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IRON, THE OXYGEN-CARRIER OF RESPIRATION-FERMENT[1]

THE idea that iron plays a part in the oxidation reactions of the living cell has appeared in a more or less definite form in the literature of the last fifty years. But since it was not possible to establish the idea and to differentiate it as correct from the false ideas which appeared at the same time, it was dropped and became worthless for science.

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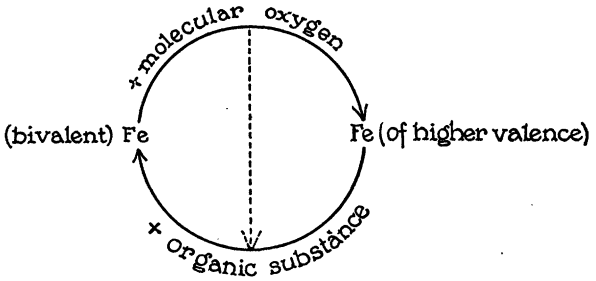
We maintain that in respiring cells there is a cycle of the form



In this cycle molecular oxygen reacts with bivalent iron, whereby iron in a higher state of oxidation is formed. The oxidized iron reacts with the organic substance and is again reduced to bivalent iron. Reactions in the direction of the dotted arrow do not occur; molecular oxygen never reacts directly with the organic substance.

According to this figure the organic substance is as little autoxidizable inside the cell as outside, the iron *alone* being autoxidizable. We know that iron can react with molecular oxygen in a test tube. Then, if our scheme is true, the problem of respiration ceases to exist, because it is solved if we are able to trace back the process of respiration to the reactions which occur in the test tube.

Not every form of bivalent iron reacts with molecular oxygen, and not every form of iron of higher valence reacts with organic substances. In order that iron may act catalytically according to our scheme, certain conditions with respect to the form in which the iron is present must be satisfied. It will be our problem to show that catalytically active forms of iron occur in living cells and in what way such forms of iron can be prepared by the chemist.

[1] Lecture delivered at the Rockefeller Institute for Medical Research, New York.