

rators did at Florida State University in Tallahassee irradiated the giant haloes with protons in an attempt to identify the elements there. The protons should energize the elements, and the elements should then identify themselves by emitting characteristic X-ray spectra. (The emission spectrum for any atom, known or hypothetical, can be calculated from well-tested principles of atomic physics.)

Among other things, Gentry and his group found a characteristic X-ray emission that could have come from element 126. They published a paper setting forth that interpretation. The attitude taken by subsequent investigators is perhaps epitomized in a paper by a German group, F. Bosch of the Max Planck Institute for Nuclear Research in Heidelberg and seven others in the Nov. 29 PHYSICAL REVIEW LETTERS. Bosch and collaborators point out quite briefly that they have examined monazite samples for evidence of element 126 and found none. They and others explain the X-ray emission that Gentry and his group attributed to element 126 by saying that the protons that irradiated Gentry's samples probably encountered cerium nuclei that happened to be in the mineral and turned the cerium into prae-seodymium. That element then decayed, emitting a neutron and the same X-ray wavelength as element 126 would have as it went.

Gentry acknowledges the growing skepticism but points out that the critics have not done exactly the same experiment as he and his collaborators did: They have not irradiated the giant haloes speci-

fically but dealt with monazite at large. Gentry told SCIENCE NEWS he is now engaged in a series of experiments which he hopes will settle the question one way or the other. He says he has no particular emotional investment in the way it goes. He would like the result to be favorable, but what he most wants to do is end the uncertainty.

Gentry's new experiments are being done at the Stanford Linear Accelerator Center in California. They consist of irradiating the giant haloes with X-rays produced as synchrotron radiation by the accelerated electrons there. X-ray irradiation should also energize whatever elements are in the haloes and induce them to emit their own characteristic X-rays, but it is a more sensitive method and improves on the previous method in two ways.

For X-ray absorption each element has a calculable threshold above which it will absorb energy and radiate its own characteristic spectrum, but below which it will not. "If we radiate above the threshold for 126 and see emission, and then irradiate below the threshold and don't see any" that will be pretty good evidence, he says. Furthermore, irradiation with X-rays removes the possibility of proton-induced formation of prae-seodymium to confuse the emitted X-ray spectrum. The first runs, made during the summer were inconclusive because of interference and other problems, but Gentry is on the point of returning to Stanford for more runs, which he hopes will be free of problems. He expects to have a definitive answer by the end of December. □

sheep placenta to the rate of passage of other inert gases like argon and helium. They found, when they artificially perfused the placenta, that oxygen moved through the placenta faster than the other gases did, indicating that oxygen was somehow assisted in its movement through the placenta.

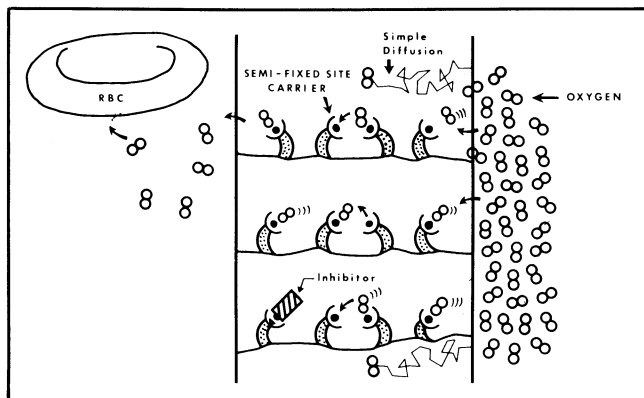
But if oxygen gets through the placenta more rapidly than other gases, how does it do so? Might a particular molecule be helping it? Burns and Gurtner suspected that a particular drug-metabolizing enzyme known as cytochrome P-450 might be responsible since it is present in the placenta and is known to latch onto oxygen molecules while in the process of metabolizing drugs. They tested this hypothesis by adding a drug known to inhibit cytochrome P-450 to their placenta perfusion system. The drug did indeed inhibit oxygen transfer through the sheep placenta but did not affect transfer of inert gases, strongly suggesting that cytochrome P-450 is the oxygen carrier.

However, more experiments must be conducted to really prove this, and obtaining such proof will be difficult since the enzyme has been only partially isolated from the endoplasmic reticulum—that area of the cell in which it resides. Another chemical might actually be the carrier. But probably some carrier is responsible, Burns says, since the placenta is 100 to 500 times thicker than the tissue interface between blood and air in the lungs and thus presents a lot of resistance to the passage of gases.

Subsequent experiments then showed them that certain drugs, notably anesthetic gases and carbon monoxide from cigarette smoke, dramatically reduce oxygen transport through the sheep placenta. These findings underscore the well-known danger of smoking and drug use to human pregnancy and also shed light on how cigarettes and drugs might exert their damage. Carbon monoxide, for example, binds with the oxygen carrier molecule so that oxygen does not get through to the fetus, thereby depriving the fetus of oxygen essential to growth and development and leading to a low-weight, frail baby—the kind that smoking mothers often give birth to. Anesthetics could likewise deprive fetuses of needed oxygen and lead to miscarriages and birth defects, especially in female anesthetists, who experience considerably more miscarriages and birth defects than do other pregnant women. Anesthetics have been shown to bind to cytochrome P-450 by Burns and others.

There are, in fact, a number of compounds in the environment that might interfere with the oxygen carrier mechanism—insecticides, tranquilizers, polychlorinated biphenyls, plasticizers, fluorocarbons and others. Burns and Gurtner will now investigate the effects of some of these chemicals on oxygen transport to the fetus. □

Oxygen's boost across the placenta



Example of a hypothetical carrier (center) that assists oxygen molecules (right) in their passage through the placenta to the fetal circulation (left).

For many years physiologists thought that oxygen traveled from the maternal bloodstream to the fetus only by passive diffusion—the random movement of molecules from regions of high concentration to regions of low concentration. Now this long-held, widespread belief has been squelched by two Johns Hopkins University physiologists—Barry Burns and Gail Gurtner.

They have found that oxygen gets ferried across the placenta faster than other gases do—apparently courtesy of some

molecular carrier. They have also found that certain chemicals interfere with this facilitated oxygen transport, and such interference may explain how these chemicals can lead to miscarriages, birth defects and underweight newborns.

In the past, physiologists had no means of determining whether oxygen moves passively or actively through the placenta. Burns and Gurtner overcame this problem by devising an elaborate placental perfusion system where they could compare the rate of passage of oxygen through the