biochemistry

Gathered at the American Chemical Society meeting in Atlantic City

ODOR

Primary smells postulated

The color blind are unable to detect one or another of the three primaries, red, blue and green. Other people, perhaps one in 50, are anosmic—they cannot detect certain odors.

From this fact, Dr. John E. Amoore theorizes that there are primary smells analogous to the primary colors, from which all other smells can be made. Anosmic people are insensitive to one or more of these primary odors.

At present 20 or 30 odors are suspected of being primaries. A primary odor would have a peculiar molecular shape which would exactly fit an odor detector in the nose. A non-primary odor might bear structural resemblance to two or more primary odors, and thus might activate two or more types of detector and produce a blended odor sensation. Or the non-primary molecule might fit the detector only imperfectly, resulting in a weaker sensation.

Dr. Amoore, of the U.S. Department of Agriculture in Albany, Calif., is conducting a computer screening program to compare structures of odor molecules. The primary odor theory would gain strength if similar odors prove to have similar structures.

NUTRITION

Pathway to the brain

It is generally assumed that substances that are eaten get to the brain only via stomach, intestines, and bloodstream. Experiments at the University of Pennsylvania's Monell Chemical Senses Center, however, indicate that traces of food sustances may take some more direct route.

Dr. Morley Kare, director of the center, reports that rats were given sugar labelled with carbon 14. Surprisingly, he says, some of the radioactive sugar or its metabolites turned up in the brain in less than one minute. Researchers at the center conclude that the sugar apparently travels along a yet-to-be-discovered pathway direct from mouth to brain.

Among the many interesting research lines this pathway opens up, Dr. Kare says, is the possibility of an explanation of the very rapid regulation of desire or distaste for salt in accordance with changing bodily needs.

DRUNKENNESS

Body may make hallucinogens from alcohol

Recently, drug users have justified their habits on the ground that alcohol is worse for the body than recognized hallucinogens. It now appears that the effects of both may be due to the same chemicals.

Biochemist Michael A. Collins of the New York State Psychiatric Institute in New York City reports that in vitro studies indicate that one product of the metabolism of alcohol might be hallucinogens in the brain.

Alcohol is converted to acetaldehyde in the body. It was shown in the test tube that acetaldehyde is able to react with cathecholamines, such as adrenaline, under ordinary body conditions, producing alkaloids.

Collins notes the general assumption that production of alkaloids is limited to plants, and he says further study is needed to determine if these alkaloids actually are formed after alcohol consumption. If they are, he says, the chemical nature of drunkenness may be explained. The alkaloids formed are related to alkaloids found in cacti that yield mescaline.

PHARMACOLOGY

Synthetic Terramycin produced

Dr. Hans H. Muxfeldt of Cornell University reports the first production of a completely synthetic antibiotic. Previous man-made antibiotics actually are artificially modified natural antibiotics.

Dr. Muxfeldt's product, he says, is identical in structure and biologic action to naturally-produced oxytetracycline—sold under the trade name Terramycin. The synthesis caps 10 years of effort by the chemist, though he admits that the success is only academic, since natural Terramycin production is well-established and cheap. He says, however, that the mechanism of Terramycin synthesis might be used to produce other antibiotics, possibly including compounds dissimilar to anything found in nature and tailored to infections currently difficult to control.

The synthetic oxytetracycline is the result of a 16 step process which starts with juglone, a simple double ring compound derived from walnut shells.

NEUROLOGY

Nerve cells may bear transistors

Proteins, nucleic acids and other substances imbedded in the wall of a nerve cell may act in a manner analogous to transistors. They may convert the nerve cell's direct current electrical potential into alternating current pulses that travel up the nerve fiber.

Dr. Victor E. Shashoua of Massachusetts Institute of Technology reports that in vitro experiments with certain molecules found in nerve cells show that these molecules are able to convert DC to AC pulses. Recorded on an oscilloscope these pulses resemble the spike-form neural impulses detected in whole nerve fibers. The frequencies, duration, and magnitude of the AC pulses depend on the type of molecule tested.

Among the materials tested were polymers of glutamic acid and lysine, cytochrome C, ribonucleic and deoxyribonucleic acid, egg albumin, and squid nerve plasm.

The experiments suggest the method whereby the nerve cell's demonstrated DC potential is converted into AC for transmission as nerve impulse along the surface of the fiber. Dr. Shashoua says if the theory is right the door is open to development of drugs influencing nerve fiber malfunctions.

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