XXXIX. On the production of heat by the contraction of elastic tissue, in reference to a former communication

J.M. Winn M.D.

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In the following table the results of the preceding analyses are collected, so as to exhibit the comparative value of each specimen. The first column gives the amount of azotized principles contained in each, and the second column represents their equivalent values in the nutritive scale.

	Azotized principles. per cent.	Equivalents.
1. Naumburg bread	16·49 . .	100·00
2. Dresden bread	14·30 . .	115·31
3. Berlin bread	14·21 . .	116·04
4. Canada flour	13·81 . .	117·23
5. Essex flour	13·59 . .	121·33
6. Glasgow unfermented bread .	13·39 . .	123·15
7. Lothian flour	12·30 . .	134·06
8. United States' flour	11·37 . .	145·03
Ditto, by mechanical analysis	10·99 . .	150·00

This table shows that the German and Canada flour contain most nutritive matter; the Essex flour being only a slight degree lower in the scale. It must be borne in mind, however, that this result may not be in consonance with the opinion of the baker in reference to the capacity of the flour for making good bread, because it takes in another element, the albumen, which is omitted in the baker's estimate. It is therefore quite possible that the specimen holding the lowest position in the table may answer the purpose of the baker in an equal or superior manner to those placed above it; but the method of determining the comparative value of flour by the estimation of the azote may furnish us at once with data of utility both in commerce and œconomy*.

XXXIX. *On the Production of Heat by the Contraction of Elastic Tissue, in reference to a former communication.* By J. M. WINN, M.D.

To the Editors of the Philosophical Magazine and Journal.

GENTLEMEN,

IN Dr. Gregory's translation of Liebig's 'Animal Chemistry,' I find at page 31 the following remark:—"The observation has been made that heat is produced by the contraction of muscles, just as in a piece of caoutchouc, which, when rapidly drawn out, forcibly contracts again with disengagement of heat." With the exception of an essay in the *Lancet*

* The result of Sir H. Davy in reference to the quantity of gluten in British flour, is sometimes nearly the double of the numbers in the table. This may perhaps be ascribed to his mode of drying the gluten,

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for September 2, 1843, in which the writer attempts to appropriate my views, I do not know of any observations to which the Professor can allude, but those which I published in your Journal for March 1839 [S. 3. vol. xiv. p. 174], and if he will refer to them he will perceive that he has not quite understood my notions. My experiments were made with elastic and not muscular tissue, and the increase of heat in the caoutchouc operated on was observed immediately after it had been elongated and before it had been allowed to re-contract.

As the Professor's imperfect explanation of my views might bring them into some discredit, I shall feel obliged by your publishing this Note.

I have the honour to be, Gentlemen,

Your obedient Servant,

J. M. WINN.

Truro, Sept. 21, 1843.

XL. *The Leaf-stalks of Garden Rhubarb as a Source of Malic Acid.* By THOMAS EVERITT, Esq.*

THE large quantity of this substance which is brought to our vegetable markets for several months in the year, beginning very early in spring, and its powerful though agreeable acid taste, make it a subject worthy of a more minute chemical examination than any which it has as yet been subjected to.

The leaf-stalks of garden rhubarb were first examined by Mr. Henderson†, who discovered in them, as he thought, a peculiar acid; afterwards by M. Lassaigne‡, who showed that the supposed new acid was oxalic acid. But these experimenters examined only the precipitate obtained by putting chalk into the expressed juice; the first-named decomposing the insoluble precipitate thus obtained by sulphuric acid; the other, by boiling it with excess of carbonate of potassa, then neutralizing the solution with nitric acid, and precipitating by a salt of lead, decomposing the latter by sulphuretted hydrogen, and thus getting crystals which were oxalic acid. Now by both these processes, those chemists threw away, in the liquid which floated above the oxalate of lime, an important constituent in a large quantity, viz. malate of lime, with a great many other things of less importance, but which rendered the

* Communicated by the Chemical Society; having been read February 7, 1843.

† Thomson's *Annals of Philosophy*, vol. viii. p. 247. (1816.)

‡ *Annales de Chimie et de Physique*, tom. viii. p. 402. (1818.)