

Brechot and colleagues at the Institut Pasteur in Paris and in the Ivory Coast. Tumor tissue from three Ivory Coast patients contained hepatitis B viral genes inserted into the human chromosomes. The scientists found no hepatitis B genes in a normal liver they used as a control.

Not only are the viral genes in at least some tumor cells, but they seem to be active there. In the Alexander cells, they are responsible for producing the one detectable viral protein. However, Prasanta R. Chakraborty, David A. Shafritz and colleagues at Albert Einstein College of Medicine found three different messenger RNA molecules containing hepatitis B viral messages. Marion and colleagues and Edman and colleagues also observed a variety of messenger RNA molecules transcribed from the viral genes. Thus, the tumor cells may make more than the one viral protein.

While finding viral genes in human tumor cells does not prove that hepatitis virus causes liver cancer, it certainly strengthens the case. The most definitive evidence still must await methods for growing hepatitis B virus in the laboratory, so scientists can observe its effects more directly. Right now, it's as if the virus in a murder mystery had been found holding a gun, but only by arriving earlier at the scene of the crime will scientists be able to determine who pulled the trigger. □

## Whale quotas set

Though stung by the failure to establish a ban on all commercial whaling, conservationists scored minor, but important, gains at the recently concluded 32nd meeting of the International Whaling Commission in Brighton, England.

Among the agreements settled on by the 24-nation body that meets yearly to decide on the management of whales:

- 14,734 whales of all species can be taken in 1981-82 compared with 15,871 in 1980-81.
- A three-year quota of 45 bowheads was set for the Alaskan Eskimos, down 1 per year from the present quota. While the bowhead is one of the most endangered of whale species, the Alaskan Eskimos claim that hunting of the bowhead is a vital part of their culture.
- A total ban was ordered on taking of killer whales by factory ships — floating bases to which smaller hunting ships bring their kill for processing. The ban, which will most affect the Soviet Union and Japan, is designed to assure that as a result of tighter restrictions on large whales, hunters will not decimate the smaller species.
- A partial ban was ordered on the use of the "cold grenade" harpoon, a move aimed at encouraging the development of harpoons that kill the whales more quickly and humanely.
- A decision was made by Spain to cease all hunting of sperm whales. □

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## At long last: Water splitting

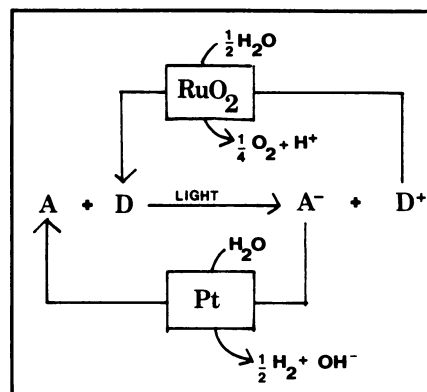
The ability to split water has long been the stuff of photochemists' dreams. Michael Grätzel's dream has come true. Grätzel, along with colleagues at the Ecole Polytechnique Federale in Lausanne, Switzerland, has developed a system that uses light energy to split water into hydrogen and oxygen — stored chemical energy.

In the solar energy field, "water splitting" is a more or less generic term that refers to the use of light energy — as opposed to another form of energy such as electricity — to generate oxygen and hydrogen from water. Researchers have approached this solar goal from several directions: Some have attempted to mimic nature's water-splitting process, photosynthesis (SN: 8/9/80, p. 84); others, like Grätzel, have studied water-splitting systems that are not closely related to the photosynthetic reactions.

Grätzel's system, described at the recent Third International Conference on Photochemical Conversion and Storage of Solar Energy sponsored by the Solar Energy Research Institute, is the first wholly synthetic system reported that is perfectly catalytic — that is, all of the components used to split water are recycled and not sacrificed in the system. But a system sans sacrificial agents is only one of several necessary keys to success in developing water-splitting systems. "Specificity and speed also are secrets of water-splitting systems," Grätzel explains, "and I can assure you that we have worked damn hard on these issues over the years."

The forward speed of a system helps to prevent back reactions. The initial step of most water-splitting systems is a light-induced electron reaction. Light serves as an electron pump, transferring an electron from a donor molecule D to an acceptor molecule A. Because A is reduced (gains electrons) and D is oxidized (loses electrons), the resulting A<sup>-</sup> and D<sup>+</sup> is termed a "redox pair." Unless this redox pair quickly is used to form useful products — to generate oxygen and hydrogen from water, for example — it will "back react" to reform A and D.

In addition to the speed of a system, separation of the redox pair helps to retard back reactions; this is where specificity comes into play. "Essentially, you want to design a system with functional components that will swallow up one of the redox species and reject the other," Grätzel explains. And he claims to have discovered a system that uses two types of spherical aggregates — RuO<sub>2</sub> and Pt — that achieved such functional specificity: While D<sup>+</sup> and RuO<sub>2</sub> attract each other because they both are hydrophilic (water soluble), the hydrophobic (water hating) A<sup>-</sup> is attracted to a special hydrophobic



A schematic version of Grätzel's photo-induced water-splitting system.

coating on the Pt aggregates.

Despite its speed and specificity, Grätzel's system does have its flaws: The generated oxygen and hydrogen, for example, can recombine slowly to form water. "That is why we're working full steam on another system in which the hydrogen and oxygen are produced separately in ... half cells," the researcher says. Although Grätzel superficially describes this new system in the July *HELVETICA CHIMICA ACTA*, he says it will be at least a year before details of it are disclosed. After all, he says, "We have a lot of competition on our back." □

## Pill users — more bad news

Oral contraceptive use is associated with "adverse physiological changes that are reversible after discontinuing such use," say researchers from the University of Michigan in the Aug. 15 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*.

The researchers looked at insulin, glucose, blood pressure and triglyceride levels in 270 women participants in the Tecumseh study, a long-term epidemiological look at residents of a Michigan town. They found that the women in their study using oral contraceptives have significantly higher levels of all four measurements than do women who have never used the pill, as well as higher levels than former users.

Though high glucose levels are not strictly related to atherosclerosis, they are associated with cardiovascular risk factors, the researchers note. And high insulin levels accelerate the formation of fatty deposits on arterial walls.

"There are distinct metabolic changes in oral contraceptive users," says Leon D. Ostrander Jr., chief author of the study, "though there's no evidence in the long run connecting oral contraceptive use to atherosclerosis or diabetes. The only thing we can say is that when people use the pill, it changes biochemistry and endocrinology in unfavorable ways." It should be used with caution in women prone to heart disease or diabetes, as well as for a finite period of time, he recommends. □

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