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A CASE OF POISONING FROM ARSENICAL WALL-PAPER.[1]

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About the middle of September, 1886, my patient, Mrs. S., changed her residence from the country to the city. She very soon discovered that some ferns in her parlors were withering, but not from neglect or improper care, since although ultimately dying, they revived for a brief season upon being removed to another part of the house. In the early part of November, she suffered from an attack of nausea and a dizziness so intense, especially when she attempted to stoop, that for several days she was obliged to keep the bed. These symptoms persisted in their intensity about a fortnight, and were followed by a sharp attack of facial neuralgia which lasted about a week.

In the latter part of December, the dizziness re-appeared, but in a far milder form than it had been the month before. At about the same time she began to complain of extreme lassitude and a loss of pleasure in pursuits that formerly gave enjoyment. The quiet of her own room was the one thing that she eagerly sought.

Although she suffered from a continual slight nausea, her appetite was unusually good; there was, as she expressed it, an almost constant "gnawing in the stomach." After the eating of food the nausea would increase, and she would complain of a feeling of heaviness and uneasiness throughout the bowels, especi-

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ally in the umbilical region. Her increase of adipose tissue began to be distressing to her. Although she had always before drank very little water, she now was thirsty all the time. The menstrual functions continued to be regular so that the symptoms presented were considered to be indicative of over-work and loss of nervous energy rather than of any physiological disturbance. The patient herself was disposed to consider her symptoms malarial in their nature, although, contrary to her expectations, quinine gave her no relief. Occasionally, she would speak of her eyes smarting and watering if she tried to use them.

Suddenly, on March 16, 1887, she was taken without any apparent cause with headache, extreme nausea, and uncontrollable vomiting. The usual antiemetic remedies, internal and external, dietary and medicinal, were tried in turn, but all without relief. On the contrary, they seemed rather to increase her distress. The only expedient that gave the slightest semblance of relief was the holding of pieces of ice in the mouth. The vomiting was almost incessant and was increased by assuming the recumbent position. The vomitus consisted at first of mucus, on the third day of free blood, and later of thick yellow bile. Tenderness in the epigastric and right hypochondriac regions speedily developed itself. The temperature and pulse remained nearly normal. The nasal discharge was uniformly bloody. The menstrual functions still remained normal so that the symptoms seemed to indicate clearly an acute exacerbation of the same trouble that had existed all winter in a mild and chronic form.

Although I could not absolutely exclude either a primary gastro-duodenal ulceration or some of the freaks of pregnancy, I remembered the withering of the ferns and began strongly to suspect some form of

irritant poisoning to be the cause of sickness. I accordingly sent samples of all the wall-papers in the house (except, of course, plain "cartridge" papers which I knew to be practically free from suspicion), to Dr. Edward S. Wood for examination. Upon analysis, he pronounced only one paper arsenical, but found such an amount of arsenic therein, that he advised its immediate removal.

To settle decisively the question of poisoning, the urine also was examined for arsenic. Six ounces collected on March 23d, the eighth day of the incessant vomiting, yielded numerous crystals of arsenic after re-sublimation in the tube, while a quart of urine collected three days later yielded a very dark deposit upon the tube, but after re-sublimation, scarcely a trace of arsenic crystals. This seemed to indicate not only that there had been a very large amount of arsenic in the system of my patient, but also that a rapid elimination of the poison was taking place.

But the vomiting and prostration continued unabated. For twenty days the patient could retain absolutely nothing upon the stomach. Enemata, both of beef tea and of Murdock's Food were attempted, but could not be retained. Finally, brandy was substituted for them and with better results. The temperature had never risen above 100°, nor the pulse much above 96. At midnight of the twentieth day the nausea and vomiting ceased as suddenly as it had begun. The following morning the patient expressed her first desire for food. We began with Horlick's Food, and although during the next week we changed at her request to Mellen's, Hard's, and to Wells & Richardson's Lactated Food, we returned to Horlick's and found it the best suited to the case. The recovery was rapid and complete in less than a fortnight. There was only one relapse that could be traced directly to arsenic.

It had seemed at first improbable not only to myself, but to Drs. Wood and Whittier, whom I consulted in the case, that the wall-paper already found to contain arsenic could be the sole cause of all this arsenical poisoning. The paper was upon the walls of a small room on the entrance floor of the house where the patient had been very little, the parlors were on the floor above, and her chamber on the floor above the parlors. In hopes, therefore, of finding some other source of arsenic, dress goods and window draperies were analyzed, but with negative results, so far as finding arsenic were concerned. Chromium was, however, found in large amounts in one pattern of dark green dress goods. I had early seen to it that all cretonnes and turkey-red material were removed from the chamber, since they are well-known to be highly charged with arsenic.

The almost conclusive proof, however, that the sole cause of my patient's sickness existed in this room is as follows: The dangerous wall-paper was removed while the patient was convalescent. She insisted that she was not yet strong enough to venture from home and so remained in the house, confined strictly to her room, while the work went on. After the walls had been scraped and washed, and the room thoroughly cleaned preparatory to the laying of the new paper, she ventured to look into the room but remained there scarcely ten minutes. She very soon had a return of nausea and vomiting, which lasted nearly twenty-four hours. I thereupon insisted that she go into the country and that in her absence the entire house be thoroughly cleaned and dusted. This was done, and since her return she has presented no further symptoms of arsenic poisoning.

Another member of the family was affected by the removal of the paper, his symptoms taking the form

of a sharp diarrhœa. The other two members did not at any time present marked symptoms of arsenical poisoning, except a noticeably sallow complexion and a pretty constant feeling of lassitude all winter. They had, however, had more exercise in the open air than my patient.

I trust the record of this case may stimulate physicians to investigate more thoroughly than they otherwise might, cases that they hastily assume to be the results of malaria, nervous prostration or other indefinite or undetermined causes. Many of these cases I believe to be simply chronic poisoning from some material source near at hand. The profession has learned that wall-paper and some kitchen utensils are often arsenical, and it is slowly realizing that articles of clothing and of household decoration may likewise be injurious to health, although the subject has not yet received the attention that it deserves. It seems to me that it is our duty as physicians interested in public health and preventive medicine to make renewed and concerted efforts to secure such laws as shall make it a criminal offence for a manufacturer to allow any deadly poison to be in fabrics or materials that are used or that are sold upon the market.

DISCUSSION.

A specimen of the paper was shown to the Society, but the amount of arsenic it contained was not known.

Dr. B. F. Davenport said: It may be of interest to the Society to know, in connection with this case, that the German government has, during the past summer, passed a new law, to go into effect next spring, in which the presence of two-and-one-half grains of arsenic per square yard is allowed in woven goods, provided it is in an insoluble (?) condition.

The presence of arsenic in any arsenical color is forbidden if the poison is present as a constituent part of the color; but if it is present simply as an impure material the law forbidding its presence does not apply. What the grounds for these limits of the new German law are, I do not know, but presumably they are based on some competent experiment.

DR. F. I. KNIGHT asked if that would modify the law in relation to the manufacture of colors also.

DR. DAVENPORT: Yes. The old German law, which is at present upon the statute books, forbids the presence of arsenic in toys and wall-papers, but its enforcement has been suspended, and they allow the presence of arsenic in other things, provided they are to be exported. They are not so particular about other nations as about their own. That reminds one of the oleomargarine law in one of the Western cities. The dairy commissioner, reporting on the subject, said it was immediately gotten rid of by shipping into the neighboring States.

DR. ALBERT N. BLODGETT said: I would like to ask Dr. Smith what degree of reliability is to be placed on the testimony of paper manufacturers or paper dealers, as to the presence or absence of arsenic in their manufactured fabrics. A short time ago in a discussion before this Section the statement was made that the certificates of chemists were often utterly valueless; that paper which was pronounced by competent chemists free from arsenic was found to contain large and dangerous amounts of it. I would like to ask if Dr. Smith has had any experience in the proving of certificates of the chemists of manufacturers in regard to the compounds of arsenic in paper, and what value he places upon them.

DR. SMITH: When I was re-papering my rooms, I was in some doubt as to what dealer to go to, Bum-

stead, or Gregory & Brown. I went to the latter, and picked out papers that I thought I would like, and saw the analyses. The papers were said to be free from arsenic. I did not engage them to hang the paper, but engaged a wall decorator; he traded for the most part with another firm, the Boston Wall-Paper Company. They had a chemist of whom Dr. Wood and Dr. Harrington had never heard. They had specimens which were said to be free from poison. I finally purchased of Gregory & Brown. Dr. Harrington had marked one specimen "Practically free from arsenic." I went to Dr. Harrington myself, because I wanted to know how much it contained. I should place very little reliance upon the statements of any dealer in wall-paper, because he is in one sense an interested, and in another sense an uninterested party. He may sell arsenical wall-paper in perfectly good faith. He receives it from the producer, and takes the word of the chemist. If it proves to be full of arsenic, of course if there were a law, he would be subject to penalty.

When I was getting the paper, Dr. Wood told me an experience that he passed through. He changed the paper in his house while he was at the sea-shore. Dr. Hills one day asked him what paper he was putting on the dining-room. He replied that it was from a lot which had been examined, as the dealer said, by Dr. Hills himself. Dr. Hills was sure he had not seen it before, and on analyzing it, it was found to be a typical arsenical paper. Mr. Bumstead had the paper taken off at his own expense, and Dr. Wood said the paper-hanger had the most typical case of inflammation about the nails that he ever saw. I think Bumstead, although he has made some mistakes that were reported here last winter, has always acted fairly when he has found any paper that contained arsenic.

I am sure that Gregory & Brown are very careful.

Dr. Davenport said: It is well to remember that the certificate of the chemist applies only to the particular sample examined. It does not apply to another roll, whether of the same pattern or not. Two rolls of the same pattern may be quite different. One may be free; the other may contain a considerable amount of arsenic.

Dr. Smith: The reason why I spoke as I did about the law, was because Dr. Wood said he had been at the State House, in relation to the matter, but has been rebuffed every time. Testimony is brought forward to controvert his own. If the law were passed, he would be cutting his own fingers, for he gets some income from analyzing the papers. He has been one of the most strenuous in pushing the law at the State House. I would like to ask Dr. Davenport whether arsenic in wall-paper does not exist for the main part as an impurity.

Dr. Davenport: I presume it does. Most wall-paper in this vicinity is manufactured by the American Wall-Paper Company. They claim, and with reasonable evidence in favor of it, that they do not now use arsenical colors at all and do not intend to have arsenic in their paper. I have understood that they had last year a thousand samples of paper, just as it came from the factory, analyzed, and found it contained arsenic on the average in some 66 per cent. of samples.

The stock from which the paper is made is largely clay, and this, as well as the ochre, may contain arsenic. All papers with gilt contain arsenic, that is, practically all, because commercial copper is very seldom free from arsenic. Of course the bronze contains copper and zinc. Gilt from the American ore is generally free, but imported ore generally contains arsenic.

Then as all chemicals are made more or less directly with the use of sulphuric acid, which is made from pyrites, it may come in that way. And so, well nigh everything, unless it has been specially freed from it, would contain a trace of arsenic.

Dr. Smith said: It seemed to me that the amount of arsenic which would thereby creep into the color would be very small, but I supposed that the arsenic was used as a mordant, and was not washed out.

Dr. Davenport: As a mordant, quite a number of large cotton print mills use twenty tons of arsenic a month. A common piece of print cloth may contain three, four or five grains of arsenic per yard.

Dr. Smith had been told last June that Mr. Binney, employed by the Walpole company, made the strong assertion that arsenic had no business in the chemistry of coloring material at the present time; that it was the lazy greediness of the manufacturers, who allow it to remain in their colors; that they do not take time to wash it out thoroughly.

Dr. Buck said: There is one element of danger in papering rooms which does not often come up here. We may have a paper perfectly free from arsenic and still get arsenic poisoning. A certain number of paper-hangers put arsenic in their paste, and that gradually gets through the paper. I would like to know if any one has seen differences in the number of cases reported in different seasons of the year. In my experience I have seen more cases in the summer than at any other time. I have seen many paper-box workers during the summer, and although I have had the Dispensary work to do at other seasons of the year. I have not seen these patients during the winter or fall months. They have presented themselves chiefly during the early summer. I have thought that possibly it might have something to do with the heat, there

being a greater degree of volatility at that season of the year.

Dr. Vickery: Would paper containing two-thirds of a grain to the yard, be poisonous?

Dr. Davenport: Whether it would be poisonous is a question of dispute. Some say yes, and some no. Nobody knows.

Dr. Blodgett: I would like to observe that the chemist of the Roxbury Carpet Works, in which nearly all the various colors are employed, informed me that he never used arsenic, and that it was entirely unnecessary and out of place in the production of any color, and that it was perfectly possible to get all the advantages found in arsenic, from other and safe means. He expressed himself very strongly, and said that the presence of arsenic even as an impurity was unnecessary if proper care was employed in the selection of colors.

Dr. Smith added that a former occupant of the house where this patient lived, had died from some obscure trouble, having had stomach and head symptoms. She supposed it was the drainage, and the plumbers had been over the house again and again, but they pronounced everything in good order. Perhaps the present case may give us some hint as to the cause of that sickness and death.

Dr. Pengra: In what form is the arsenic set free from the wall-papers? Is it in the form of gas or solid?

Dr. Davenport: I believe it is now commonly considered that the danger is from the dust which is removed from the surface and inhaled. It was claimed at one time that there was danger of arseniuretted hydrogen being formed and exhaled as a gas. I believe the latest experiments have shown that this gas is not formed except there is free arsenic present in the

color. In the case of Scheele's green or Paris green, each commonly contains a certain per cent. of free arsenic, so that in the presence of moisture and fermentation, arseniuretted hydrogen may be formed. In connection with those hearings which were carried on before the legislature, one of the gentlemen papered a large room with a heavy arsenical paper, and drew the air from the room through a solution which would take out the gas which would be formed. I think it was carried on for some weeks without any result.

DR. PENGRA. I would like to know whether the finish would not have something to do with it.

DR. DAVENPORT. As I understand it, the danger is of the color being mechanically removed. Of course if the finish is such as to prevent that, the danger is prevented. A rough finish I presume is more likely to be loosely attached than the smooth polished surface. There are a great many interesting questions arising from this. Take a paper which contains a grain of arsenic per square yard. Suppose that it covers a room larger than the average, so that we have sixteen rolls of paper. Such a room would have something like sixty grains of arsenic on the wall. It would take a good many years for the paper to fall off, and if one were in the room and inhaled all of it, it would be a very minute quantity. It seems as if people were more affected by very minute doses than we are accustomed to see when we give it medicinally. One writer says that it has a greater effect, but I do not know why.

DR. PENGRA said, I would agree with Dr. Davenport's statements that the arsenic would not become arseniuretted hydrogen, but the process of fermentation may produce that gas. During the past four years I have seen students to the number of from one

hundred to two hundred, working in a laboratory where the gas was generated every day, each student probably generating from six to ten volumes in a moderate-sized room. They did this during six to nine months of the year. I have never seen a student suffering from anything like arsenic poisoning. I have seen students suffering from the fumes of amyl alcohol, and from sulphuretted hydrogen; but never has there been a case of arsenic poisoning among students who have been there two years.