of the commercial importance of an accurate estimation of sulphur in pyrites, I have no doubt that a prompt repetition of my work as described above will soon be published by some other analyst, and the main point at issue, namely, the necessity of a very slow addition of the barium chloride solution, be settled.

FURTHER NOTES UPON THE FATS CONTAINED IN THE TUBERCULOSIS BACILLI.

BY E. A. DE SCHWEINITZ AND MARION DORSET.

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IN the *Journal of the American Chemical Society*, for August, 1895, we published an article upon the composition of the tuberculosis and glanders bacilli, and noted the probable composition of the fats which are present in these germs in considerable proportion. The amount of crude fat in the tuberculosis bacilli is very large, having been found by us to be in round numbers thirty-seven per cent. of the weight of the dried germs. In the article referred to the amount of fat at our disposal was very small, and we could at that time determine only palmitic acid, and a high melting acid, which we stated appeared to be arachidic so far as the quantity at hand could be utilized. Recently we have made some further study upon these fats, and the results so far obtained seem to be of sufficient interest to warrant publication as a continuation of our previous work.

The quantity of crude fat available, which had been extracted from the germs was about three and five-tenths grams, and this was examined in the following way : It was first saponified in a closed flask with sodium hydroxide, in accordance with the method prescribed, for the determination of fats by the American Association of Official Agricultural Chemists, as this method seemed to give the most satisfactory results. The saponification yielded a hard soap which was difficultly soluble in water. The dissolved soap was acidified with sulphuric acid and submitted to distillation until 100 cc. of the distillate had been obtained, again in accordance with the usually prescribed method. The distillate had a pungent odor, something like that of sweet almonds, and when titrated with tenth normal hydroxide solution, required for neutralization two and four-tenths cc. of the latter. The total amount of volatile fatty acid was therefore exceedingly small. As the total amount of sodium hydroxide required to neutralize the volatile acid from three and five-tenths grams fat was only 0.0096 gram, the total quantity of volatile acid could probably not have been 0.05 gram, an amount too small to permit of a determination of its character.

The non-volatile fatty acids which formed a hard layer in the distilling flask were filtered off and well washed with water to remove all sulphuric acids and salts. The mixture was partially soluble in cold ninety-five per cent. alcohol, but readily soluble in hot absolute alcohol. The only method that appeared practical for the separation of the fatty acids in this mixture, was a fractional crystallization. Even this was extremely troublesome, but finally by repeated efforts the larger portion of the acid was found to have a melting-point of 62° C., which remained constant upon recrystallization. The principal fatty acid was therefore palmitic. After the palmitic acid had been removed a residue remained which was partially soluble in cold eighty-five per cent. alcohol, and partially in hot eighty-five per cent. alcohol. The acid soluble in hot eighty-five per cent. alcohol after the first crystallization melted at 85° C., while two subsequent crystallizations raised the melting point to 102° C. Unfortunately again the quantity of this high melting acid was too small for further crystallization or identification. It was evidently the same acid that in our first article we noted as probably arachidic acid.

The acid soluble in cold eighty-five per cent. alcohol was further purified and gave white crystals that melted at 42°–43° C., which would correspond to lauric acid. The amount was too small to permit of a positive identification.

This examination of the tuberculosis fats has shown that it is principally a glyceride of palmitic acid. In addition there is a minute amount of the glyceride of a volatile fatty acid to which the tuberculosis cultures owe their characteristic odor, and very small amounts of probably lauric acid and an unusually high melting acid, an acid apparently with a larger carbon content, so far as we can find, than any before noted in plants.

We propose still to identify the volatile and non-volatile acids found in such small quantities, but as it will require probably several years to collect the material for this work, it has seemed best to give the results so far obtained at the present time.

THE CASSEL-HINMAN GOLD AND BROMINE PROCESS.

BY PARKER C. MCILHINEY.

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THIS process, recently introduced by the Gold & Bromine Co., is for the extraction of gold from low grade ores, and those which will not give up their gold to amalgamation. If an ore is free milling no process yet devised can compete with amalgamation for its treatment, and if it is of sufficiently high grade to bear transportation and smelting charges, and contains nothing to interfere with the process of smelting, there is comparatively little inducement to use a wet process. But for ores such as the telluride ores of Colorado, which will not amalgamate, and in which the gold and tellurium compounds are of such a friable nature that they cannot be concentrated, and which are in addition of too low grade to smelt, some wet process must be used. The wet processes which have proved commercially successful are chlorination and the cyanide process. Of the cyanide process nothing need be said except that on many ores it has been used very successfully and from many others it fails to extract a sufficiently high percentage of the gold present. Chlorination has, after being the subject of a great deal of experimenting, been reduced practically to two methods of operation: the vat process, in which the ore is treated with chlorine gas and water, without agitation, and the Thies barrel process, in which the ore is agitated in a revolving barrel with water, bleaching powder, and oil of vitrol. Of the two the barrel process is more generally applicable as the ore cannot be leached in vats unless it is comparatively free from slime and allows the liquid to pass through it readily. The barrel process is recognized generally as better practice. It is evident that in the vat process the strongest solution of chlorine which can at any time be in contact with the ore will be an aqueous solution saturated at the ordinary temperature and pressure, because it