seems to indicate that, if not essentially, it is at least originally of the same nature. That all metallic oxyds are not equally proper to seize and fix vegetable colours; that some of them seem to attack the latter with the greatest ease, while others retain them only in a very weak manner. In the last place, that the new metal called tungsten carried to the utmost degree of oxydation, and which has not yet been tried in that respect, has a decided advantage above all the other metallic oxyds; that it is capable of forming lakes valuable for painting, which stand, without alteration, tests by lime water, the acetic acid or radical vinegar, sulphurized hydrogen gas, and even to a certain degree oxygenated muriatic acid gas, that enemy of colours, which suddenly burns them, and which, according to the expression of Berthollet, performs in a few moments what is effected in a long time by the combined action of air and light. This assertion will excite less surprise, when it is known that this is the only one of all the metallic oxyds which withstands the solvent power of the three mineral acids.

The oxyd of tungsten charges itself easily with the colours of all vegetables. Hitherto I have found only one exception in the petals of the *nic ago*, from which I could not extract the beautiful purple red, though I was unable to discover the cause of my failure.

In general the lakes formed with this oxyd become darker instead of lighter when diluted, and it is therefore necessary to soften the shade. I have remarked that they acquired also more intensity, when I made the oxyd assume a blue colour, by boiling it in vinegar. C. von Mons, one of my
colleagues,

colleagues, being informed of the object of my researches, called my attention to the aloë. C. Desfontaines was so kind as to procure me several species, but I shall speak only of that known under the name of the succotrine aloë. I accordingly tried experiments on this plant, one of the richest in colour, though it has not the slightest appearance of it while the equilibrium of its principles is maintained by vegetable life. The woody fibre which is on the outside serves as a covering to a very viscous matter of a whitish green colour, weakly acid; but scarcely has this matter been exposed to the air when it assumes a very lively purple red colour, which becomes extremely abundant by the progress of fermentation. Of this matter I have formed lakes with alumine, the oxyd of tin, and the white oxyd of zinc: but none could bear a comparison with that prepared by means of tungsten. I have no doubt that the oxyd of this new metal may be employed in the composition of colours for dyeing, at least for the dyeing of silks which are not intended to be subjected to boiled leys. The oxyd of tin may be employed for that purpose with advantage, as it is not easily injured by acids: but our oxyd is absolutely insoluble.

I shall conclude with a reflection which may add some interest to these researches:—Wolfram, from which this oxyd is obtained, is found in the territories of France*, several mines of it are already known, and the French chemists have been employed for some years in endeavouring to simplify the processes for freeing it from foreign substances: we hope then, that the properties I have explained, will supply artists with new means to ensure duration to the productions of their genius, and open a new branch of national industry.

* It is found in abundance in the tin mines in Cornwall. EDIT.