

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.

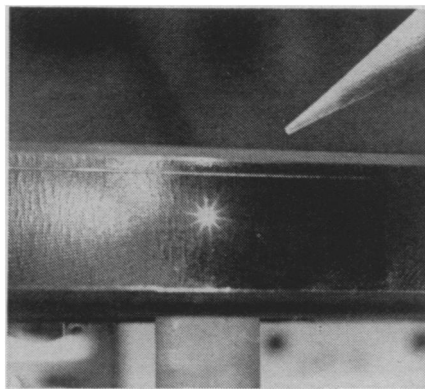
Perhaps the prime ingredient of the success of the European planners, she says, is public ownership of land in

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. □

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

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.

first step is to shake the bottom of the box to break the van der Waals force. When this is done, the laser beam, entering through the bottom of the box, lifts the sphere until it reaches a point where light pressure balances its weight. "The particle is extremely stable and can remain aloft for hours," Ashkin and Dziedzic report.

A laser beam shone in from the side can then be used as a probe to study the forces exerted on the ball as it floats in the first laser beam. Levitation has been accomplished in air and in partial vacuums down to pressures of one torr. At that point the particles were lost, in part because of a reduction of viscous damping by the air, which had aided stability, and in part because of a downward force on the balls that arises because their tops are slightly hotter than their bottoms.

Optical levitation is expected to provide a way of manipulating small particles without mechanical support. It could be useful in communications research to study scattering loss caused by small particles either in the atmosphere or other transmission media. It could also be useful in the construction of gyroscopes and accelerometers. □

Dropping out of school: Problem or symptom?

Campaigns aimed at keeping kids in high school or getting dropouts to go back to school have made the diploma an all-important factor in future success and have equated dropping out with failure and delinquency. Scientists at the University of Michigan's Institute for Social Research in Ann Arbor feel that these campaigns are deceptive and may be doing more harm than good.

Their conclusions are based on a five-year study designed to investigate the causes and effects of dropping out. The results of the study, by Jerald Bachman, Swayzer Green and Ilona Wirtanen, will be published later this fall by ISR. Speaking this week in Ann Arbor, Bachman explained the design and results of the research.

A national sample of 2,313 10th-grade boys was selected. They were interviewed in the fall of 1966, the spring of 1968, the spring of 1969 and again in the summer of 1970 (one year after they were scheduled to complete high school). The researchers found, as they expected, that there is a substantial difference between those who dropped out and those who stayed in school, particularly those who went on to college. The researchers found, for example, that family background is an important factor. The lower a family's socioeconomic status, the more likely the boy is to become a dropout.

Giving reason to rhythm: Inducing ovulation

Executive control over the body's hormones lies in the hypothalamus, an area of the brain that is particularly reluctant to give up its secrets to science. Nonetheless Andrew Schally and his team of endocrinologists at the Veterans Administration Hospital in New Orleans recently succeeded not only in isolating and characterizing but also in synthesizing the hypothalamic hormone that, via several pituitary hormone mediators, turns the body's sex hormones on and off (SN: 7/17/71, p. 37). The synthetic hormone, Schally prophesied, holds potential for providing several new approaches to birth control. One would make the rhythm method work with certainty by inducing ovulation. This way a woman would know exactly when she ovulated, and could time intercourse accordingly.

It now looks as if this boost for the rhythm method might be closer to clinical application than was previously believed. Schally and his team report in the Oct. 29 SCIENCE that they used the LH/RH portion of the synthetic hormone LH/RH-FSH/RH to induce ovulation in hamsters that had been previously treated with a drug (phenobarbital) to prevent spontaneous ovulation. Control hamsters were placed on phenobarbital and a salt solution, and none of them ovulated. The results, the New Orleans investigators conclude, indicate complete blockage of spontaneous ovula-

tion by phenobarbital, and hence proof that LH/RH did indeed induce ovulation in those animals receiving it. Injection of the synthetic LH/RH did not induce ovulation in hamsters whose pituitaries had been removed, excluding the possibility that the synthetic LH/RH might stimulate the ovaries directly, without being first mediated by the pituitary luteinizing hormone (LH).

Schally and his colleagues have also induced ovulation in rats using the purified, natural LH-RH. In these animals spontaneous ovulation was again blocked with phenobarbital. The natural hormone did not alter the blood pressure and heartbeats of the rats, which indicated the hormone did not trigger undesirable side effects on the cardiovascular system. More animal tests, of course, are needed to see whether the synthetic LH-RH is free of serious toxic effects, not just on the cardiovascular system but on other systems in the body. Other questions also need answering, such as whether synthetic LH-RH can induce ovulation when spontaneous ovulation is not suppressed.

If and when LH-RH induction of ovulation becomes clinically available to women, it could have profound effects on world population control, especially in Roman Catholic countries. Rhythm is the only form of birth control permitted by the Roman Catholic Church.

Intelligence and academic ability are also factors in dropping out. But a more important predictor of dropping out is past school failure. The report says the dropout rate among boys who failed a grade is 40 percent. It is only 10 percent among those who never failed.

These aspects of the findings, however, are neither new nor surprising. What is different about the study is that the students were all contacted while they were still in school. And the researchers were able to compare the dropouts to those who completed high school and those who entered college. "Because ours was a before-and-after design," the researchers say, "we were able to show that in nearly every case a difference which turned up at the end of the study was present equally strong at the start—before dropping out occurred."

Tests given during the four-year period measured more than 20 personality and behavior characteristics. The authors found that "there are very

few changes of any consequence and virtually none that would support the argument that dropping out damages a young man's mental health and his commitment to society's values." And the argument that dropping out leads to higher unemployment, the report finds misleading. The unemployment rate for dropouts may often be twice that of graduates but there is no evidence that this is a direct result of dropping out. It is more likely, Bachman says, that unemployment is a result of pre-existing factors such as low intelligence or low socioeconomic level.

The conclusion ISR scientists draw from the study is that dropping out is an end result or symptom of other problems that have their origins much earlier in life. The kids had their problems before they quit, therefore time and effort should be spent on correcting the problems. Bachman suggests the money being spent on antidropout campaigns could be better used in making the schools more palatable and valuable to the potential dropout. □