

**On the chemical and microscopical analysis of an unsound wine / by Jas. R. Napier, F.R.S., and Professor J.G. M'Kendrick, M.D.**

**Contributors**

Napier, James R. 1812-1879.  
McKendrick, John G. 1841-1926.  
University of Glasgow. Library

**Publication/Creation**

[Glasgow?] : [publisher not identified], [1878]

**Persistent URL**

<https://wellcomecollection.org/works/huqvwdjh>

**Provider**

University of Glasgow

**License and attribution**

This material has been provided by This material has been provided by The University of Glasgow Library. The original may be consulted at The University of Glasgow Library. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection  
183 Euston Road  
London NW1 2BE UK  
T +44 (0)20 7611 8722  
E [library@wellcomecollection.org](mailto:library@wellcomecollection.org)  
<https://wellcomecollection.org>

*On the Chemical and Microscopical Analysis of an Unsound Wine.* By MR. JAS. R. NAPIER, F.R.S., and Professor J. G. M'KENDRICK, M.D.

---

[Read before the Philosophical Society of Glasgow, January 23, 1878.]

---

MR. JAS. R. NAPIER gave an account of a purchase of wine he had made from a maker in Taormina, Sicily. According to the winemaker's statement "it was a very fine and pure natural white wine, called Alcantara, *perfectly* pure, of exquisite flavour and perfume, and moderately dry. It had been heated, and all ferment perfectly destroyed, and the price for a quarter cask of about 23 gallons, free on board at Messina, would be £7, 10s." The Custom House duty on arrival in Glasgow having been charged at 2s. 6d. per gallon, instead of at the shilling duty of natural wine, led him to suspect that it was a fortified wine which had been sent to him, and not the natural wine ordered. He stated that the two analyses submitted, the one by Dr. Edward J. Mills, Glasgow, and the other by Dr. August Dupré, London, agreed in showing that the wine was neither pure nor natural—that at least from 6 to 8 per cent of proof spirit had been added. Dr. Mills says that there is a considerable amount of acetic ether present, and Dr. Dupré, that the excessive amount of acetic ether proves the wine to be unsound, and in a condition in which it certainly ought not to have been sold. A remark of Pasteur's in his "*Etudes sur le Vin*" as to the parasites in unsound wine, led to Mr. Napier's getting a microscopical analysis of the wine from Dr. M'Kendrick of the Glasgow University. This showed that there were abundance of the *Mycoderma aceti* and the *Mycoderma vini*, as figured by Pasteur, present.

*Report on Alcantara Wine, by Dr. J. Mills, F.R.S., Professor of Technical Chemistry in Anderson's College, Glasgow.*

I have examined the sample of wine which you handed me on May 24. The results are,—

*Alcantara Wine.*

|  |           |        |
|--|-----------|--------|
| Specific gravity at 17°.7 C.                 | . . . . . | 0.9996 |
| Alcohol per cent. by weight,                 | . . . . . | 15.0   |
| [Equal to "proof spirit,"                    | . . . . . | 32.5]  |
| Total acids, reckoned as tartaric, per cent. | . . . . . | 0.67   |
| Sulphuric acid (So <sub>4</sub> ) per cent., | . . . . . | .06    |
| [Equivalent to Plaster of Paris,             | . . . . . | .08    |
| or Tartaric acid lost,                       | . . . . . | .09]   |

The acidity is much above the average, as far as I can find, for Sicilian wines: probably but little of it is owing, in fact, to tartaric acid, but to acetic acid. There is a considerable amount of acetic ether present, and the wine has in general a harsh, acetic character.

Although not a heavily plastered wine, the Alcantara contains an amount of plaster of Paris in solution that is not natural, but the effect of an addition during manufacture. In this respect it resembles most sherries. It also contains at least 3 per cent. of added spirits (absolute alcohol).

The wine has the general character of an inferior sherry, not "natural" either in respect of its plaster or added spirit. It would probably yield unpleasant results in bottling.

EDWARD J. MILLS.

*Report on a Sample of Wine received from Mr. Jas. R. Napier,  
July 11, 1877, by Dr August Dupré, F.R.S.*

The wine was contained in an ordinary wine bottle, corked but not sealed. The bottle had two labels, one with "Alcantara," the other with "From Jas. R. Napier, 22 Blythswood Square, Glasgow. August Dupré Esq., Westminster Hospital," written on. On analysis the wine yielded the following result:—

|   |                                    |                |
|---|------------------------------------|----------------|
| Specific gravity of wine,                     | . . . . .                          | 999.3          |
| Alcoholic strength in per cent. proof spirit, | . . . . .                          | 33.3 per cent. |
| Total free acid, calculated as tartaric acid, | . . . . .                          | 0.57 "         |
| Free fixed acid calculated as tartaric acid,  | . . . . .                          | 0.19 "         |
| Free volatile acid calculated as acetic acid  | . . . . .                          | 0.30 "         |
| Real tartaric acid                            | . . . . .                          | 0.00 "         |
| Total dry residue,                            | . . . . .                          | 5.02 "         |
| Consisting of                                 | { mineral matters (ash), . . . . . | 0.55 }         |
|   | { organic matters, . . . . .       | 4.47 }         |
| The ash contained alkaline carbonates,        | . . . . .                          | 0.19 "         |

The rest consisting chiefly of sulphate, phosphate, and chloride of potassium, calcium, and sodium.

The above analysis proves that the wine has been fortified by the addition of spirit, at least from 6 to 8, if not more per cent. of proof spirit having been added. No natural European wine the purity of which is beyond doubt, has ever yet been found to contain anything like the above proportion of spirit, and 26 to 27 per cent. proof spirit must be taken as representing the strongest natural European wines. The wine next contains an excessive proportion of acetic acid, showing it to have been badly kept, and having in consequence turned sour in some degree. The proportion of alkaline carbonates in the ash is remarkably high, and this, coupled with the extremely low percentage of free fixed acid, leads me to the belief that the excessive acidity of the wine has been in part neutralised by the addition of an alkali. Lastly, the proportion of sulphate present is also rather high, indicating that in all probability the wine, or rather the must, has been slightly plastered. The total absence of tartaric acid points to the same conclusion.

As regards the addition of spirit and the slight plastering, they are, in wines of this class, such common, not to say universal practices, that they cannot well be made matters of complaint unless this particular sample was specially declared to be free from such admixture. The excessive proportion of acetic acid is, however, a very different matter, it proves the wine to be unsound and in a condition in which it certainly ought not to have been sold. My conclusions are thus shortly the following :—

1st, That the wine has undoubtedly been fortified.

2nd, That it is unsound.

3rd, That in all probability it has been slightly plastered, and treated with an alkali to reduce excessive acidity.

Dr. A. DUPRÉ.

Westminster Hospital, London,

July 16, 1877.

*Microscopical Analysis of Wine, by Dr. M'Kendrick, University of Glasgow, November 6, 1877.*

I have examined with the microscope (magnifying power 800 diameters) the Alcantara wine, and I find in it abundance of *Mycoderma aceti* and *Mycoderma vini*, as figured by Pasteur in Figs. 1, 3, and 4 of his work "Etudes sur le Vin," which I send along with this note. When the wine is poured into a glass, a scum or pellicle gathers on the surface of it, and it is in this scum that

the organisms are chiefly found, but they also exist more or less throughout the fluid. From their appearance, and from the masses of debris lying about in the field of the microscope, I think the organisms are dead, and that they have probably been destroyed by excess of alcohol or of acetic acid or ether in the wine. I mention this because it is well known that when the alkalinity of decomposing urine reaches a certain point, all the organisms which at first initiated the alkaline fermentation are killed, and I suppose a similar occurrence has taken place in this wine. In its present condition the wine is undoubtedly unsound and unfit for use.

JOHN G. M'KENDRICK.

After a short account of the views of Pasteur regarding the causes of unsoundness of wine, Dr. M'Kendrick explained that he had examined two samples of the wine submitted to him by Mr. Napier, with the result of finding, (1.) numerous specimens of the fungus figured by Pasteur as *Mycoderma aceti*, the cause of acidity in wine; (2.) specimens of *Mycoderma vini*, always found in greater or less abundance even in perfectly sound wines; and (3.) a few isolated cells, about the  $\frac{1}{2000}$  of an inch in diameter, nucleated, and closely resembling the common yeast cell, *Forula cererisiæ*. He had no doubt of the unsound character of the wine; and he pointed out that, by the use of the microscope, those interested in wines might discover the presence of microscopic organisms even before the evidence of unsoundness could be ascertained by the senses of taste and smell. If these microscopic organisms became abundant, the wine quickly became so unsound as to be detected by the unaided senses; and when this stage had been reached, it was impossible to do anything to remedy the evil. It would be a matter of great importance to ascertain by the microscope the presence of the fungi while they were still comparatively few in number, as at that stage they might be destroyed by the use of one or other of the processes mentioned by Pasteur in his work, "Etudes sur le Vin."

---

DISCUSSION ON PAPER BY MR. NAPIER AND DR. M'KENDRICK.

The PRESIDENT then proposed a vote of thanks to Mr. Napier and Dr. M'Kendrick, and invited discussion upon the paper.

Dr. WM. Wallace expressed an opinion that the wine which had been the subject of the paper had been fortified after becoming unsound, in order to give it so far the properties of a dry sherry, which was characterised by the presence of very small quantities of sugar and a moderate amount of acetic acid. He pronounced the wine under discussion as quite unfit for use, in consequence of the large quantity of acetic acid contained in it. Referring to the process of "plastering," which this wine had evidently undergone to some extent, he said that the "plastering" of wine seemed to be almost universal in Spain, and he deprecated it as rendering wine unwholesome. He observed that beer and porter were called "hard" when they contained even less than one-half of the acetic acid in the wine before him.

In answer to a question by the President, Dr. WALLACE said that he had repeatedly advised wine importers to introduce into this country wines, natural wines, which had neither been "plastered" nor "fortified."

The PRESIDENT referred to the use of carbonate of lime in Italy for the curing of the acidity of wine, and Dr. Wallace explained Liebig's method of doing the same by the addition of the neutral tartrate of potash.

Mr. NAPIER stated that the process used by Pasteur for preserving natural wine in corked bottles was simply to raise its temperature for a few minutes to about 140° F. This was safely and efficiently performed by placing the bottles in a bath of cold water and heating that, the depth of water being such as to be above the level of the wine. On the large scale the wine was heated to the necessary temperature in specially constructed apparatus before being corked, and sometimes it was heated in the casks themselves. Pasteur had proved by many experiments that at the temperature of 140° F., and even at a considerably lower temperature, the vitality of all the parasites which he had found in wines of all descriptions was destroyed, and that the wines so treated were preserved, and had more of the delicate flavour or bouquet of matured sound wine than was found in wine fortified with alcohol.

The process of preserving wine on the large scale being so very cheap, Mr. Napier saw no reason why sound and durable natural wine—wine without any spirit having been added to it—should not be procurable in any British wine-shop or public-house

for eightpence or ninepence per bottle, or even for less. He had bought wine last year outside the gates of Messina, for which he had paid at the rate of twopence per bottle.

In explanation of the discrepancy between Dr. Mills and Dr. Dupré's statement of the amount of proof spirit in the wine the following note from Dr. Dupré, and which had been mislaid during the meeting, is appended :—

Dr. DUPRÉ to JAS. R. NAPIER, Esq.

"Westminster Hospital, July 28, 1878.

"Dear Sir,—The discrepancy in alcoholic strength between the reports of Dr. Mills and myself is really very small, and quite within a reasonable limit of error; even one experimenter estimating the strength of the same wine twice over will often find as great a difference between his first and second estimation. However, in the wine under consideration another explanation is also possible. The sample which Dr. Mills had had a higher specific gravity than mine; the difference is in reality greater than that shown by the figures, because Dr. Mills seems to have taken the specific gravity at 17·5, whereas mine was taken at 15·5. This would add about ·0003 to Dr. Mills' figure, and make it 999·9 against mine, 999·3; and this is just about the difference which would be caused by the difference in alcoholic strength, as given by Dr. Mills and myself respectively. Besides this, Dr. Mills gives the total acid as 0·67; I found 0·57. Now this is very much beyond an experimental error, and shows, I think, that the sample examined by Dr. Mills contained more acetic acid than the one I had. This of course would have been caused by the oxidation of alcohol; and Dr. Mills would naturally find less alcohol than I found, some alcohol having been changed into acetic acid. This is by no means extraordinary; the bottle may not have been corked quite as well, or may have remained open, or stood upright a longer time, &c. There are many causes which might induce a greater production of acetic acid in one bottle as compared to another, when once the action has begun. I am of opinion, therefore, firstly, that the actual difference is unimportant, and may either be due to a small error on the one side or the other (I believe mine is very close to the truth, for it is the mean of two experiments); or, what seems on the whole more probable, the sample which Dr. Mills examined has suffered more, was further gone on the stage of becoming vinegar, than the sample I had.—Yours truly,  
"A. DUPRÉ."



