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TISSUE RESPIRATION IN THE LIGHT OF RECENT RESEARCH

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IT has been known for a long time that living tissues possess both reducing and oxidising powers. In 1883 Hoppe-Seyler drew attention to the strong reducing processes in living tissues; and Professor Theobald Smith has recently used liver-juice as the agent with which to close the open end of a tube where bacteria could best grow under anærobic conditions. Ever since the time of Lavoisier it has been certainly known that the carbon dioxide and water eliminated from the animal body have been produced by the oxidation of carbon and hydrogen within it. It was originally held that this "carbonaceous" oxidation took place in the blood itself, but the undoubted production of carbon dioxide by a frog whose blood had been replaced with salt solution showed that at least that gas must have originated in the tissues and not in the blood. Oxidation and reduction evidently go on side by side within the living tissues; oxygen they must have, and they soon die if it is withheld. The source of this oxygen is of course the respiratory pigment oxy-hæmoglobin, whose loosely held oxygen is removed by the tissues which are, therefore, said to have oxygen-avidity (*Sauerstoff-Bedürfniss*) or reducing power. This continual oxidation of materials within the tissues and the reduction of the oxyhæmoglobin in the circumambient blood is conveniently called tissue-respiration. Within the last few years, attempts have been made to gain a clearer insight into both the processes of tissue oxidation and tissue reduction, with the result that both are now thought of as carried out by intracellular ferments. Many workers on the continent of Europe and in England have studied the action of what have been called oxidases, ferments believed to be concerned in effecting oxidations of a large number of substances inside the living cells. These workers have studied the expiratory phase of tissue-res-

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