yield of a Spartan missile warhead to be used in the Safeguard ABM system. The warhead is designed to intercept enemy missiles above the atmosphere and deactivate them with X-rays.

The Committee for Nuclear Responsibility and six other environmental groups tried to obtain a court injunction against the test on grounds that the AEC failed to give proper consideration to environmental hazards. After ordering the release of hitherto secret Government documents on the subject, a U.S. District Court ruled Monday that the dangers had been sufficiently considered. The attorney for the seven environmental groups said they would appeal the ruling.

Meanwhile, time was running out. The warhead had been lowered to the bottom of the 6,000-foot test shaft and the shaft was being plugged. The test could still be postponed, though rescheduling would cost an estimated $50 million to $100 million. Fishing boats had been warned away from the area, and it seemed unlikely that the test would be either halted or postponed. □

Learning and memory transfer: More experimental evidence

Until recently the transfer of learning and memory from one brain to another brain was straight out of science fiction. Then in the early 1960's investigators turned fantasy into reality by feeding brains from flatworms trained to respond to light or to navigate a maze to untrained flatworms, and found that the recipients aped the donors' behavior. In 1965, Ejnar Fjerdingstad of the University of Copenhagen took a crucial experimental leap from the worm to a vertebrate, the rat. He trained rats to go to light in order to receive water, then injected the brain material from trained rodents into naive ones. The recipients did not imitate the donors' learned habit right off, but they did acquire it faster than control rats that had not been injected, implying that the injected brain material indeed boosted learning.

There are now some 32 laboratories in the United States injecting brain extracts from trained amphibians, fish, mice and rats into untrained recipients, and the work seems to be achieving ample success in modifying the behavior of the recipients. Most brain transfers are limited to one species, although several labs are transferring brain material from one species to another, with some positive results.

What's more, the first memory molecule has been isolated, characterized and synthesized by Georges Ungar of Baylor University in Houston and by Wolfgang Par of the University of Houston. They first announced the achievement last December, and a technical report will appear soon in NATURE. What these investigators did was slowly to accumulate several pounds of brain from rats that had been shocked in the dark. They tested different fractions of this brain material for memory transfer ability in recipient rats until they narrowed the material down to what appears to be the actual memory molecule. It is a protein and dubbed "scotophobin," after the Greek words for "fear of the dark."

Several groups are now working with scotophobin. William Braud, a psychologist at the University of Houston, for example, reported at the first annual meeting of the Society for Neuroscience last week in Washington that he has been injecting extracts of crude rat brain (which he believes are scotophobin) into fishes' brains. The recipient fish indeed exhibited fear of the dark. The fear lasted up to 10 days in some fish, but usually not more than six days and was an on-again off-again phenomenon.

Rodney Bryant of the University of Tennessee confirms this short, transient effect. He reported at the neuroscience conclave that he has injected synthetic rat scotophobin into the brains of hundreds of goldfish. While the fish indeed exhibited fear of the dark and resisted learning to swim into the dark, the fear was of brief duration. "I would not say scotophobin is a memory molecule at this point, but memory linked," he said.

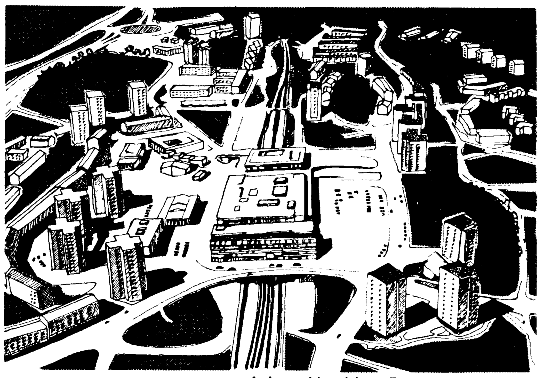
Then Ronald Hoffman, a biophysicist at the University of Houston, reported that after teaching goldfish to swim through a triangle to get food, he injected their brains into other fish. All swam to the triangle without prompting. Yet here again instilled learning lasted but a day or two. Hoffman is now working on the isolation and purification of the learning molecule involved. He thinks it is a protein-RNA complex.

Even these vertebrate experiments, though, haven't convinced everyone that learned information can be transferred chemically from one organism to another. Scientists who believe that memory is primarily a function of the neural pathways of the brain, requiring an intact brain, particularly score the possibility that memory is solely a cellular, or biochemical, phenomenon. Nonetheless those investigators doggedly pursuing biochemical packets of learning and memory avow that they have analyzed their results statistically and that the behavior of recipients is definitely not chance. Those workers tend to agree, though, with William Byrne of the University of Tennessee and author of a book on learning and memory molecules that far more brain material must be obtained, scrutinized and tested before biochemistry's true role in learning and memory can be delineated. □

Humans and cities: The European answer

It has become a kind of truism that the United States lags far behind Europe in urban planning—and that such land-use planning may be a fundamental determinant of the quality of peoples' lives and environments. In a book published this week by Johns Hopkins Press, Ann Louise Strong, director of the University of Pennsylvania's Institute for Environment Studies, provides a detailed description of some of the key European urban developments. The book, *Planned Urban Environments,* amply proves United States' backwardness—but the author is often remiss in producing evidence that the quality of the lives of the residents of the European developments matches the glitter and attractiveness of the developments.

If a single conclusion comes from the book, it is that there is no single



Johns Hopkins Press

Stockholm's Vällingby Center.

way to approach urban planning problems and thus to produce habitable human environments. In the United States, for instance, environmentalists have sometimes tended to see high-rise apartment buildings as unmitigated evils. In Tapiola, a newly planned city outside of Helsinki, however, high-rise buildings are made harmonious with the natural environment through careful spacing and imaginative architecture. Other European developments likewise have aimed at meeting local or national needs in diverse ways.

"In the Netherlands, amenity is the national government's basic reason for wishing to limit metropolitan growth. . . . Most nations, including Sweden, Finland, France and Israel, are concerned primarily with the economic implications of concentrated economic growth. . . . France and Finland fear that further concentration in Paris and Helsinki will contribute to the weakening of other urban centers." And, the author continues, a prime concern in Israel (as well as the Netherlands) is preservation of limited arable land for agricultural use. These diverse needs have stimulated diverse approaches.

But even where the prime goal is economic development, there appears to be little doubt that the European planners, unlike U.S. developers, usually refuse to buy the growth at the expense of human beings.

Stockholm, for instance, has a strong interest in economic growth. Here is Strong's description of the result of this emphasis when it is melded with a concern for human needs: "An excellent public transportation system links satellite [suburban] centers, located inside and outside the city limits, to the center city and to one another. The satellite centers have a high density and offer a range of shops and cultural facilities clustered about transit stops, all within easy walking distance of most residences."

The contrasts between such developments and U.S. failures in planning are often striking. Stockholm's walk-and-ride system for commuters is in stark contrast to harried U.S. freeway commuters; Dutch developments in the Ranstad (the Amsterdam-Rotterdam-Hague urban agglomeration) which aim at clear-cut boundaries for the cities, and the suppression of megalopolitan linkages, stand in equally stark contrast to U.S. urban sprawl and the creation of ugly commercial strips between urban centers; the successful emphasis in Tapiola on mingling residents of all social and economic classes is a lesson to Americans that social, economic and racial ghettos need not exist.

Perhaps the prime ingredient of the success of the European planners, she says, is public ownership of land in urban areas and thus a stifling of speculation and all of its attendant evils such as leapfrogging development. In the United States, she says, there is an ideological antipathy to such public ownership "and a conviction that the increment in land value . . . should go to the successful speculator rather than the public at large. We have been ready to compensate the landowner damaged by public planning decisions, but, unlike the Europeans, we have refused to charge the landowner benefited by such decisions. . . . The irrationality of our current posture is ever more costly to us as a nation, and to us as individual taxpayers."

The ideological objection to public landownership, that it would destroy the "American Way of Life," is nonsense, says Strong. She points out, for instance, that 90 percent of "socialistic" Sweden's gross national product is produced by private industry and that 90 percent of its citizens are employed in private enterprise.

The book is an excellent summary of European developments, viewed from broad sociological, economic and technological perspectives. But there is a large gap in the author's description of human realities. For instance, she quotes a Tapiola official to the effect that university professors and skilled workmen live side by side in the development in harmony and that the workmen adjust their "standards" upward to those of the professors. It is tantalizing to speculate about what these "standards" are and whether such an upward leveling is really desirable. She suggests no answers. □

Work in holography, molecular structure net Nobel Prizes

The development of holography has brought the 1971 Nobel Prize in Physics to Dennis Gabor. Born in Budapest in 1900, Gabor is now a British citizen. He has been on the faculty of Imperial College, London, since 1949, but he is currently working in the United States as a staff scientist at the Columbia Broadcasting System's Laboratories in Stamford, Conn.

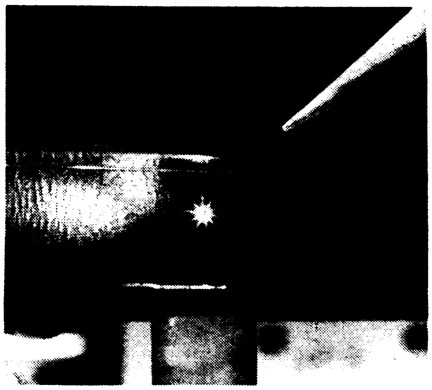
Holography is a method of using coherent light to record and reconstruct images without the necessity of focusing lenses. Laser light reflected from the object to be imaged is combined with an unreflected reference beam. The interference pattern formed by the reflected and reference wave fronts is recorded on photographic film. Proper illumination of this hologram will cause an image of the object to appear in the space near the hologram. If the object is three-dimensional, the image will also be three-dimensional. If the hologram is on color film, the image will be in color. The existence of holography depends on the coherence of laser light.

The Nobel Prize in Chemistry will be awarded to Gerhard Herzberg of the National Research Council in Ottawa for "his contribution to the knowledge of electronic structure and the geometry of molecules, particularly free radicals."

Herzberg was born in Hamburg in 1904. Except for a few years at the Yerkes Observatory in Williams Bay, Wis., he has resided in Canada since 1935. He is particularly known among his fellow scientists for his work in atomic and molecular spectroscopy, the structure of atoms and molecules and the functions of atomic and molecular processes in astrophysics.

Each Prize is worth about $90,000 at current rates of exchange.

The ball stands still in the air



Bell Labs

Ball floats on beam of laser light.

Radiation pressure is the pressure exerted on objects by light. It is the sum of the impacts of the countless photons in a light beam and is similar to gas pressure, which is the sum of the impacts of countless gas molecules.

Until the advent of lasers radiation pressure was more of a curiosity than an effect to be reckoned with. The coherent beam of a laser provides a more concentrated radiation pressure than natural incoherent light beams and raises the possibility of doing things with radiation pressure.

Arthur Ashkin and Joseph M. Dziedzic of Bell Telephone Laboratories at Holmdel, N.J., have made laser light lift tiny glass balls into the air. They report this achievement in the Oct. 15 APPLIED PHYSICS LETTERS.

"When we focus a quarter-watt laser on a small transparent glass particle, the extremely small force exerted by light is then sufficient to lift the sphere off the surface and suspend it," says Ashkin.

The ball remains stable in the light beam and does not slide out because of a so-called optical-well property that Ashkin discovered during earlier work on the effects of laser beams on small particles suspended in liquids.

The laser beam is most intense along its axis, less intense near its edges. If the little glass ball happens to be off-center in the beam, its opposite edges will experience light forces of different sizes. Ashkin found that the net effect of the difference is a transverse force that always tends to return the sphere to the axis of the light beam.

The experimental procedure for levitation begins with a glass ball about 20 microns in diameter lying on the bottom of a box. The ball must be transparent or it will absorb energy from the light and melt.

Since the ball is attracted to the bottom of the box by a chemical force, the van der Waals force, which is much stronger than the light pressure, the