

## COPPER IN PRESERVED GREEN PEAS.

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HAVING recently had several samples of French preserved green peas submitted to me for analysis, by the Board of Works for the Strand district, I found in each of the specimens, nine in number, unmistakeable evidence of the presence of copper.

The method which I employed to estimate the amount of the copper was as follows: I weighed out about 1000 grains of the peas, and the liquor with which they were mixed, into a porcelain basin, dried and ignited them over the flame of a Bunsen burner, and when they had burned down into a grey ash, this was suffered to cool, and then treated with a little concentrated sulphuric acid, ignited again, and finally the residual carbon burnt off in a muffle. The treatment of the ash with sulphuric acid prevents the loss of copper, which would occur from the presence of sodium chloride in the ash when the residual carbon is being burnt off at the high temperature requisite for its combustion, and it is to be noted that unless the carbon be wholly removed from the ash, the copper cannot be completely dissolved from it. The ash was next boiled with nitric acid, to which some few drops of hydrochloric acid were subsequently added, and again heated to boiling, the dish being covered with a glass lid. The solution so obtained was then carefully evaporated, diluted with water, and made strongly alkaline with ammonia, filtered, and the precipitate washed—the precaution was taken of re-dissolving and re-precipitating the first precipitate. The filtrates were mixed, evaporated into a small bulk, transferred to a weighed platinum basin, and acidified with hydrochloric acid. The platinum basin was then made the negative electrode of a battery of one of Grove's cells, a strip of platinum dipping into the acid liquid being the positive electrode. A slow evolution of hydrogen at once commenced, and in a couple of hours or so the whole of the copper was separated in a bright metallic film upon the surface of the plate. The liquid was then rapidly poured out, the basin washed with hot water, dried at 100° C. and weighed.

In this way quantities of copper, weighing from 0.02 grain up to ten times that amount were obtained from the above-mentioned weights of the specimens employed.

The method of separating the copper from the acid solution by precipitating it with zinc I did not find so successful, partly on account of the impossibility of obtaining zinc which dissolved without residue. I found that the presence of the copper might be beautifully shown by placing a quantity of the peas themselves in a platinum dish, acidifying them with hydrochloric acid and making the basin the negative electrode of a constant battery; in about twenty-four hours an abundant separation of the copper in a metallic film is obtained, but I have not found that the whole of the copper is separated in that time. I would here suggest a precaution, which I, however, omitted to take, namely, that of mashing the whole of the sample, together with the liquor left for analysis, into a paste with pestle and mortar, and taking an aliquot part of that paste for analysis. The individual results would then be more concordant, though, of course, the results of the analysis of another portion of the "tin" might present the expected divergencies.