Biology

Julie Ann Miller reports from Boston at the meeting, "Molecular Biology Now and Tomorrow, Thirty Years of DNA"

The case of the missing mouse embryos

Detective work often goes into determining the exact defect behind a genetic abnormality. Such sleuthing must also be applied to genetic changes deliberately made with laboratory techniques. Rudolf Jaenisch of the Heinrich Pette Institute in Hamburg, West Germany, recently exposed mouse embryos to a virus that inserts DNA into cell chromosomes. The virus-derived DNA in the mouse chromosome is inherited in the same manner as a gene. But when Jaenisch bred male and female mice each containing one copy of the viral DNA in a particular location on a chromosome, he never found the expected 25 percent of offspring containing two copies of the viral segment. Further experiments revealed that embryos of this genetic makeup (called homozygous) appeared healthy until the twelfth day of gestation, but by day 13 they were dead. The genetic defect was not lethal to cells growing in the laboratory, but fatally disrupted development of the intact embryo. The gene that is deficient in these embryos encodes a major collagen component (Type I, *alpha 1*), Jaenisch determined. The virus had inserted itself into the collagen gene, near the edge of the first non-coding region, and somehow prevented gene activity.

As part of the structural matrix surrounding cells, collagen has been thought essential for the beginnings of organ development. But these new data refute that idea because by the twelfth day of gestation, most organs have formed already, Jaenisch says. "This suggests collagen is important in the late stages of organogenesis. Organs start to grow very fast at day 12," he says. "This experimental system can serve as a model to study the role of collagen in development."

Double bill: Watson & Crick onstage

It was quite a triumph for the organizers of a meeting commemorating the discovery of the DNA double helix. James D. Watson and Francis Crick, who haven't seen eye-to-eye for years, both attended, at least for one day, the conference arranged by NATURE magazine, which published their history-making paper in 1953. Watson, now director of the Cold Spring Harbor (N.Y.) Laboratories, is an energetic fund-raiser, administrator and spokesman for molecular biology. "It takes extraordinary physical energy to do molecular biology," he says. "That's hard after you're forty." Crick's interests, in contrast, have shifted from genetics to studies of the brain (SN: 9/17/83, p. 188). The advances in molecular biology will certainly advance neurobiology, but they won't solve all the problems of how information is processed at high levels, Crick says. Still, in a meeting with reporters, the discoverers of the double helix could agree on at least one thing: that no one would have guessed 30 years ago how fast molecular biology would be progressing today.

Thirty years of DNA is not enough

Self-satisfied biologists attending the meeting were taken down a peg by Sydney Brenner in a talk supposedly entitled "Outlook," but which he renamed "Look out! There's a lot of molecular biology to come." Brenner, the director of the Medical Research Council Laboratory of Molecular Biology in Cambridge, England, says, "I want to dispel the impression that we just need to apply what we already know.... There's much more to find out."

The genes of an organism are an internal representation of its structure, function and construction, Brenner says. But, he points out, we know little about biological architecture. "We talk loosely about genetic engineering," he says. "Engineering contains the essence of design." Currently, he says, biologists can call themselves, at best, "genetic mechanics." The audience of genetic whatevers, put in their place, broke in with a round of applause.

Environment

Love Canal leak redirects cleanup

At a public meeting in Niagara Falls, N.Y., last week, the Environmental Protection Agency (EPA) announced that it had learned several months ago that seepage of wastes from the Love Canal chemical dump was more extensive than originally believed. The leaking chemicals, identified only in two bore-hole monitors, were "at the very low parts-per-billion level," said EPA's James Marshall. Of primary concern, he noted, was the identification of the highly toxic pesticide lindane.

Because the chemicals had migrated beyond the site of a proposed underground retaining wall, EPA planners must now go back to their drawing boards and redesign a cleanup program the agency is coordinating under the Superfund Act. Moreover, because the retaining wall was to have helped satisfy habitability requirements set by the federal Department of Health and Human Services, this finding of more extensive chemical contamination threatens to affect how quickly the adjacent residential neighborhood — now largely uninhabited — can be safely decontaminated and repopulated. (The Love Canal Revitalization Agency purchased 400 of the 550 homes closest to the chemical dump with government funds. Those homes are to be resold once the area's habitability is established.)

At present, EPA expects work on a clay cap to seal the top of the chemical-waste site to be finished by the end of the year. Remedial cleanup of storm sewers and an adjacent creek — where dioxin has been detected — is due to begin next summer. And New York state officials are expected to complete within six months a study on how best to contain chemicals now seeping through the sides of the Love Canal dump. Though EPA also expects to eventually develop long-term monitoring that will scout for potential groundwater contamination, today only limited cleanup-related monitoring is being conducted.

Melanoma risk and socio-economic class

A new study has failed to confirm the previously suggested link between working as a chemist and having an elevated risk of developing malignant melanoma — a rare, virulent and sometimes fatal skin cancer. However, the study did find a small but statistically significant correlation between educational attainment and melanoma risk — a finding its authors at Los Alamos National Laboratory, in New Mexico, cannot yet explain.

The study had been prompted by the report of an apparent increased incidence of melanoma among male employees of Lawrence Livermore National Laboratory (LLNL) in California (SN: 5/3/80, p. 278). Chemists at LLNL developed the skin cancer most often. Since Los Alamos and LLNL conduct similar types of nuclear and chemical research, J. F. Acquavella and colleagues decided to try replicating the LLNL finding using a cohort of current and former Los Alamos workers.

Unlike at LLNL, the Los Alamos researchers detected no overall excess melanoma in their study populations. Nor was any correlation found between the disease and a worker's exposure to plutonium, to external penetrating radiation, to chemicals or to ultraviolet light. There was also no statistically significant association at Los Alamos between the skin cancer and any job classification.

"The only association that emerged from the current investigation was for higher educational achievement among [melanoma] cases," the researchers report in the September HEALTH PHYSICS. Previous studies have linked melanoma with high socio-economic status, the researchers note. And, they point out, education is one of the many social factors which generally characterizes high socio-economic status. "Clearly, the achievement of a college or graduate degree cannot be considered to cause melanoma," they say, adding, however, that some as-yet-unknown socio-economic factor probably does play a role in elevating melanoma risk.