

MITCHELL (G.S.) & HYNDMAN (J.G.)

A STUDY OF THE SNOOK-HERR POISONING
CASE.

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A WEDDING dinner was recently partaken of by sixty or seventy guests at the country-house of the bride's parents, near Louisville, Ky. Within a few hours the great majority of the guests were taken ill, all presenting the symptoms of gastro-intestinal inflammation. Within a few days several died. The lives of others were prolonged for from ten to fifteen days. Six cases finally terminated fatally. The symptoms in all the cases were essentially identical, differing only in intensity. Such an occurrence would under any circumstances have attracted much professional and popular attention, but in this instance it was probably increased by the social prominence of the victims and the number of people affected. Shortly after the repast, the newly-married couple left for the North. When their train

¹ Read before the Cincinnati Academy of Medicine, June 1, 1891.



reached Cincinnati, three hours later, both were feeling ill; they concluded to remain at a hotel over night, and continue their journey the following day.

Dr. Mitchell was called to see Mr. Snook at 10 o'clock on the evening of April 15, 1891. The patient was partly undressed and reclining on a lounge. He stated that he and his wife had arrived that evening from Louisville via the Shortline Railroad, and that the motion of the train had made him ill. He complained of nausea, abdominal pain, intense thirst and a constriction of the throat. He had vomited several times while on the train, and had had one stool. Upon inquiry as to what he had eaten, he said that he and his wife had attended a reception just prior to starting, and that he had partaken freely of chicken-salad, ice-cream and cake. His wife had eaten but little, and was only slightly nauseated. While giving this recital he vomited quite freely, the vomited matter consisting mainly of water, mucus and bile. The case was regarded as one of ordinary gastro-intestinal irritation, due to the character of the food eaten, and aggravated by the motion of the train, upon which latter point the patient laid particular stress. Although the pain was quite severe, it was deemed best to assist nature in washing out the stomach and unloading the bowel. The patient was given warm water in large quantities to drink, which was immediately vomited; after which one-tenth grain calomel powders were ordered to be taken one every hour, and mustard to be applied over the stomach. Dr. Mitchell then left, promising to return on the following morning. He was again summoned, however, at

2 A.M., and learned that the patient had continued to vomit. He had had three stools, and the pain in the stomach and bowels had become so severe as to be unbearable. A hypodermatic injection of one-third of a grain of morphine was administered. At the expiration of one-half hour the patient had become easy. At 7 A.M. on the following day Dr. Mitchell was informed that the patient had slept some, but he still complained of pain, vomiting and diarrhoea. The pulse was 100, and the axillary temperature 102° F. These symptoms continued throughout the day. Milk and lime-water were ordered; also a siphon of seltzer. These were mostly rejected, while the thirst increased. The calomel was discontinued, and a mixture of bismuth and paregoric was given. In the evening the temperature of the patient was found to be one degree lower. At the morning visit, on this second day, Mrs. S. presented the same symptoms as her husband, but not in so intense a degree. Her temperature, however, was the same as his. During the day Dr. Mitchell became convinced that his patients were not suffering from an ordinary attack of biliousness, and suspicion was aroused that some irritant poison had been ingested. Careful inquiry of the patients failed to furnish any light upon this point, both firmly believing that the motion of the train had produced their illness.

On the morning of the 17th, Mrs. S. had slightly improved, but her husband was worse in every way, save that his temperature had fallen almost to the normal. It continued to fall until late in the evening, when it was found to be subnormal. Dr. Hynd-

man was now asked to see the case in consultation, and from this time forward he and Dr. Mitchell continued in joint attendance. Mr. Snook was then in a condition of profound collapse. He was cyanotic, his heart's action very rapid and weak, the skin bathed in a profuse cold perspiration, and he axillary temperature 96° . Strophanthus was now administered per os. This was selected instead of digitalis on account of the continued irritability of the stomach. Morphine (one-tenth grain doses) combined with atropine was given hypodermatically. Warm applications to the body, in the form of frequent mustard baths, were employed.

During the fourth and fifth days there was improvement, the stools becoming less frequent, but the nausea continuing. At this time we learned of numerous similar cases having occurred in and about Louisville, all traceable to the same wedding dinner. It was ordered that the urine and vomited matters be preserved for us, but, by some oversight, we did not obtain any for examination until the sixth day of the patient's illness. On this day, and upon several subsequent occasions, the urine, vomited matter and mucous excretions from the bowel were carefully examined by Reinsch's method, but the bright copper strip showed no signs of the characteristic deposit of arsenic.

Beginning on the third and fourth days respectively both cases exhibited a decided eczematous eruption over the arms, shoulders, face and upper portions of the chest. In the case of the lady this continued during her entire convalescence, which began about the sixth or seventh day. In the case of Mr. S.

the eruption had more of a papular appearance. Under strophanthus, whiskey and a bland diet for the next few days he appeared to improve. His heart's action became stronger, his temperature remained about 100° , and his abdominal tenderness diminished. Diarrhœa and vomiting were almost checked. But the thirst, restlessness, and mental hebetude were quite pronounced. Morphine in small doses was continued. There was also decided subsultus tendinum. His urine, heretofore passed in normal quantity, was found diminished, and had to be withdrawn by the catheter. On the ninth day of his illness but four ounces were secreted. We now resorted to the hot vapor-bath, reinforced by the hypodermatic injection of one-sixth of a grain of pilocarpine. The profuse perspiration which followed was accompanied by a marked amelioration of his mental condition. Three injections of pilocarpine were made at intervals of eight hours. At the end of this time the kidneys appeared to have resumed their function and secreted almost the normal quantity; but catheterization was required from this time on.

While Mr. Snook could at all times be aroused without much difficulty, his mind seemed sluggish. About the tenth day epistaxis set in. Though not profuse it reappeared daily for several days. On the twelfth day, having for three days had no stool, he was given a saline cathartic in divided doses. The resulting passages each contained a small amount of bright-red blood, evidently from the lower bowel. From this time on the bleeding continued. Its amount was small, but it was con-

stant, and the patient, though able to answer questions intelligently, did not seem to realize that hæmorrhage was going on. His restlessness continued, interrupted only by very brief naps, and, notwithstanding stimulants, his heart's action grew more and more feeble, occasionally intermitting. These intermissions grew more frequent and the contractions weaker, until the evening of April 30th, the sixteenth day of his illness, when he died.

During the week preceding death Dr. Long, of the Marine-Hospital Service, and on the last day, Dr. P. S. Conner, saw the case in consultation with us. The coroner was at once notified of the death; upon his arrival he decided to order a post-mortem examination and a chemical analysis of the tissues. The following is the pathologists' report to Coroner Bange:

“In accordance with your instructions we have this day, May 1, 1891, made a post-mortem examination of the body of W. B. Snook. The body was that of a well-developed, well-nourished, white, adult male, of the apparent age of about thirty-five years, about 5 feet 6 inches in height, and about 160 pounds in weight. Post-mortem rigidity and post-mortem staining were well marked. On the right arm and left leg were found numerous small elevations of the skin, resembling wheals. On section the subcutaneous fat was found in good quantity. *Pleura*: In the right pleura about one ounce of fluid blood was found, with some extravasations of blood under the pleura. The *lungs* were normal, with the exception of slight hypostatic congestion. *Heart*: An extravasation of blood, about the size of a split pea, under the endocardium of the left ventricle, was found. The *stomach* contained about

three ounces of reddish, grumous fluid. The mucous membrane was marked by hyperæmia, and there was marked extravasation of blood in its substance.

Intestine: The small intestine in its mucous and submucous coat contained extravasated blood; the mucosa was very hyperæmic, and the solitary follicles and the patches of Peyer were swollen. The large intestine was also hyperæmic, with swelling of the solitary follicles. The *liver* was somewhat fatty. The *spleen* was slightly larger than normal, firm and hyperæmic. The *kidneys* were fatty, with small extravasations of blood under the capsule and under the lining of the pelvis. *Bladder*: Marked extravasation of blood under the epithelium and in the mucosa. The *brain and meninges* were normal.

“In our opinion the cause of death was, in all probability, the ingestion of some irritant poison.

“FREDERICK KEBLER.

“E. W. WALKER.”

On May 8, 1891, the following report was submitted to the coroner by Dr. Dickore, the analytical chemist:

“On Friday, May 1st, you sent me for poison-analysis the following parts of the body of the deceased Mr. Snook: 1. The stomach and its contents, in separate glass vessels. 2. The liver, spleen, heart, kidneys, intestines, a piece of rib, etc., in another glass jar; all of which I have carefully examined and analyzed for metallic poisons.

“In the spleen, the liver, the intestines, and the other parts from jar No. 2, separately examined, I have found traces of copper-combinations in sufficient quantity to be separated and to answer all chemical tests for this metal. None of this was found in the stomach.

“The analysis for arsenic by Marsh’s method re-

sulted, in the case of the liver, spleen, intestines and stomach, in producing a few little spots on white porcelain, resembling those which arsenic gives by this method; but the spots were not larger than pin-points—only two of the size of small pin-heads—and it was impossible to produce the nitrate-of-silver reaction with them; and as this is the only absolute and true test for this poison, I cannot conscientiously call these little spots a positive proof of the presence of arsenic.

“If any larger quantity of poison had been introduced into the system of the deceased, it must have been eliminated during the sixteen days of his illness by physiological processes and careful medical treatment. Very respectfully, W. DICKORE.”

Thus far we have given a full account of the two cases falling under our observation. The greatest interest necessarily attaches to the diagnosis of the cause of these symptoms. The diagnosis, reached by the process of exclusion during the life of the deceased, and expressed by us, was that we were dealing with cases of arsenical poisoning. At the present time, with the additional information before us, derived from post-mortem and chemical examinations, we feel even more confidently than before that our original diagnosis was correct.

A number of explanations offered themselves. Among them were the possibility of the existence of some acute infectious disease, such as trichinosis or typhoid fever, of mushroom-poisoning, or poisoning by tyrotoxin or other ptomaine, or by irritant minerals, such as arsenic.

The early onset and the great severity of the symptoms, together with the proof that no form

of pork was used at the meal, exclude from consideration the possibility of trichinosis. Though the post-mortem lesions, so far as the intestinal tract is concerned, somewhat resemble those of typhoid fever, the almost simultaneous attack of so many persons leads us very quickly to abandon the supposition of typhoid fever, even though we have before us some resemblance to the hepatic, renal and intestinal changes occasionally following the action of the typhoid bacillus, and the resultant chemical changes due to the ptomaines.

The possibility of tyrotoxinon-poisoning naturally suggested itself. Our patients presented the nausea, epigastric pains, vomiting, and purging characteristic of the action of this ptomaine. Their pupils, however, were never dilated, and, instead of subnormal temperature, they presented fever. The lesions found post-mortem also contra-indicate tyrotoxinon-poisoning; according to Vaughan, this ptomaine produces the symptoms without the lesions of gastro-intestinal irritation. Subsequent investigation showed that those wedding guests escaped who partook only of ice-cream and coffee with cream.

Mushrooms cannot be charged with the production of the symptoms, because some of the most severe cases were those of persons who had not eaten any mushrooms.

One of the latest of the many local theories of explanation is based upon the report that, at the time of the wedding, the chickens and turkeys at the bride's home were affected with chicken-cholera, and that some fowls showing evidence of being affected with this disease were used in the preparation

of the salad. The report states that parts of these chickens, which were black, were cut off and the remainder utilized. It is difficult under the circumstances to conceive of the possibility of such an occurrence. We are informed by very competent authority that, in this vicinity, chicken-cholera is almost unknown so early as April; but aware, as we are, of the rapidity with which such pathogenic germs may multiply and cause general barnyard infection, we do not care to insist upon this objection. Persons living on a farm and familiar with chicken-cholera would be the first to recognize danger from this source. The further elaboration of the chicken-cholera theory is by no means convincing. We are told that the chicken-salad left over from the wedding was examined (eight or ten days later), and that ptomaines were found. As these investigations were not begun until after the death of several of the persons poisoned, and as the material examined consisted of such remnants of the wedding dinner as were still collectable at the end of a week of warm weather, it is not at all surprising that ptomaines should be present. Being chemical compounds, formed during the putrefaction of organic substances, such ptomaines would almost necessarily exist in the refuse food a week old; but, we are told, these ptomaines were identical with those found in the chickens which died of cholera and in the stomach of one of the victims (who died eight days after the wedding). As to this, we can only state that as far as we are acquainted with the literature of ptomaines, we believe that the ptomaine resulting from the action of

the chicken-cholera bacillus has never yet been isolated. There is, therefore, good ground for scepticism regarding this discovery. In the light afforded by the symptoms, the post-mortem lesions, the chemical analyses, the fact, already mentioned, that up to the present time no such anatomical lesions have ever been observed to follow ptomaine-poisoning, and the utter absence of any reliable experimental observations upon these ptomaines (or their precedent bacilli) in man—we feel justified in saying that the application of the ptomaine-theory to this case is not tenable.

Let us now consider the theory of a mineral irritant. The history of our cases has recorded the occurrence of thirst, nausea, retching and vomiting, epigastric and abdominal pain, tenderness on pressure, severe purging, decided fever, small, irregular pulse, labored respiration, suppression of urine, great restlessness, mental hebetude, eczematous eruptions, epistaxis, hæmaturia and intestinal hæmorrhage. Many of these symptoms were manifested by both, and all by the fatal one, of our cases. No poison but that of a mineral irritant could produce such an array of symptoms and such lesions as have been described. These post-mortem conditions, found by two of the most competent pathologists of Cincinnati, led them in their report to the coroner to state that the cause of death was probably "the ingestion of some irritant poison."

Portions of the liver, kidney, spleen, muscle, brain and bone were submitted to Dr. Dickore for chemical analysis. As stated in his report, Dr. Dickore found decided traces of copper, and lesser

amounts of some other substance which might possibly have been arsenic, but which was present in too minute a quantity to be absolutely determined.

It is a well-known fact that copper, like antimony, silver and lead, often remains in the organs for many months after it has been taken. Copper may be taken under so many different circumstances and in such diverse ways, and is, in consequence of its slow elimination, so frequently found in the tissues, as to lead some very able toxicologists to claim that it is one of the normal constituents of the body. It is a well-known fact that copper exists in some edible vegetables, being taken up from the soil in which they grow. Then, too, copper salts are often employed to impart a fine, green color to pickles and other preserved fruits. Its frequent presence in the food and its very slow elimination might possibly account for the discovery of copper in the body of our patient. Its presence should never, however, be supposed to indicate copper-poisoning unless we have the symptoms and pathological lesions which are known to follow its administration in large quantities. These were entirely absent in our patients. The characteristic color of the vomited matter, the jaundice, the green line along the gums, were all absent. On the other hand, there were numerous bloody extravasations in the heart, liver, spleen and pleura, which, according to Tardieu, the greatest French authority, are altogether absent in copper-poisoning.

Copper rarely causes fatal poisoning. Such large quantities are required that the styptic taste would call attention to it, and thus, if homicide were in-

tended, defeat the object. Natural verdigris is undoubtedly poisonous ; but the supposition is too strained that, on the occasion of a wedding, unclean copper vessels should be employed, or even, if used, that enough verdigris should exist to poison fifty persons, many of them fatally. It is possible that the poisoning may have been produced by arsenite of copper, the symptoms of which are mainly those of the arsenical ingredient. In this case, however, the analyst would as likely have discovered the arsenical as the cupreous ingredient.

Having, as we believe, excluded all poisons other than arsenic, we desire to take up a few points of interest in connection with this as the probable agent. The late appearance of the pronounced symptoms in many of the cases has been by some considered as excluding arsenic from consideration ; but it is recognized by all writers on this subject that there are few poisons which present a wider variation in the time of appearance of symptoms than arsenic. As one of the many instances of this fact we may mention the case recorded by Reese, in which, after a teaspoonful of arsenic had been taken by mistake, no symptoms whatever manifested themselves for six hours. It is true that no arsenic was discovered by ourselves in the tests made of the urine, the vomited matter, and the fæces. For this purpose the Reinsch test was employed, but, as stated in the narration of the cases, our tests of these excretions were not made until the sixth day. During this time vomiting and purging had been profuse and had probably eliminated the greater portion of the poison.

The question will naturally arise, If arsenic were the cause of death, why was it not found in definite quantity in the tissues in our fatal case? We reply that it was simply because the patient was kept alive for fifteen days, and the poison was eliminated by the vomiting, the purging and the excretion of kidneys, possibly the skin, this elimination being accelerated by the hot vapor-bath and the pilocarpine injections. It is a well-known fact that the eliminative functions may in the time alluded to entirely free the system of arsenic. In proof of this we need only cite one of many cases, *e. g.*, that of Dr. Alexander (*Medical Times and Gazette*, April 15, 1857), in which "a gentleman swallowed a large dose of arsenious acid, and after suffering the usual symptoms, died on the sixteenth day. Chemical analysis detected no trace of the poison in any organ of the body, although it was abundantly contained in the food swallowed by the deceased." Casper says: "Arsenic may be eliminated by the excretory organs to that degree that it may entirely and completely disappear on an average of from one to two weeks. According to some experiments on animals, fifteen grains disappeared completely in three days." Taylor states that in many undoubted cases of arsenical poisoning not a trace of the poison can be found in the stomach or the contents. "It is, further, a well-known fact that if an individual, to whom arsenic has been administered with criminal intent, lives for fifteen or sixteen days, no part of the body may present any trace of the poison."

We are firmly convinced that had an analysis of the tissues been made in those cases in which death took

place during the first week, arsenic would have been found and the whole matter long ago have been made plain. Instead of this being done, we learn from the Louisville press that in the case of one of the first to die, a man of high social and business standing, no post-mortem was made and no inquest was held. Instead of the pathologist and analytical chemist, an undertaker was summoned, who proceeded at once to embalm the body with an arsenical fluid. Fortunately, all cases were not handled in this peculiar manner. Scientific interest was not altogether thwarted. The one missing link in this chain of evidence is supplied by the results of the examinations made by Mr. Flexner, a most competent chemist of Louisville, who, with the attending physician, found arsenic (by Reinsch's method) in the urine of two of the non-fatal cases. A single positive observation of this character is of greater value than any number of negative and hypothetical statements.

In conclusion, we would say that at least one of our cases was so marked that, had we seen the arsenic administered, we could have looked for no more pronounced symptoms and no more characteristic pathological lesions. These, considered in connection with the analyses just referred to, in cases having the same origin and many of the same symptoms, leave no doubt in our minds that arsenic was the offending substance.

At this distance so many difficulties and conflicting statements are encountered in our search for the particular ingredient containing the poison that for

the present we purposely omit discussion of this feature.

ADDENDUM.—Since presenting the foregoing report to the Academy, the Coroner of Louisville has begun an inquest. The testimony of the father of the bride, at whose home the wedding-dinner was given, completely demolished the chicken-cholera theory. Mr. Herr stated that the chickens and turkeys on his place were healthy, and that not a fowl had died there for years. The chickens were prepared and dressed by a colored woman on the place, and the family had been eating of the giblets for three meals. He stated also that there were no copper vessels on his place. The food was cooked in iron vessels.

THE CINCINNATI ACADEMY OF MEDICINE.

Meeting of June 1, 1891.

G. S. Mitchell, M.D., *President*; T. V. Fitzpatrick, M.D., *Secretary*.

DISCUSSION OF A STUDY OF THE SNOOK-HERR
POISONING CASE.

DR. WHITTAKER, in the discussion of the Snook-Herr poisoning case that followed, said:

As the symptoms read, the differential diagnosis would include the consideration of cholera morbus, typhoid fever, trichinosis, meat-poisoning, mushroom-poisoning, and a mineral poisoning, most especially arsenic.

Cholera morbus might be excluded because of the large number of people affected, but chiefly because of the persistence of the symptoms after the use of evacuants and morphine subcutaneously.

Typhoid fever sometimes begins with gastro-enteric signs so intense as to resemble poisoning, but this is exceptional. It would be impossible to conceive of forty cases all beginning in this way. In the absence of this knowledge the condition of the mind and the course of the temperature would exclude the diagnosis of typhoid fever.

Trichinosis rarely shows signs of such intensity at the outset, and simultaneously in so many persons. Multiple cases of trichinosis have been considered as true cholera, or as poisonings, but not in late years since we have had definite knowledge concerning trichinosis. Characteristic muscle-pains and œdemas at the end of the first week mark this affection.

Mushroom-poisoning also leads to severe vomiting and diarrhœa at periods varying from six to twenty-four hours after ingestion, with subsequent nervous symptoms,

and unless the history of the case be clear (no mushrooms eaten, for instance) or fragments of fungi be found in the discharges, the resemblance to arsenical poisoning may be complete. The speaker had occasion, a few years ago, to treat one of his fellows in Cincinnati for fly-fungus poisoning (muscarine) and was impressed by the signs of intoxication which supervened within one hour after ingestion. The patient chattered and raved incessantly, and was in and out of bed in constant excitement which he strove in vain to subdue. Inhabitants of Kamtschatka partake of this fungus purposely to secure this kind of intoxication, and the poor are said to drink the urine of these rich epicures to indulge the same passion. In the case reported the stomach-tube quickly relieved the physician.

Meat-poisoning, which it is now the fashion to call ptomaine poisoning, we know only in connection with pork and veal. Most of the cases thus reported—as at Andelfinger, 444 cases, 10 deaths; Klotten, 657 cases, 6 deaths—on examination turn out to have been trichinosis or typhoid fever. Nevertheless, undoubted cases, independent of these diseases, have been reported. Perhaps the best-observed cases were reported by Gärtner, of Jena: fifty-eight cases in twenty-five families; one death, in a laborer aged twenty-one, taken ill in two hours and dead in thirty-five hours after taking the food. The other fifty-seven cases became sick in from twenty-four to thirty hours and recovered in from a few days to two weeks. The main symptoms were enteritis, prostration, sopor. The discharges were studied bacteriologically with the discovery of a so-called bacillus enteridis, which was cultivated and inoculated in various animals. As a rule the symptoms of meat-poisoning show themselves later than those of arsenical poisoning, sometimes not until the day following the ingestion of the poison. Groenouw confirms the statement of Ulrichs that in all

severe cases of meat-poisoning there is both dilatation of the pupils and disturbance of accommodation.

Arsenic shows itself by gastro-intestinal irritation and narcosis. The practitioners in these cases, debarred from tests of the vomited matter at the outset, by the absence of all knowledge of other cases, very properly had the urine (in which arsenic has been detected at any time from five hours to two weeks after it has been taken) examined as soon as suspicion was aroused. Arsenic has been found in the liver four hours after administration and has been wholly eliminated from the body in two weeks. Flaudin found that fifteen grains might disappear wholly from the body of animals in three days. It is pretty universally distributed over the body, including the nervous system and the bones. In his experiments with animals, Scolosohoff found arsenic thirty-six times oftener in the brain and cord than in the liver, and in the muscles four times oftener than in the liver. Rand reports a case of exhumation and examination of the contents of the stomach two weeks after death, with negative results, and a re-exhumation and examination of the soft parts two months after death, with positive results. Sonnenschein found arsenic unequally distributed in the bones, but mostly in the pelvis and adjacent vertebræ. So arsenic has been detected in bodies three, eight, ten, by Altschul fourteen, and by Steinhauser twenty-two years after death.

Inasmuch as the symptoms vary so much that an absolute conclusion cannot be based upon them, or upon the lesions, though both symptoms and lesions read like arsenic in these cases, absolute proof here must rest upon exhumation of the bodies of some of the six victims and examination of the viscera and bones.

DR. G. A. FACKLER agreed with the essayists that the evidence presented in the paper argued strongly in favor of their theory. Although it cannot be positively asserted that arsenic was the toxic agent, still, assuming

this to be the case, the appearance of all symptoms can be readily explained. He could not, without exception, agree with the previous speaker as to the discovery of arsenic in bodies of all individuals who had died from the poisonous effects of that drug, even if such bodies be exhumed months after death. It is true that a large number of cases have been reported to substantiate this statement. Yet an equally large number have been reported that would contradict it. We can easily reconcile such apparent contradiction by remembering the fact that arsenic is rapidly eliminated. The first class of cases, then, includes those in which the period between ingestion of the poison and death is brief—too brief to insure complete elimination. The second class, to which the one under discussion belongs, includes those in which considerable time has elapsed after the administration of arsenic until a fatal effect ensues, thus permitting the entire or nearly all of the amount absorbed to leave the body. We must not forget that the toxic effects of arsenic are not due to its direct action upon the tissues. If the agent be injected subcutaneously the same changes will be observed in the internal organs, *i. e.*, the degeneration of glandular organs, submucous structures of the gastro-intestinal tract, manifestations on the part of the pleura identical with those described in the paper of the evening, etc. This action is due to the fact that arsenic, after its absorption, acts alternately as a reducing and as an oxidizing agent, arsenious acid being changed by the absorption of oxygen into arsenic acid; and, again, giving off oxygen, this is changed to arsenious acid. Such changes produce a rapid interchange of oxygen within the protoplasmic structure of the organs in which either of the acids finds entry, and must exercise a destructive action upon them. Thus arsenic sweeps, like a fire, through the organism and, in cases in which life is prolonged, disappears, leaving devastation behind. In these very cases (and the one reported probably belongs to

this class) the alterations and degenerative changes produced are of such severe character as to result in a loss of the functional power of the affected organs that must lead to a fatal termination. Exhume such bodies and the closest scrutiny and most accurate analysis of all tissues will not disclose a trace of the poison.

It is true that our knowledge of ptomaines and their action is very meagre. Yet we must not disregard the possibility of their existence. Cases have been reported, especially in Italian literature, in which chemical examination has disclosed the presence of various mineral poisons and alkaloids, and a more careful examination revealed the fact that the symptoms observed ante-mortem, as also the post-mortem changes, were attributable to the presence of certain ptomaines.

DR. S. P. KRAMER said that he thought that the fact of copper being found had not been sufficiently dwelt upon. Arsenic was rapidly eliminated from the system and copper more slowly; therefore he thought the possible source of poison in these cases might have been the tri-arsenite of copper, or Paris-green as it was more commonly termed, which contained a large amount of copper.

PROF. DICKORE said, in answer to the statement made by the previous speaker in reference to Paris-green, that it contained a larger amount of arsenic than copper, and that the former was more quickly eliminated from the system than the copper. He still thought that the presence of copper might indicate one of the sources of the poisoning. By very careful work he had obtained several little black spots on white porcelain, which looked exactly like those produced by arsenic. Under other circumstances, when no medico-legal question was involved, he would have called these spots "arsenic;" since they were too small to produce all the arsenic reactions he could not make any other report than the one he had given the coroner. Small quantities of arsenic

were sometimes found in medicinal preparations, as for instance in subnitrate of bismuth. It would have been interesting to have had the bismuth administered in these cases examined for arsenic. It must also be remembered that arsenic is by no means of uncommon occurrence in some sections of Kentucky, Ohio and Indiana. Most iron pyrites, and the water of some mineral springs, contain arsenic. Traces may enter the human body from such sources. Copper is sometimes found in articles of diet. Cases are on record in which fatal poisoning has happened from eating pickles colored with copper; also from other dishes of acid reaction kept or prepared in copper vessels. The speaker had met a brother of Mrs. Snook who had just recovered from the poisoning, and who said that an aunt who had eaten none of the chicken-salad had become sick and died; another relative had partaken of everything, but had drunk no coffee or water from the silver pitcher on the table; this relative remained well. These facts speak against the theory of ptomaine-poisoning. In the case of the brother of Mrs. Snook, it was stated that the solid parts of his discharges were of a tea-green color; this points toward copper-poisoning. He was under the impression that the water in the silver pitcher contained the poison. He also stated that the taste of the coffee was disagreeable, to such a degree that he could not even yet bear the smell of coffee. The speaker said that in his opinion the mystery was not entirely cleared up. He would recommend that the bodies of some of those who had died first be exhumed and carefully examined; should they all contain copper and arsenic, then Paris-green was the poison; but should they show copper only, or only arsenic, then the one or the other of these metals would be the cause of death. The young man referred to had ulcers of the lips, gums and tongue, such as are result from mineral poisons.

DR. MITCHELL, in replying to a question of Dr. Evans,

stated that he had very recently received a letter from Dr. Irwin, of Louisville, who had treated many of these poisoning cases; that up to that date no post-arsenical paralysis had appeared in any of his cases.

DR. HYNDMAN, replying to a remark of one of the previous speakers, warned him that in case any of the bodies now buried should be exhumed and copper should be found on chemical analysis, not to jump to the conclusion that that metal was the cause of death unless found in very large quantity. As stated in the report, copper is so often found in chemical analyses of the body, that it is claimed by some chemists to be a normal constituent.

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