

CHEMISTRY

Julie Ann Miller reports on the meeting in Washington, D.C. of the American Chemical Society

Whiff of locker room—in a test tube

The characteristic fragrance of humans, distinct from “rabbit odor,” “monkey odor” or “elephant odor,” is not directly due to substances secreted by the glands. Instead, the scent is created by metabolic byproducts of microorganisms feasting on the human secretions. To lay the groundwork for studies on the communicative power of human odor (SN: 4/28/79, p. 282), researchers at the Monell Chemical Senses Center in Philadelphia are working to duplicate that smell in the laboratory. They incubate secretions from human glands with normal skin microorganisms. The method provides sufficient odorous material for chemical analysis and allows identification of different components of the scent system.

“Scalp odor” has been created in a test tube by microorganisms grown on the secretion of sebaceous glands, the hormonally controlled glands located primarily on the face, forehead and scalp. John N. Labows Jr. of Monell reports that the major scalp resident, yeast *Pityrosporum ovale*, metabolizes lipids in the secretion to compounds including lactones characteristic of coconut flavor and peach flavor. (Labows hints those yeasts might be useful in making food flavor additives.) He finds, however, that some chemicals characteristic of the scalp appear only after further metabolism of the lactones by bacteria.

Underarm odor can also be created in the laboratory by microbial action on an odorless human secretion. Micrococci bacteria produce one component, a sweaty, acid odor (due to isovaleric acid) when incubated with secretions of apocrine glands, the glands located primarily in the underarm and genital areas. Other bacteria, the diphtheroids, also produce isovaleric acid and other characteristically human odorants from apocrine secretion. Labows and colleagues suspect that the odorants include a steroid similar to androstenone, the compound involved in the sexual behavior of the boar. Apocrine secretion contains steroids and cholesterol that may be metabolized to strong-smelling compounds.

Translating odors to information about disease, sexual state and stress is the long-term goal of the research. Researchers at Monell have so far identified volatile components of saliva associated with periodontal disease and others that change concentration in correspondence to the menstrual cycle. The detailing of human odors represents a potentially useful, non-invasive technique, Labows says.

Solar energy equation: The other half

An efficient process for generating hydrogen for energy from sunlight and water must regard the entire chemical reaction. Several laboratories have successfully used solar energy to produce hydrogen from water by transferring electrons from another chemical such as an amine. Jean-Marie Lehn of the Louis Pasteur University in Strasbourg, France, says such a process, which consumes the electron donor, would be too expensive for large-scale operation. So he is looking at the other phase of the water-splitting reaction and has found a method to use sunlight to generate oxygen. For the most economical solar energy system, he now needs to link the processes, Lehn says.

Lehn looked to photosynthesis by green plants for inspiration on generating oxygen. The trick there is that the plants are able to transfer four electrons at once. Lehn found he can use ruthenium oxide powder as a catalyst surface that allows four electrons to transfer. A cobalt complex acts as the electron acceptor and is consumed in the oxygen-generating reaction. The problem remaining in linking the hydrogen- and oxygen-generating half reactions is finding materials that can act both as electron donors and acceptors with sites separate enough so as to avoid short-circuiting the operation.

BIOMEDICINE

Kidney cancer and chromosomal mixup

Although cancer runs in a number of families, there has been no way of identifying which offspring in these families will get cancer and which won't because the chromosomal or genetic aberrations responsible for their susceptibility have not been identified. Now a human cancer has finally been linked with an inherited chromosomal defect. The cancer is kidney cancer, and the chromosomal mixup is a translocation between a chromosome number three and a chromosome number eight.

Andrew J. Cohen of the University of Massachusetts Medical Center in Worcester and his colleagues encountered a family with an extraordinarily large incidence of kidney cancer — 10 victims over three consecutive generations. So they performed chromosomal analyses on as many members of the family as possible — 22 persons in generations two and three. As the researchers report in the Sept. 13 *NEW ENGLAND JOURNAL OF MEDICINE*, all eight kidney cancer victims whom they analyzed had a translocation between a chromosome number three and a chromosome number eight; none of the family members without the translocation had kidney cancer.

In an accompanying editorial, Alfred G. Knudson Jr. of the Fox Chase Cancer Center in Philadelphia suggests that other families with a predisposition to kidney cancer should now be studied to see whether those members with cancer also have the translocation. If so, the translocation might be a means of screening persons in families susceptible to kidney cancer to determine which members are at risk.

Dietary fat and toxemia of pregnancy

Toxemia of pregnancy, which is characterized by high blood pressure, excessive protein in the urine and fluid retention late in pregnancy, can result in the death of both mother and fetus. Several reports have suggested that a poor diet plays a role in toxemia, and a high fat intake has now been linked with it.

Ronald Chung and his co-workers at the Tuskegee Institute in Tuskegee, Ala., examined a group of young pregnant women in Macon County, Ala., where toxemia is alarmingly common. Data were collected on the lifestyles, income, education levels and eating habits of the subjects. Dietary recalls were taken twice a month from each subject in her last trimester of pregnancy, and analyses for fat, fatty acids and cholesterol were performed on those food items that contributed to each subject's daily diet. As Chung and his team report in the September *AMERICAN JOURNAL OF CLINICAL NUTRITION*, toxemic patients consumed significantly more fat and cholesterol than did nontoxic pregnant women.

Flaws in clinical trials

A number of modern drug and other clinical treatment trials, even those that appear in prestigious medical journals, often contain serious flaws. So charges Rodney B. Nelson of the University of Illinois at Chicago in the September *FORUM ON MEDICINE*. For instance, researchers may fail to specify what exact hypotheses are to be tested. They may gather data and then tailor a hypothesis to fit them rather than formulate a hypothesis and then generate data to test it. Investigators may peek at their data while it is still being gathered and terminate the study when the desired results are obtained, rather than deciding before the study starts when it will terminate.

Such flaws have grave consequences for American society, Nelson contends, because they suggest that a treatment is the best available when it really isn't, and physicians' treatment decisions, as well as patients' requests for specific treatments, are greatly influenced by clinical trial results.