Cytochrome Encyclopedia Article

Cytochrome

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Since the mid-1800s it was known that oxygen was carried by the red blood corpuscles from the lungs to the cells. Exactly what happened to the oxygen from there was still not known as late as the early 1920s.

In 1924, a Russian-born British parasitologist/biochemist named David Keilin (1887-1963) discovered the missing element. Keilin was engaged in a study of the horse botfly. Using a microspectroscope, he noticed a four-banded absorption spectrum in the botfly's muscles. When he shook the cell suspension with air, the four bands disappeared, then reappeared soon afterward. Keilin reasoned that a pigment, or substance, in the cells absorbed the oxygen, which was what caused the spectrum to disappear as the cells mixed with air. Keilin called this respiratory enzyme *cytochrome* and suggested in his first paper on the subject in 1925 that it also acted as a catalyst for the combination of oxygen with hydrogen within the cells. While an earlier spectroscopic observer, C.A. MacMunn, had reported in 1884 a four-banded spectrum linked to the respiration process, Keilin established the existence of cytochrome and its function.

The German biochemist Otto Warburg furthered knowledge about cytochrome in the late 1920s. Noting that carbon monoxide molecules attach themselves to cytochrome as they do to hemoglobin, Warburg found that the respiratory enzyme iron oxygenase was a protein with iron-containing groups. It was the iron, Warburg concluded, that activated the oxygen transfer within the cells. For this discovery, Warburg was awarded the 1931 Nobel Prize for physiology or medicine.

It is now known that there are several forms of cytochrome in the body, most notably, cytochrome c. The different forms of cytochrome are involved in many important metabolic processes, such as electron transport systems and ATP production.