

months" so that it can be ready by next August. This may not be soon enough for the shuttle's first orbital flight, however, which NASA says "is anticipated between the end of March and July 1980." The agency believes that inspection and repair of tiles will not be necessary on the first flight, which has been "designed to cause lower than normal stress." Also, tests of the tiles will soon be conducted on F-15 and F-104 jet aircraft in maneuvers intended to expose the tiles to dynamic pressures up to 1.4 times as great as those expected for shuttle operations.

Another in-orbit tile-inspection method under study is the deployment of small "satellite" TV cameras from the shuttle, after which the craft would fly around them to expose different parts of its surface to view. □

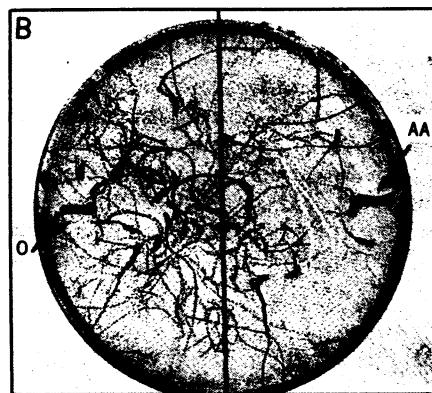
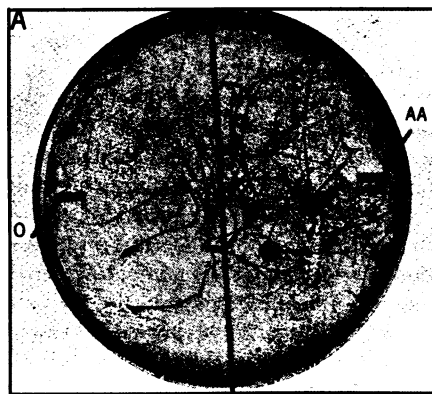
## Flies are never too young to learn

The simple brain of an immature fruit fly can grasp the association of an odor and an electric shock — unless, of course, the larva comes from the family lines named dunce, turnip or cabbage. Only a few years ago scientists devised a scheme to show that adult fruit flies (*Drosophila melanogaster*), the geneticists' favorite organism, are capable of learning and that scientists are capable of detecting and measuring the flies' abilities (SN: 6/15/74, p. 391). The testing scheme involves administering an electrical shock simultaneously with a whiff of an odorant. Given the choice of that scent or of one not associated with an electric shock, most fruit flies move toward the innocuous scent.

But adults have no monopoly on learning ability and may not be the most convenient stage of development to study, Efrain O. Aceves-Piña and William B. Quinn of Princeton University now report. The worm-like, immature form of the fly, which later undergoes extensive metamorphosis, can discriminate odors, respond to electric shock and learn to associate the shock with odors nearly as well as do its elders. Thus the structures involved in learning are already present in the simple larval brain.

Not satisfied to observe learning, the geneticists, in their customary style, sought flies with slight genetic variations that create non-learners. Among the adults, they found three such learning-deficient mutants, which they named dunce, turnip and cabbage; another mutant fly called smellblind simply does not respond to odors. Such learning-deficient flies give scientists the opportunity to pinpoint biochemical and anatomical sequences that are necessary for normal learning behavior.

The mutations that produce dunce, turnip and cabbage flies also function in



Larvae trained to avoid the odor of 3-octanol (O) trek to the right side of the plate, while those trained to avoid the amyl acetate (AA) odor move to the left. The dotted lines are larval tracks.

the larval stage, Aceves-Piña and Quinn find. The larvae with those mutations can sense odors and respond to electrical shock, yet fail to learn to avoid an odor that is associated with a shock. The scientists had expected larvae with the smellblind mutation to be able to sense odors because the olfactory end organs are sloughed off during metamorphosis and replaced in the adult fly with receptors of a different type. Instead, smellblind larvae are as insensitive as smellblind adults. The researchers suggest that either both receptor types require the normal gene product or that the mutation disrupts olfactory information processing not at the receptors but in the brain.

Although immature flies may be adequate learners, their memories are not as efficient as those of adults. The larvae forget the odor-shock association within 30 minutes, whereas adults remember their experiences for 1 to 6 hours. "We believe that the difference between larval and adult retention spans is probably intrinsic and that the lengthened adult span results from anatomical or metabolic changes in *Drosophila's* nervous system during metamorphosis," Aceves-Piña and Quinn say in the Oct. 5 SCIENCE. The biologists were unable to learn whether genetic traits for poor memory extend from the adult to the larval brain. Even normal larvae forget as

fast as do those adults considered to be amnesiacs.

Because larval brains are simpler, more compact and easier to isolate than are adult brains, researchers may now shift their search for the anatomical and biochemical elements of learning to the larvae and work on teaching very young *Drosophila* old tricks. □

## Estrogen therapy: Still deliberating

Several hundred physicians, scientists and concerned citizens gathered in mid-September at the National Institutes of Health for a Consensus Development Meeting on the subject of estrogen replacement therapy for post-menopausal women. The consensus, unfortunately, was that no one knew enough about estrogen's effects to issue any hard-and-fast recommendations. But the panel did summarize the known risks and benefits of estrogen therapy, and in the process provided some general guidelines for its use.

Overall, the panel advocated a policy of "lowest dose for the shortest time" for women whose menopausal symptoms are severe enough to warrant estrogen therapy. The note of caution was sounded not only because much remains to be learned about the hormone, but also because its users are subject to a two-to-twelve-fold increased risk of endometrial cancer. This danger, which increases with the length of treatment, is generally acknowledged to be the best-documented risk of estrogen therapy. Some researchers found an increased incidence of the disease among users after only six months of the hormone therapy; others extended the "safe" period to five years. The difference in time span as well as the wide variation in increased risk factors is attributed to different research methodologies. The panel judged the time span after which risk increases to be from two to four years.

The increased risk of cancer associated with estrogens, however, does not linger indefinitely. Barbara Hulka of the University of North Carolina at Chapel Hill reported that a two-year estrogen-free interval reduces the risks to normal, non-user levels. Hulka pointed out that this is a very short interval in which to eliminate the hazard of a presumed carcinogen; after five years of abstinence, cigarette smokers only lower their risk by one-half — still far higher than the risk for non-smokers.

The benefits of estrogen replacement therapy are as well-documented as the risks. Estrogens are effective in preventing vasomotor flushes (commonly known as hot flashes); they do overcome vaginal atrophy, which produces symptoms of dryness, itching and pain during intercourse; they do retard osteoporosis, the decrease in bone density that occurs frequently in aging women.

Vaginal atrophy and hot flashes recur after estrogen therapy is stopped, and they can be severely disruptive to a woman's life, but they are not life-threatening conditions. Endometrial cancer, although it is highly treatable if it is diagnosed in the early stages of the disease, is still a very real threat to a woman's life and health. Given these two choices—a sort of quality vs. quantity of life decision—the panel said that “the decision of whether to initiate therapy should depend on the severity of the symptoms and the patient's perceived need for relief.”

Osteoporosis, in contrast to hot flashes and other menopausal symptoms, is considerably more of a health threat. It is far more common in women than in men, and its victims are prone to increased hip, wrist and spinal compression fractures. Sixteen percent of the women who suffer hip fractures will die of related complications within three months of the accident. Estrogen therapy can retard osteoporosis; three well-controlled studies document this, and some as yet unpublished evidence cited by Isaac Schiff of Harvard Medical School suggests that estrogen use may lead to a decrease in the number of osteoporosis-related fractures. But the panel offered no recommendations for this use of estrogens at this point because it is impossible to predict who is most prone to osteoporosis, and the therapy must be started around the time of menopause—before the osteoporotic damage is apparent—to be most effective.

There are psychological as well as physiological symptoms traditionally associated with menopause. But as panelist Anne M. Seiden of the American Psychiatric Association pointed out, no one has yet demonstrated that these symptoms are indeed caused by the physiological changes that occur with menopause, and no study has shown an increase in depression or irritability at menopause. Other panel members suggested that the relief of hot flashes and other physical symptoms afforded by estrogens might well lead to increased feelings of mental well-being. The panel did not recommend that estrogens be used to treat primary psychological problems at menopause.

In contrast to these partially unquantifiable risks and benefits, there are some clear contraindications for estrogen replacement therapy: a previous history of cancer, heart attack, stroke or blood clot in the lung; high blood pressure; and a strong family history of cancer.

The conclusion appears to be that each woman's symptoms must be considered individually. If she finds that her menopausal symptoms interfere with her life, and is otherwise healthy, and if she understands and is willing to take the risk, estrogens at the lowest effective dose and for the shortest period of time may be the best therapy. That—no more and no less—is the consensus until estrogens and their effects are better understood. □

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## Science magazines: The more the merrier

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Is another post-Sputnik-like boom in science and technology about to hit us? Is there an expanding awareness of the relevance of science to our existence? Is there a growing need to be better informed about science? To judge from the number of recent, new and proposed ventures in popular science publishing, the answers to the above questions are yes.

OMNI, the magazine of science fact and science fiction, is celebrating its first anniversary this month and boasting a circulation of almost one million. The New York Times's weekly science section, Science Tuesday, has been with us for nearly a year and appears to be surviving. The American Chemical Society's SCIQUEST is a reworking of CHEMISTRY magazine in an attempt to reach a broader audience.

New on the scene this week are SCIENCE 80 and a special edition of SCIENCE DIGEST. SCIENCE 80, a publication of the American Association for the Advancement of Science, came out this week with a projected circulation of 250,000 on a bimonthly basis. An attractive, feature-article magazine, it positions itself somewhere between SCIENTIFIC AMERICAN and POPULAR SCIENCE and plans to achieve a circulation of one million, on a monthly basis.

The Hearst Corp. appears to be testing

the waters rather than taking a plunge. Instead of producing an entirely new magazine, as had been rumored, Hearst has issued a special, magazine-size edition of SCIENCE DIGEST. If this special issue is well received there may be more.

Several other science magazines are currently in the planning stages—The Foundation for National Progress, publisher of MOTHER JONES, has been working on a politicized science magazine; V.N.U., a Dutch publishing firm, is considering a science magazine for the U.S. audience, but plans have not been finalized. A number of other science magazines are reportedly in the works, but the one arousing the most interest at present is the on-again off-again entry of Time Inc. This magazine has been on and off the drawing board for more than a year, and two dummy issues have already been prepared. According to the Oct. 8 Gallagher Report, Time Inc. plans to do a one million piece direct mail promotion in January and base its final decision in March on the results. If the decision is positive, plans are to start up with a circulation of 1.5 million. If these plans and those of the other publishers come to fruition, we might be witnessing the beginnings of an era of increased scientific awareness. □

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## Blitz to declassify reveals bomb secrets

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Temporary relaxation of federal standards regarding the declassification of formerly secret documents resulted in nearly 100—and possibly more—being “erroneously declassified,” according to a September 21 General Accounting Office study that served as the basis of a Senate hearing last week. The study, conducted for Sen. John Glenn's (D-Ohio) Governmental Affairs subcommittee, was to investigate how allegedly “sensitive” data pertaining to the design of thermonuclear weapons ended up in the public domain and in THE PROGRESSIVE magazine's much-talked-about article on the hydrogen bomb.

The situation developed, GAO says, when a program undertaken from 1971 to 1976 by the Atomic Energy Commission sought to declassify as many documents as quickly as possible from inactive files for better access by the general public and scientific community. Nearly 2.8 million were reviewed; of them, nearly 1.5 million were declassified, some in near-marathon sessions.

For example, between January 15 and February 16, 1973—a period of 33 days—234,215 of 388,092 documents reviewed by a team at Los Alamos Scientific Laboratory were declassified. “Some of the reviewers felt the thrust of the informal instruction at this review was, ‘whenever in doubt, declassify,’” the GAO

study reported. But in the rush, “simple administrative and clerical errors” crept in, such as the mistitling of reports or the failure to properly indicate when only an excerpt of a report was to be made available to the public.

In addition, the AEC dropped the mandatory second review of all declassification requests by its review teams during the crash program. It also loosened criteria for qualifying declassification reviewers. “In some cases the final decision to declassify a report rested with a review team member who was neither a classification specialist nor technically competent in the subject matter of the report,” the GAO study charged.

THE PROGRESSIVE magazine cited use of 40 of these declassified documents—obtained in the public library at Los Alamos (SN: 6/2/79, p. 360)—in their appeal of a government ban on their bomb article. The ban was dropped last month when the Madison Press Connection published the data the government had hoped to censor.

Only 19,000 of the nearly 1.5 million declassified documents have been listed. The Energy Department, which has begun a new review of the 19,000, has already identified 2,000 pertaining to nuclear weapons and withdrawn many pending closer scrutiny. Of 244 such documents, 91 have been reclassified. □