BIOLOGY

Membrane docks for ribosomes

Ribosomes, the intracellular protein compilers, line up to perform their job. They position themselves along the endoplasmic reticulum, a membrane inside the cell. Ribosomes, however, are particular as to the exact surface on which they stand. An area of reticulum crowded with ribosomes, for instance, may be contiguous to a deserted region. Researchers at New York University's medical center have now found the membrane molecules that make the difference. David D. Sabatini reported at the conference on Cell-Cell Interaction in San Diego that two glycoproteins seem to bind the ribosomes. He calls those medium-sized proteins ribophorins I and II.

Sabatini and colleagues identified the ribophorins by their presence in ribosome-dotted membranes (rough endoplasmic reticulum) and absence in the smooth endoplasmic reticulum which lacks ribosomes. For every ribosome present, the membrane contains a constant number of ribophorin molecules. When Sabatini and co-workers gently dissolve most of the membrane proteins, the ribophorins remain with the ribosomes. Also, chemicals that link neighboring proteins bind ribophorins and ribosomes. Further experiments indicate that the ribophorins extend across the membrane and that the sugar portions are on the opposite side from the ribosomes. Sabatini speculates that, in addition to binding ribosomes, ribophorins may guide new protein across the membrane.

More light, more milk, more cow

Light, not hormones, may be the best growth stimulant for livestock. Holstein cattle showed increased growth, of similar magnitude to that achieved by steers receiving DES (diethylstilbestrol), when normal winter daylight was supplemented with fluorescent light. Cattle basking in a daily total of 16 hours of light increased girth and weight 10 to 15 percent more than a sunlight-only group averaging 9.8 hours of light daily. In the summer when sunlight was available up to 15 hours, supplemental light made no measurable difference. All groups ate the same amount of alfalfa hay.

Extra light also increased milk production. Cows on supplemental light produced 10 percent more milk for at least 100 days after calving than did cows receiving only winter sunlight. The milks produced had the same percentage of fat. Sixteen hours of light daily also maximizes lamb growth and egg production in poultry, Robert R. Peters, Larry T. Chapin, Kay B. Leining and H. Allen Tucker point out in the Feb. 24 SCIENCE. The Michigan State University researchers conclude, "Manipulation of supplemental light may thus cause dramatic increases in food supplies from animals."

Instamatic blood analyses in color

A drop of blood serum for a splash of color is all you need for precise analysis of blood constituents, according to a report by Kodak researchers at the International Congress of Clinical Chemistry in Mexico City. Kenneth C. Kennard and colleagues described multilayered films, each about the thickness of a human hair and 2 centimeters square, that can measure glucose, blood urea and triglycerides. Each film contains catalysts, buffers, wetting agents and dye formers. There is no measuring, mixing or diluting. The researchers just place a single drop of serum on the plastic slide and incubate it several minutes at 37°C. However, the process does require a high precision research reflectometer to accurately measure color formation. Another Kodak researcher, Jack E. Pinney, is developing that instrument. Kennard predicts "a hitherto-unknown degree of precision, accuracy, convenience and cost-effectiveness."

SPACE SCIENCES

Jupiter's electrons "channeled" to earth

It was discovered from space probes in the mid-1960s that among the cosmic rays, solar-wind particles and other motes reaching the earth from space were streams of electrons whose numbers showed an odd, 13-month periodicity. It took Pioneer 10, late in 1973, to show that the electrons were in fact coming from Jupiter, whose roughly 12-year orbital period means that it gains about a month per year (in terms of solar longitude) on the earth, thus adding up to the 13-month cycle. The Pioneer data also, however, showed strange "lows" in the flux curve — not matched to the 13-month cycle — when the number of electrons reaching earth would drop by as much as 90 percent for several days at a time.

In 1977, Thomas F. Conlon and John A. Simpson of the University of Chicago suggested an explanation. Other scientists had previously described a solar-wind effect which they termed "compressed interaction regions" (CIR's), regions of compressed solar wind spiraling out from the sun, formed where the leading edge of a fast solar-wind stream catches up with a slower one. In a CIR, both the interplanetary magnetic field strength and the number density of the plasma particles are substantially higher than in the "rarified" regions between CIR's, and at Jupiter's distance from the sun the CIR's are frequently bounded by magnetohydrodynamic shock fronts. Conlon and Simpson suggested that the lows in the electron flux at earth could be occurring at those times when a CIR blocks the Jupiter-to-earth path. Large numbers of arriving electrons perhaps depend, the researchers said, on both planets being in the same rarefaction, in effect providing a CIR-bounded "channel" between worlds.

Now, reports Conlon (currently with NASA) in the Feb. 1 JOURNAL OF GEOPHYSICAL RESEARCH, there is evidence suggesting how such a channel might work. Data from Pioneer 11 show that electron transport across the average interplanetary magnetic field direction (which, at Jupiter's distance, is close to the CIR path) is greatly inhibited in CIR's and enhanced in rarified regions. Thus, he says, the electron flux in a CIR is about 1,600 times less than in a rarefaction, implying that cross-field transport is reduced by solar-wind compression. The CIR's effectively lock the electrons in their original rarefaction all the way to earth.

Oblique-wing aircraft

A third of a century after the concept that spawned it, an experimental aircraft is being built for the National Aeronautics and Space Administration with a wing that can pivot so that one-half is swept back while the other is swept forward. Proponents claim that with the wing in swept position, for supersonic flight (the prototype is subsonic), the design can offer twice the fuel economy of the Anglo-French Concorde or the Soviet SST. In unswept position, the wing offers its maximum lift, enabling quieter takeoffs through reduced power requirements.

The concept originated in about 1945, at the same time as the now-conventional swept-wing idea, says designer Robert T. Jones, now with the NASA Ames Research Center in California. Various wind-tunnel and remotely controlled models have been built over the years, and the Boeing Co. has studied the design's use as a commercial transport aircraft.

The piloted, subsonic test version is being built by the Ames Industrial Corp. of Bohemia, N.Y., under a $218,000 contract from the NASA Dryden Flight Research Center in California. About 12 meters long with a 10-meter wingspan, the foam-and-fiberglass AD-1 (NASA Ames-Dryden 1) will be powered by two small, 90-kilogram-thrust turbojet engines and will have a gross weight of about 816 kg. It is expected to be delivered to Dryden late this year, with the first flights due in early 1979, when it is planned to operate at speeds up to about 250 kph.

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