

## **Nobel Prize in Medicines 1931**



**Otto Heinrich Warburg**

**The Nobel Prize in Physiology or Medicine 1931 was awarded to Otto Warburg" for his discovery of the nature and mode of action of the respiratory enzyme"**

The discovery for which the Nobel Prize for Physiology or Medicine is to be awarded today concerns intracellular combustion: that fundamental vital process by which substances directly supplied to cells or stored in them are broken down into simpler components while using up oxygen. It is by this process that the energy required for other vital processes is made available to the cells in a form capable of immediate utilization.

Many famous names and many discoveries have been associated with research on this vital process, while, before natural philosophical thought was limited by the demands of accurate measurement, it was a fertile field for speculation. The life work of many savants finds a place in the volume of which Otto Warburg has written - for the time being - the last pages. The first were written by John Mayow in 1670, then less than 30 years of age, whose observations on the power of saltpetre to set fire to organic substances led him to the view that certain igneo-aer al particles existed in saltpetre, in the air, and also in organic substances. He inferred that the significance and function of respiration was to

bring these particles into the body, and so make combustion therein possible. It is clear that Mayow's igneo-aerial particles correspond with oxygen, which had not yet been discovered. Some thirty years later the ill-famed phlogiston theory of combustion was born, and spread like an epidemic throughout the scientific world, causing the seeking for truth to be diverted from its proper course that had been opened by Mayow's discovery, which had, if one may use a somewhat dubious expression, been made before its time and had received little attention. Comprehension of the mechanism of combustion was thus, quite foolishly as it might seem, delayed for more than a century. Return to the proper path had to await the discovery by Lavoisier of the real nature of the process in connection with the final discovery and isolation of oxygen in the hands of Priestley and Scheele. Otto Warburg's work has met with a kinder fate.

As combustion of foodstuffs outside the body in the presence of atmospheric oxygen occurs only at high temperatures, it must be assumed that during combustion in living cells, something happens that alters the rather inert air-oxygen, or the foodstuff, or perhaps both so that they can react with each other. Fully conscious of the insuperable difficulties of explaining at present the innermost mechanism by which this inertness was overcome, Warburg decided to investigate the nature of the mysterious substance that acts as the primus motor in intracellular combustion. Nature often seems to use methods that appear to be indirect and less «natural» than those we should have devised, and such was the case here. It was not possible to isolate the active substance, the catalyst, or respiratory ferment as Warburg called it, by ordinary chemical methods, because it forms less than about a millionth of the weight of the cells to which it is firmly bound, while it is easily destroyed by procedures which might be used for liberating it. So, just as in modern atomic research, indirect methods had to be used.

It had been known, since the days of Davy and Berzelius, that many metals possess the power of initiating or accelerating various reactions, including combustion. Starting from the possibility that had indeed been envisaged earlier, Warburg assumed that intracellular combustion might also be regarded as being due to catalysis by metals, i.e. that

it might be initiated by some metallic compound. Definite proof that he was on the track of this well-hidden secret of Nature was obtained by the use of exact measurements of combustion in living cells or, as Warburg calls it, cell respiration. The quantitatively measured variations in the process of combustion under different conditions threw light on the nature of the respiratory ferment. Its tendency to enter into compounds with substances which combine with iron showed that it is itself an iron compound, and that its effects are due to iron. The correspondence between the effects of light on cellular combustion inhibited by carbon monoxide and on carbon-monoxide compounds of certain pigments closely related to blood pigments led, with the aid of a detailed mathematical analysis to the conclusion that the respiratory ferment is a red pigment containing iron, and that it is closely related to our own blood pigment. This was the first demonstration of an effective catalyst, a ferment, in the living organism, and this identification is the more important because it throws light on a process of general significance in the maintenance of life.

Professor Warburg. From the start, your research has been focussed on problems of central importance. Your bold ideas, but above all, your keen intelligence and rare perfection in the art of exact measurement have won for you exceptional successes, and for the science of biology some of its most valuable material.

I take the liberty of mentioning those two of your discoveries, which seem to be of the greatest value.

The medical world expects great things from your experiments on cancer and other tumours, experiments which seem already to be sufficiently far advanced to be able to furnish an explanation for at least one cause of the destructive and unlimited growth of these tumours.

Your discovery about the nature and effect of the ferment of respiration, which the Caroline Institute is rewarding this year with Alfred Nobel's Prize for Physiology or Medicine, has added a link of brilliant achievement to the chain that binds for all time, John



*International Journal of Science Innovations and Discoveries*

ISSN:2249-5347

**IJSID**

*An International peer  
Review Journal for Science*

Mayow (England), Antoine Laurent Lavoisier (France), and Otto Warburg (Germany). On behalf of the Caroline Institute I invite you to accept the prize from the hands of our King.

***For more details please visit:***

[http://www.nobelprize.org/nobel\\_prizes/medicine/laureates/1931/press.html](http://www.nobelprize.org/nobel_prizes/medicine/laureates/1931/press.html)

***Call for research and Review articles publication: [ijsidonlineinfo@gmail.com](mailto:ijsidonlineinfo@gmail.com)***