

COLOURING MATTER (ARSENICAL) USED FOR COLOURING CANDLES

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WHILST the use of dangerous mineral colours for colouring tinned and bottled fruits, wall papers, etc., has been pretty nearly stamped out, their use for colouring wax candles appears to have been overlooked. The danger of using them for such a purpose has recently been brought to my notice, and a brief description may be of interest to the members of our Society.

A children's party was given by a gentleman in the district for which I am Public Analyst, and a Christmas-tree with a large number of small coloured candles was the principal attraction. On the day following the party about twenty per cent. of the children who had been present, and also several grown-up persons, suffered from symptoms of irritant poisoning. At first it was naturally supposed that something in the food had caused the mischief; but on making inquiries the gentleman found that some of those attacked had taken nothing to eat or drink in the house, but had been present at the Christmas-tree, so that it could not possibly be the food. His suspicions then fell on the green candles which had been used for lighting the tree, and as he had had a chemical training, he examined one of the green candles himself, and found traces of arsenic in it. He then forwarded the remainder to me for examination, and I found the green ones contained both copper and arsenic, evidently having been coloured with one of the arsenical greens, which appeared to be "emerald green."

There was not sufficient material to estimate with any accuracy the amount present, but I was able to separate a small quantity of the colouring matter itself by dissolving the wax in warm ether. It is well to note that at first it appears as if the colouring matter had also dissolved, for it is in such a finely divided state that it floats about in the ether for some time, thus giving the appearance of a green solution; but if it is filtered or allowed to stand a few hours it is seen that it is merely in suspension.

From information I have obtained, it appears to be a common practice in the smaller candle works to use arsenical greens for colouring candles, as they are easier to

use than the aniline green, and stand the action of light so much better, the candles coloured with aniline greens having a tendency to fade unless kept in a dark place.

The quantity employed, I am informed, is from $\frac{1}{8}$ oz. to over 1 oz. of emerald green to 28 lbs. of wax, and that for the small green candles about 1 oz. to 28 lbs. would be employed. At this rate each small candle, I find, would contain about $\frac{1}{4}$ grain of colouring matter, and would be capable of yielding about $\frac{1}{8}$ gr. of arsenious anhydride; so that I should say that a dozen or two of such candles burnt in a room of moderate size would be capable of producing very serious effects.

Red candles also are usually coloured with an injurious mineral colour, at least for such a purpose, for vermilion is used, and a red candle from the same Christmas-tree, I find contains vermilion, but I believe the candles used were chiefly green ones. I intend to make a further examination of the matter, and I hope some of the other members will do the same, for I think that such a practice should, if possible be stopped.

DISCUSSION.

Mr. HEBNER said that about twelve years ago he was just about to publish a note on the same subject when he found that Prof. Church had already drawn attention to the matter.

Mr. CASSAL said that the fact of arsenic having been found in candles was not new. Some years ago the question had been brought forward, and it was alleged that some people had been actually poisoned by arsenical candles, but if he recollected rightly they were *white* candles, not coloured ones. The subject was of very considerable interest and importance from a hygienic point of view. The statements that the practice was being stamped out he could not agree with. Most analysts still had a good many things to examine for the presence of arsenic. Some years ago, at the time of the Health Exhibition, he had occasion to examine a number of articles for arsenical and other poisonous pigments, among them butterfly nets, coloured balls, and various children's toys, arsenic in large amount being frequently found. The green gauze used for nets had been found to contain arsenic.

The point was the extreme minuteness of the quantity by which the injury may come about. It would be a good case to help Mr. Dyer, as the whole chain of evidence was complete.

With regard to the use of arsenious acid in candles, he understood it was used to give the burning wick the turn; and if that were so, he was surprised some evil effect had not been discovered.

As to the rash mentioned, that was quite a fact; he had heard of several instances of rash being produced by arsenical pigments, which have an irritating effect on the skin.

The whole matter was very interesting to him from a medical as well as chemical point of view, with the experience he had had.

Mr. ALLEN said that the paper just read showed the desirability of extending the Sale of Food and Drugs Act. Public analysts ought to have under their care all such articles as arsenical wall-papers, fabrics of candles, besides disinfecting powders, &c. The subject was not strictly a novel one, but it was only by calling attention to cases which came within their own experience that it was brought home to them, and he thought they were indebted to the author for bringing the matter forward. He might remind them of the historical case of a member of the royal family of Austria who was practised on by introducing arsenic into the candles used in his bedroom. It was not fair to judge of the poisonous effects of arsenical paper or candles from the amount of arsenic present, for the finely-divided arsenious oxide would be so distributed through the atmosphere as to affect the system far more strongly than if an equal amount had been taken into the stomach; in fact, the effects would probably be more properly

comparable with those attending the breathing of arseniuretted hydrogen, which was known to be intensely poisonous.

He should like to know what became of the copper in the candles. How any candle could contain a measurable or weighable amount of copper which did not go into the wick he could not understand; in fact, if he had had to analyse such a candle, he thought he should have burned the candle and condensed the arsenic by some contrivance similar to that for estimating sulphur in coal gas, and should have looked in the candle end for the whole of the copper which had been previously distributed throughout the candle.

Mr. BERNARD DYER said he would be glad if Mr. Harvey would send him the medical details of the case. It might be known to members that this question of injurious colouring matters, not only applied as to papers, but to other things, had been taken up at various times by various societies, but more especially by the National Health Society. The Society of Arts had previously collected evidence and made a report, but nothing came of it. The National Health Society, in 1883, appointed a committee consisting of medical men and chemists to draft a Bill for the suppression of the sale of arsenical wall paper, on the same lines as the Acts of Parliament in operation on the Continent and, he believed, also in America. In Germany, he believed, arsenical paper was made and exported to this country, but it could not be sold in Germany. In Sweden there was a very stringent law on the subject. The great difficulty in drafting a Bill was in defining the word "arsenical." After considering the question for some time, Mr. Carr, Mr. Heisch, and Dr. Bartlett suggested a very excellent modification of the Marsh apparatus which seemed to meet all difficulties, both as to testing and defining arsenical colours. Dr. Willoughby was at first secretary of the committee, and was succeeded by himself (Mr. Dyer), and the Bill became finally matured during his (Mr. Dyer's) secretaryship, in 1885; and Dr. Cameron undertook to bring the matter before the House of Commons. But the Irish question came up, and Dr. Cameron said it would be perfectly hopeless to bring this forward then, as it would certainly be opposed by the large trade interests, and as he, moreover, was very busy; so nothing was done, and the draft Bill was still on the shelf awaiting an introducer and an opportunity of introduction. The fact remained that England is almost the only civilised country where arsenic-dyed wall papers were allowed to be sold.

One of the great difficulties Dr. Cameron said they would have to contend with was that, as large trade interests were involved, and there would be much opposition, a Select Committee would be doubtless appointed, and that Committee would ask them for their medical evidence. Now, the Society of Arts and the National Health Society had gathered a drawer full of medical evidence, but much of it related to cases where the arsenic was so abundant that, on wiping the paper with a duster, the green came off on the cloth, and much more to cases where patients being out of health, and wall paper being found arsenical, the two facts were assumed to be cause and effect on grounds which, though very strong, did not afford strictly accurate and convincing evidence.

They felt that, before the matter could be brought forward with full confidence, they should strengthen their medical evidence. Any strictly authentic cases of domestic poisoning from arsenic he should be glad to receive on behalf of the National Health Society, that he might hand them to Mr. Kenneth Millican, who had undertaken the collection and collation of medical facts on the question.

Mr. CASSAL said that general practitioners among medical men who had not studied hygiene were not likely to give specially valuable opinions on the points referred to—at least, that was his experience, which was not a small one. Mr. Cassal mentioned the case of a lady who had been wearing a bonnet with bronzed leaves in it, some of these leaves having been kept in close contact with the skin. The leaves contained a large

quantity of arsenic, and the lady had suffered from an obstinate skin eruption and other arsenical symptoms. Another lady who had bought some coloured "Indian" muslin at a large establishment in the West End, and worked at it with her maid, had noticed that both of them were beginning to suffer from inflammation of the eyelids. The muslin was brought to him for analysis, and he found large quantities of arsenic. The vendor had said that he would eat all the arsenic that could be found in it, and he (Mr. Cassal) was sorry he did not do so. The sulphide was at his service.

In another case five or six children were being kept in a room with a large fire in it, the walls being covered with a green arsenical paper. The symptoms had been mistaken for those of a violent common cold.

Dr. MUTER said he had had some similar Indian muslin sent to him, and he also found arsenic in it.

Dr. HARVEY stated that he frequently met with arsenical wall papers. Only on the previous day a case was brought to his notice of serious illness traced to a drab-coloured bedroom paper, which upon analysis was found to contain a considerable amount of arsenic. He was acquainted with numerous other cases where injury appeared to have resulted from the use of such papers.

Mr. ADAMS said that more than twenty times he had had patients suffering from arsenical poisoning. It was a common result that the eyelids became affected; they had a peculiar red appearance which a practical oculist at once knew to be due to arsenic. He had a case quite lately showing what a very minute amount would do the mischief. Of course, in the case of the candles it must have been a very small quantity that each person could have breathed. The poisonous effects of arsenic depended in a measure on two things—first, the idiosyncracies of the person (some could take it with impunity whilst others are injuriously affected by the smallest amount), and secondly, if it gets into the system by the air cells of the lungs it is absorbed much more quickly and injuriously. A lady patient of his had some fur which he had examined and found to contain arsenic. She wrote to him about it on the previous day as follows:—"I am very pleased to tell you anything I can about the fur you found contained arsenic. Directly I began to wear it I had every symptom of a very bad cold in the head, and later on this was accompanied by sore throat and diarrhoea. Naturally in hot rooms I always felt worse" The lady put the fur on one side and at once recovered. When she resumed wearing it, all the symptoms recommenced. This experience was repeated again and again till she came to associate the symptoms with the wearing of the fur, which was then sent to him, and he found out the cause.
