III. "On the Distribution of Assimilated Iron Compounds, other than Hæmoglobin and Hæmatins, in Animal and Vegetable Cells. Preliminary Communication." By A. B. MACALLUM, Associate-Professor of Physiology, University of Toronto. Communicated by Professor M. FOSTER, Sec. R.S. Received December 3, 1894.

The question of the presence of iron in the chromatin of animal and vegetable cells and the methods of demonstrating the element in this substance were discussed in a communication to the Royal Society made more than three years ago.* Since then I have endeavoured to determine with perfected methods the distribution of assimilated iron compounds in cells of all classes, and have succeeded in obtaining results of which the present communication is an exceedingly condensed and preliminary account. A full account will be published elsewhere.

The methods adopted were such as prevented a confusion of the iron of inorganic and albuminate combinations with that of assimilated compounds. The reagent which proved to be of the greatest service was freshly prepared ammonium hydrogen sulphide made from a solution of ammonia of 0·96 specific gravity, and applied, mixed with glycerine, to the isolated cells in the way already described. Sulphuric, hydrochloric, and nitric acids, dissolved in certain proportions in alcohol of 95 per cent. strength, have been found to liberate the iron of assimilated compounds, but the results obtained with these acids were, in all cases where this was possible, controlled by experiments with the sulphide reagent. The iron liberated was readily demonstrated in the form of ferrous sulphide or of the Prussian-blue compound.

The fact that the iron of coagulated hæmoglobin is unaffected by ammonium hydrogen sulphide enables one to overcome the difficulties presented by the presence of that colouring matter in many animal forms. The iron of hæmatin is, however, liberated by that reagent, but the rapidity with which this is done, under the most ordinary conditions, may be employed to distinguish the iron so derived from that of other organic compounds. Whether chlorophyll contains iron as a constituent of its molecule is still a matter of dispute, but the presence of that colouring matter in vegetable cells does not complicate the results, since in the hardening processes, especially when alcohol is used, it may be wholly removed from vegetable tissues, which then, so far as the distribution of "masked" iron is con-

* "On the Demonstration of the Presence of Iron in Chromatin by Microchemical Methods," 'Roy. Soc. Proc.,' vol. 50, p. 277.

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cerned, give no evidence of anything different from what obtains in *Monotropa uniflora* and *Corallorhiza multiflora*—phanerogamous plants destitute of chlorophyll.

Some of the more important facts ascertained in the investigation may be thus briefly stated:—

1. Iron, firmly combined, is a constant constituent of animal and vegetable chromatin. Another compound, less rich in iron, is found in nucleoli.

2. The chromophilous substance in ferment-forming cells contains iron, and the cytoplasm of Protozoan organisms, which also probably secretes ferments, yields evidence of the presence of a firmly combined iron compound.

3. A firm compound of iron is present in the chromophilous substance of the cytoplasm of Fungi.

4. Of the non-nucleated organisms, Bacteria, owing to their minuteness, have, with one exception, given little evidence of the presence of an organic iron compound; but in the Cyanophyceæ the chromophilous portions of the "central substance" contain iron, and iron may be also demonstrated in the peripheral granules formed of the so-called cyanophycin (Palla).

IV. "Micro-metallography of Iron. Part I." By THOMAS ANDREWS, F.R.S. Received December 15, 1894.

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