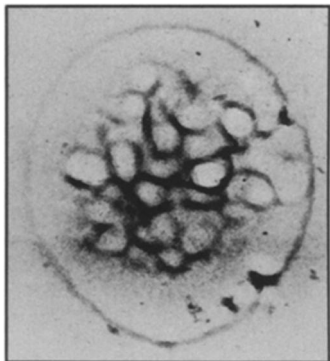


BIOLOGY

New microscopic look at living cells

A technique designed to define ultra-small elements of computer circuits has now been focused on living cells. Scientists from the National Institute of Mental Health and from IBM Watson Research Center in Yorktown Heights, N.Y., have developed an X-ray technique that can explore the internal features of a cell in a relatively natural state. The new technique combines use of soft X-rays and use of a carbon-based photosensitive material called a resist. The scientists use X-rays to form a replica in the resist of the cell under study, and then they observe the resist in an electron microscope. The technique can resolve structures as little as 50 angstroms wide. Transmission electron microscopes can have higher resolution, but the samples must be thinly sliced and placed in a high vacuum. In addition, the X-rays may be used to distinguish different chemical elements in the cell.



Blood platelets were among the first cells to be studied with the new technique. In response to chemical signals, platelets send out long fibers that become entangled forming a blood clot. The soft X-ray-resist-electron microscope technique showed that these fibers, or pseudopods, originate inside the platelet and thus are not extensions of the membrane. Dark filaments thread among round light areas, which are vacuoles, within the 3-micrometer-diameter platelets. These filaments are thought to be formed of muscle filaments and appear in some cases to be continuous with the intracellular extension of a pseudopod.

Stress-response hormone synthesized

After a decade of intense effort, scientists at the Salk Institute in San Diego have characterized the structure of a brain hormone implicated in the body's response to stress. And they have synthesized the hormone chemically. Wylie Vale, Joachim Spiess, Catherine Rivier and Jean Rivier report in the Sept. 18 *SCIENCE* the 41-amino acid sequence of corticotropin-releasing factor (CRF) isolated from sheep hypothalamus glands. When they made a synthetic chemical of the same sequence, it had the same biological activity as the natural material. It triggers pituitary gland cells to release two hormones, ACTH and beta-endorphin. They found the sequence of CRF has similarities to other peptide hormones, including angiotensin, which causes blood vessel constriction, and sauvagine, a hormone recently isolated from the skin of a South American frog.

The hormone CRF appears to be key in mediating the stress — "fight-or-flight" — response. The ACTH it releases activates in turn release of adrenal steroids that influence blood sugar levels, metabolism and the immune system. Beta-endorphin affects mood and pain perception. In addition, the scientists find that CRF triggers "stress-like" effects on blood pressure and behavior. They speculate that CRF is probably also distributed outside the hypothalamus and that it will show effects beyond the pituitary activity. CRF may directly affect the brain. "This peptide might be a key signal in mediating and integrating an organism's endocrine, visceral and behavioral responses to stress," they conclude. Knowledge of the chemical structure opens the way for development of new types of drugs for high blood pressure and such stress-associated diseases as cardiovascular disease, peptic ulcers, reproductive dysfunction and a variety of behavioral disorders.

ENVIRONMENT

Lead in bone meal

Bone meal is sometimes used as a dietary calcium supplement. But "consumers — especially children and pregnant women — would be best advised to avoid bone meal supplements altogether," according to the August issue of *ENVIRONMENT AND BEHAVIOR*, a newsletter of the Washington-based Center for Science in the Public Interest (CSPI). The problem is lead contamination.

Lead is toxic and its ingestion by humans has been associated with anemia, kidney failure and nervous-system disorders. Developing children, including the unborn, may also suffer behavioral and mental problems at lead-intake levels of 100 to 150 micrograms (μg) a day, the Food and Drug Administration says. Now, a study of lead-contaminated bone meal by a Baltimore laboratory and FDA researchers showed that consumers could ingest 70 to 230 μg lead daily if they took the calcium supplement at the recommended daily rate. *ENVIRONMENT AND BEHAVIOR* reports. Of seven supplements tested, NuLife All Bone and Natural Brand Bone Meal Powder ranked highest in contamination. And contamination found in those two products "is not confined to the single batches tested in May," CSPI says.

CSPI has petitioned FDA to warn consumers about the lead hazard posed by certain of these supplements, asked the agency to remove products with clearly dangerous levels of lead from the market, and urged that a strict lead limit be developed for bone meal supplements. The original samples were collected from around the Washington, D. C., area as part of an investigation by a local television station. FDA has since collected additional samples and is evaluating their lead content.

Acid rain: We could've had a V-8

The most acidic rainfall in the United States — a pH of 1.4 in Wheeling, W. Va. — surpasses that of lemon juice (pH 2.2) and comes out only slightly less acidic than battery acid (at a pH of 1.0). While considerably better at a pH of 3.5, the average February 1979 rainfall of Toronto still proved more acidic than tomato juice (pH 4.3). All this comes from a new survey of the problem in the Sept. 14 *CHEMICAL AND ENGINEERING NEWS*.

Most fish species die at a pH of 4.5 to 5, which explains why so many Northeast lakes are dead or in jeopardy. Natural buffers in area soils tend to neutralize acidity, so area waterways don't necessarily match the pH of their rain. But the neutralizing capacity in some regions is being taxed so that areas encompassed by low-pH rains are increasing.

The average pH of rain in 1979 was 4.2 for northern Pennsylvania, western New York and lower Ontario, Canada. A region with rainfall averaging 4.4 radiates from that zone to include most of upper and western Maine, all of New England and upper New Jersey, with a lower eastern boundary running diagonally from western Maryland to eastern Texas. Its western bounds cut north diagonally across Arkansas, along eastern Missouri, western Illinois and the western side of Lake Michigan.

Precedent-setting ozone ruling

At 0.12 parts per million, is the ambient air-quality standard for ozone fair? Yes, the U. S. Appeals Court for the District of Columbia ruled on September 3. Challenged by a host of industry and environmental associations — by some for being stronger than data could justify, by others for being too weak — the standard forced the court to tackle a laundry list of conflicting claims. In the end the court concluded that these "technology-forcing" regulations were "expressly" designed to make polluters develop controls that might appear economically and technologically unfeasible at the time.