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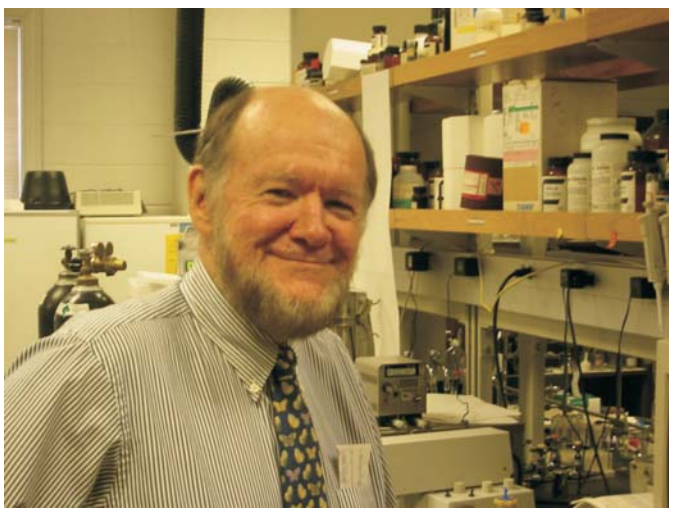
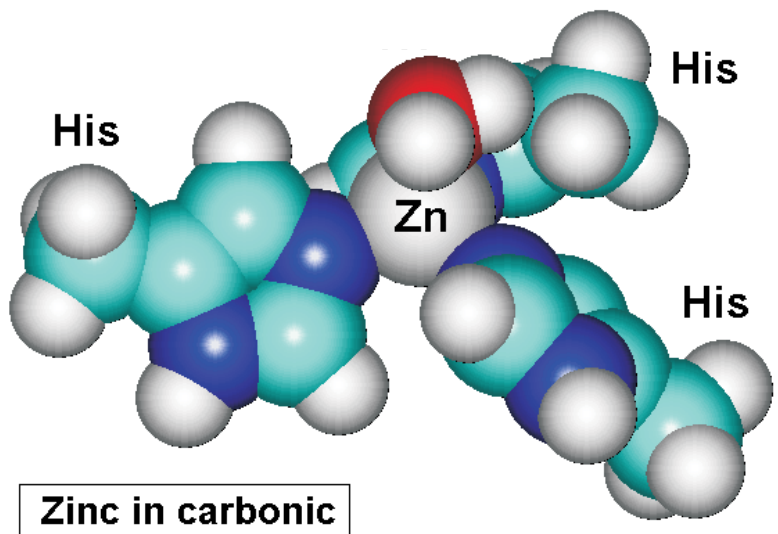


INORGANIC CHEMIST
Dr. Robert Hancock

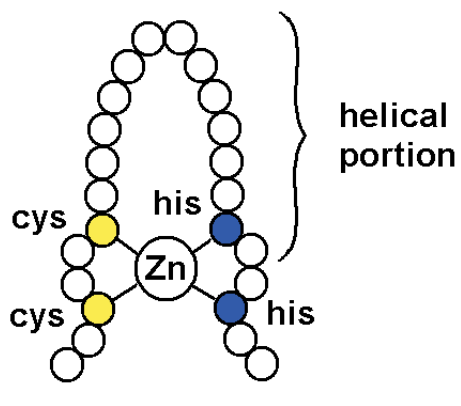
Inorganic chemistry is the study of the chemistry of all the elements other than the chemistry of carbon. The chemistry of carbon is the basis of *organic* chemistry, the chemistry of living ('organic') things. Thus, inorganic chemistry deals with the chemistry of elements such as calcium, sodium, iron, copper, or zinc.

In spite of the fact that organic chemistry deals with the chemistry of carbon, many elements that are really inorganic are still very important in the chemistry of living things. Our bones and teeth are made of the inorganic substance calcium phosphate. Other metals are of great importance in the functioning of our bodies. For example, if we do not have enough iron in our bodies we become anemic, so that we are pale and feel sick and weak all the time. In such a case we may need to take iron supplements. On the other hand, too much iron, and we suffer from iron poisoning. A shortage of zinc may be involved in the eating disorder anorexia. For plants to grow satisfactorily, we may have to add fertilizers that supply the plant with inorganic substances such as potassium or phosphate.

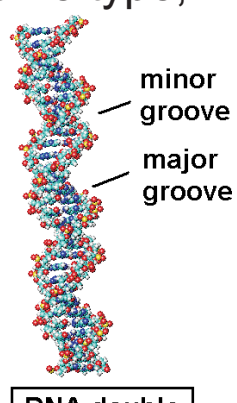


Zinc in carbonic anhydrase

My research interests focus on what inorganic substances such as zinc or calcium actually do in the body, and how they do it. Zinc is used in many *enzymes* that are used to cut molecules up in the body. The zinc ion (a zinc atom that has lost two electrons) is used as a pair of 'scissors' for cutting up molecules. Our interests focus on how the Zinc does this, and how the body controls this so that it cuts up only the things that need to be cut up. Many snake venoms are Zinc-containing compounds that cut things up randomly in our bodies if we are bitten, which does not do us a lot of good. In addition to being part of bones and teeth, the calcium ion is used as the 'switch' in our bodies, and is involved in switching on enzymes, in vision, in allowing nervous impulses to jump across the gaps called synapses, in causing muscle contraction, in controlling cell division, and in the opening and closing of the membranes that surround the living cell. In all these cases, only the calcium ion can act as the trigger, and we have a great interest in understanding how this is achieved by the body. Our work shows the wonderfully sophisticated design of the switches, which allows only calcium to act as a trigger. Understanding how these switches work is important because these same calcium-trigger switches are involved in addictive behavior, and if we can learn how to control these switches, we can learn how to control addictive behavior. We are mostly all addicts of some type, whether it be addiction to drugs or doughnuts.



Zinc finger



DNA double helix