

VII.—*On a Case of Poisoning by Sulphate of Protoxide of Iron.*

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[*Read January 25th, 1853.*]

As the recorded cases of poisoning by sulphate of protoxide of iron are rare, there being only two cases described in Christison and Taylor's valuable works, and a third which occurred about twelve months ago, I believe it may prove interesting to some of the members of our Society to have a case presented to their notice which I have recently examined; the more so as, owing to the kindness of Dr. Brown (the Lecturer on Medicine, and one of my colleagues at the Royal Medical School here,) I am enabled to give an anatomical description of the stomach and intestines, which has not hitherto been given in cases of poisoning with green copperas.

On Thursday, the 4th of December last, Mr. Girdleston, surgeon, at Shelton, brought me the stomach and intestines of John Hill, late of Bagnall, near Stoke, Staffordshire, who had died, he supposed, from the effects of some irritant poison; he had found all the organs of the deceased healthy, with the exception of the stomach and intestines, which were highly inflamed. Mr. Girdleston also stated that at about half-past nine o'clock on the morning of the 27th of November, the deceased had been seized with sickness and purging, which continued up to the period of his death, about nine o'clock the same evening.



The evidence at the inquest was adjourned until chemical research could be brought to bear upon it. I much regretted that the liver had not been removed, in addition to the stomach and intestines, and had determined to request the disinterment of the corpse, but having been enabled in my examination of the stomach and intestines to find copperas, I thought it unnecessary to exhume the body. I first removed the small amount of fluid which was found in the stomach; I then placed in another vessel the contents of the intestines, and to these I added respectively some washings obtained by cleansing these viscera with distilled water. These fluids being heated to ebullition, and the coagulum thus produced separated from the liquid, the precipitates were desiccated, and the fluids evaporated to dryness in an oil bath of  $220^{\circ}$  Fahr. These were examined for oxalic acid, oxalates, bi-chloride of mercury, salts of antimony, lead, copper, and barytes.

Having arrived at no results, but still believing death to be due to some irritant poison, I tested for salts of zinc, during which process I detected the presence of salts of iron, and having satisfied myself that an unusual quantity existed in the coagulum, and in the fluid separated therefrom, as well as in the tissues of the stomach and intestines, I then proceeded to determine the quantity of iron still remaining in the tissues, as well as in the fluid and solid matters which I had obtained from them. I say remaining quantities; for the amount I extracted could be only a small proportion of that taken by the deceased, as he had vomited nearly constantly for twelve hours, and been also purged.

I found by experiment that it was impossible to extract all the oxide of iron, by simply carbonizing the matters, and treating them with aqua regia, evaporating to dryness, and washing; but it was essential that the carbon should be perfectly removed by calcination, before the whole of the iron could be removed.



Having to contend with phosphates which would have rendered the determination of the iron in the state of peroxide of iron very tedious and difficult, I treated the calcined residuum with pure hydro-chloric acid, evaporated with care to a syrup, added water, and filtered; the liquors were then reduced to the state of proto-chloride of iron by means of pure zinc, and the amount of iron they contained determined by Marguerite's test (per-manganate of potash). The following results were obtained:—

	Grs.
6½ oz. of the Intestines yielded $\text{SO}^3 \text{FeO}$ .....	1·054
5¼ oz. of the Stomach yielded $\text{SO}^3 \text{FeO}$ .....	0·324
Of portions of the Stomach and Intestines previously treated for other poisons.....	1·256
The Coagulum obtained by boiling the fluids of the Stomach .....	0·660
Contents of the Stomach separated from the Coagu- lum and evaporated to dryness, and insoluble in Alcohol .....	0·526
In the above, but soluble in Alcohol .....	0·324
Liquid obtained by washing Intestines .....	0·993
Fluid from the Intestines .....	0·526
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Total amount of Copperas, or the Sulphate of Protoxide of Iron.....	5·663
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I also found an unusual quantity of sulphuric acid or sulphates in the different fluids.

An interesting fact is, that although nine days had elapsed between the death of John Hill and the day following that on which the intestines were placed in my hands, the patches or spots on the intestines still preserved an acid reaction, which was manifested on a slip of blue litmus paper being applied to them.

I have great pleasure in publishing here an extract of the anatomical appearance of the intestines and stomach, as described by Dr. Henry Brown:—



“*The stomach*, which had been previously laid open, presented nothing worthy of remark, excepting a trace of arborescent vascularity in the sub-mucous tissue. The mucous membrane could not be easily stripped off.

“*The intestines* externally presented no unusual appearances except in five places, all of which were confined to the jejunum; in each of them the uniform purplish red hue of the peritoneal covering was changed to a dirty opaque white, studded with minute flocculent-looking brownish spots. The form of each was oval, with the exception of the second in order from the stomach, which had two pointed extremities. They equalled in size a half-crown piece, some more, some less, and were all situated on the free border of the intestines, none reaching around or across the entire circumference. The margins of the spots were very distinct, with the exception of the last; and at first sight the spots seem to have been produced by a fold of the intestine having rested against the dry surface of the glass jar in which they had been kept, by which the blood had been pressed out from them. On extending the peritoneal coat, however, it was evident that such was not the case, for each spot was found to be encircled by two distinct rings of different colours; the first was very slight and red, and the second, which was a quarter of an inch in breadth, was of an ivory white colour. The white colour was shaded off evenly, but abruptly, towards the uniform general redness of the parts not marked; the shading did not occupy more than one-eighth of an inch.

“*Internally*, the folds of the mucous membrane (valvula conniventis) were every where of a deep purplish red colour, excepting in the parts corresponding to the external markings, from which the colour had been discharged. The mucous membrane in consequence, over a space equal to the whole of the external marks, was whitish, and the shading off was so gradual as to extend at least a quarter of an inch



“beyond the external white zone. There was no thickening  
“of any of the coats of the intestines in the places thus  
“marked, neither did they appear to have lost any of their  
“cohesion and firmness; the mucous membrane did not peel  
“off more readily than elsewhere.

“The contents of the intestines consisted of a thin, reddish  
“brown gelatinous mucus, without any hardened fœces.”

Dr. Brown adds,—“From the above facts, I believe that  
“the appearance could not have been caused by mechanical  
“pressure and drying after death, neither do I know of any  
“other post-mortem cause capable of producing them. The  
“appearances have all the characteristics of extreme vital  
“irritation (without actual corrosion) in its very first stage—  
“stages which have been suddenly arrested, and stereotyped  
“as it were, by death. Four fully-grown tape-worms were  
“found, with their heads, and have been preserved.”





Crace-Calvert, F. 1854. "On a Case of Poisoning by Sulphate of Protoxide of Iron." *Memoirs of the Literary and Philosophical Society of Manchester* 11, 163–167.

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