

der had always turned out white, a significant fact which seemed strongly to indicate that the heating had been continued too long, and perhaps too intensely. It also agreed with the two cases already described, in which the intense heat of the furnace during two hours had produced the same injurious effect. It corresponded also with the fact already stated, that a portion which had been adequately raked was rendered perfectly white in the crucible by fifteen minutes' red heat in a strong fire, the same effect not being producible by a weaker heat for a much greater length of time.

In due time, after finishing a quantity of my James's powder, I was anxious to know something of its medical effects, and with this view gave it to several friends for trial, and used it also in my own person. But in most of the cases tried, the powder had a rough action, producing sickness, and sometimes vomiting. I had used equal quantities of bone-ashes and sulphuret of antimony as directed by Pearson, and followed in the pharmacopœias, but this proved to be too much of the sulphuret. I therefore made new trials of the process with half the quantity of antimony. In these proportions the difficulty and uncertainty of the process were greatly diminished; the powder almost always turned out snow-white, and when used as a medicine in due doses was for the most part easily borne in the *prima via*. But it is very probable that Dr. James employed a less ratio of sulphuret of antimony even than one-half; he sometimes prescribed his powder in doses of ten grains every six hours, and even twenty grains at once, without much effect on the stomach, bowels, or skin.

There is a slight objection to conducting the process of roasting in an iron ladle, and raking with an iron rake; minute particles of protoxide of iron are found in the resulting powder, very small in quantity, but unpleasant in appearance. This may be remedied by substituting an earthen dish, and it was such a vessel that Pearson used in his experiments; but the iron ladle is far more convenient.

I believe that James's powder may be prepared in the following manner:—Let any quantity, say eight ounces, of bone-shavings be heated in an earthen-ware dish or an iron ladle, over a moderate fire, and frequently stirred or raked during its incineration. When burnt to a black powder and amoniacal fumes are no longer perceptible, let four ounces of levigated sulphuret of antimony be thrown in, and let stirring with an iron rod from the bottom and all parts be immediately commenced and rapidly continued, so that the sulphureous fumes shall have a free issue and be no longer discoverable. This is most important.

During the desulphuration the heat should be kept as low as may be sufficient to cause the discharge of the vapour. In the dark, the powder should show a thin, blue flame, as faint as possible; but as often as this flame disappears, the heat should be gently raised until it again appear. But neither the bottom of the ladle nor the powder should be allowed to become red-hot while vapours are discharged, or while there is blue flame from the burning sulphur. At length even a higher heat will not expel any more sulphur. During this roasting, innumerable bright spiculae of metallic antimony will sparkle through the powder. The ladle and its contents may be allowed to become red-hot for two or three

minutes, the raking being continued. If the process has been rightly conducted, the powder, at this stage, will have assumed the colour of the dust of bath brick.

The contents of the ladle should now be powdered, sifted, transferred to a skittle-pot, its cover laid on, and the whole placed on a stand in the fire-grate, and lumps of coal are to be built round and above it in such a way as to permit a free current of air to pass through. The skittle-pot and its contents will thus be brought to a uniform bright red-heat, which may be maintained at that degree for about an hour, more or less, according to the quantity. The skittle-pot is then to be taken from the fire, and should the powder prove to be pure white, except perhaps a thin layer at the top, it only requires to be reduced to the finest powder in an earthen mortar, and sifted through a fine silk sieve. Should the powder not prove white, it may be returned to the skittle-pot, placed in the fire as before, and continued in a state of ignition for half an hour, according to the judgment of the operator.

In the first part of the process, the sulphuret of antimony is slowly decomposed; its sulphur burns, and exhales in the state of sulphurous acid. The antimony, now insulated, appears in small brilliant spiculae, which, as the heat increases, gradually disappear. In the second part of the process, when the roasted matter is heated in the skittle-pot, antimony, while in the state of vapour combines with oxygen, and is converted into protoxide, part of which crystallizes in the upper part of the skittle-pot, or escapes as a thick, white smoke. The heat increasing, the protoxide is converted into antimoniæ of antimony, which remains mixed or combined with the phosphate of lime.

If the heat be raised much above that of a good coal fire in a common grate, the mass will slightly cohere, and in some parts will become yellowish and vitreous. If the heat be still higher, as that of an air-furnace, the powder will change to an olive-brown mass as hard as stone.

All the time the powder is in the skittle-pot and very hot, protoxide of antimony is escaping or crystallizing on the cover, and hence the difference discoverable by analysis, and by the medical efforts of different parcels of James's powder. It therefore becomes an important and difficult question, what is the criterion by which the completion of the process is to be judged? I know of no other than this, that when the powder is white it is fit for use: any greater or longer-continued heat I believe to be injurious. It may not always happen that the whole charge will prove white; when it does not, the whitest parts are to be separated, and, if worth the trouble, the remainder may be slightly calcined again. But should the first charge, after being duly heated, prove dark-coloured throughout, it cannot be improved and may be rejected.

Before concluding this paper, I may mention some facts relative to James's powder which were communicated to me a great many years ago by a very old gentleman who had been an apothecary in Dublin, Mr. William Speer, the clever inventor of a well-known hydrometer for ascertaining the strength of excisable spirituous liquors. It was as follows:—

In 1758 Dr. Anthony Relhan, a Fellow of King and Queen's College Physicians in Ireland, practised in Dublin, and was one of

the physicians of Mercer's Hospital. The Fellows refused to meet him on account of his employing James's powder in his practice, although the decree against antimoniæ by the French College of Physicians had been long before repealed. In consequence, he wrote to Dr. James, who advised him to go to London to practise, which he did. Becoming intimate with Dr. James, the latter, during several interviews, communicated the process practically to him, his patent-right having expired. In 1760, Relhan returned to Dublin, and being acquainted with Mr. Ducros, an eminent apothecary, then residing in William Street, he communicated the process to him confidentially. Ducros prepared the powder in presence of Relhan, and it was repeatedly administered in Mercer's Hospital and other places, with exactly the effects of James's powder. Mr. Speer was apprentice to Mr. Ducros, and on his death in 1868 succeeded to his business. The widow gave up to Mr. Speer a MS. book containing the account of the Pulvis Jacobi, which he retained ever after. The following is the process:—"Take one pound of hartshorn-shavings; boil them in a large quantity of water, and dry them by a slow fire. Rub them to a fine powder. Then put an equal weight of the hartshorn and powdered crude antimony into a crucible, and set it on a moderate fire, stirring it with a long rod of iron for six hours or as long as it smokes."

I have repeated the above process several times, but never could produce the snow-white powder with which we are familiar; the resulting colour being generally that of bath brickdust already described, but on a few occasions paler. Yet the statement of Mr. Speer is I think supported by facts. Dr. Pearson says, "It is probable that this powder was made for several years with merely the heat necessary to carry off the sulphur and calcine the bone, in an open vessel, and consequently it was of a light clay or ash colour. Its property of turning white in a greater degree of fire appears to have been a subsequent discovery." But in this greater degree of fire the powder discharges copious fumes of protoxide of antimony, and becomes less active as a medicine; and at length assuming the hard, vitreous state, it loses all medical power. On one occasion, when I had obtained the powder from the iron ladle paler than usual, I took several doses of it without any striking effect, which proves at least that, in this state, it is innocuous; its taste was most disagreeable, whereas the white powder is tasteless. I imagine that in this form the powder would prove to be in its most active state; that it was in this form that Lilo's and Schwanberg's powder obtained its celebrity; and that the subsequent process of whitening it by fire deteriorates its medical effects more or less according to its degree and continuance. But is of little use to insist on this part of the subject in the present day. If the whitening process in the skittle-pot were relinquished, and the light ash-coloured powder from the ladle were accepted, we should probably have an efficacious medicine of uniform or little-varying strength.

Clare Street, Dublin.

#### Poisoning by Carbolic Acid

Has occurred in England. On the 5th of February, Dr. Machin was called to a hospital where three women had, by mistake, bathed themselves with a sponge with carbolic