blames bad genes, the other too much close work. Each faction of ophthalmologists offers its "definitive" studies, but according to Kolata, a reporter for *Science*, recent evidence weighs in favor of the close-work hypothesis.

Myopia occurs, Kolata notes, when an eyeball becomes elongated, placing the retina (back of the eye) beyond the point where the eye's lens can focus sharply on an image. When a person does close work—reading, sewing, drawing, using a computer—his eyes must "accommodate," or curve the lens, in order to focus. Too much close work, the theory goes, puts too much strain on the eye, which can increase its internal pressure (pushing the retina back) or else weaken its ability to accommodate. Several population studies seem to back up this notion. In 1883, a scientist ranked Dutch military recruits by their former occupations and observed that the prevalence of nearsightedness rose as the men became more educated: from 2.5 percent among farmers and fishermen to 12 percent among craftsmen doing close handiwork and 32 percent among scholars. A research project in Alaska found that young, literate Eskimos were more often myopic than their illiterate elders. It is also known that lawyers and graduate students have myopia rates approaching 50 percent.

Only within the last few years, the authors observe, have researchers been able to develop animal models to study the condition. Francis Young, a psychologist at Washington State University, has raised a colony of nearsighted monkeys. When their distance vision is limited to 14 to 20 inches (forcing full-time accommodation) for a year, many monkeys become nearsighted—a significant fact, since they are not normally myopic. Two other researchers, Elio Raviola and Torsten Wiesel, of Harvard and Rockefeller universities, respectively, discovered that sealing shut a monkey's eyes also stimulated myopia. However, the nearsightedness only develops if the monkeys are in the presence of light. Darkness halts the myopia. Thus, the researchers believe that perceiving fuzzy images through the monkey's eyelid is the cause.

Nearsightedness cannot be cured, Kolata reports, although some ophthalmologists are trying to retard its onset in children who are developing the condition. One treatment involves "atropine" eyedrops, which relax the eyes' ciliary muscles. Another employs bifocals. Both methods aim for similar goals: to take the strain of visual accommodation out of close work.

How Does an Embryo Grow?

"The Molecular Basis of Development" by Walter J. Gehring, in *Scientific American* (Oct. 1985), 415 Madison Ave., New York, N.Y. 10017.

The development of a fertilized egg—a single, minute cell—into a complex and variegated creature is one of nature's great mysteries. How exactly does it happen?

Biologists have known since the 1950s that the architecture of a developing organism is encoded in the helical strands of its deoxyribonucleic acid (DNA), the storehouse for its genetic information. But the method by

which the DNA translates that code and orchestrates the growth of a complex fleshy animal (with hundreds of distinct tissues, organs, and systems) is only now becoming clear, reports Gehring, professor of cell biology at the University of Basel in Switzerland.

Every cell contains "active" and "inactive" genes, Gehring notes. Scientists now believe that "master" genes—containing small segments of DNA called homeoboxes—act as virtual switches, turning whole groups of genes "on" and "off." The homeobox does this by creating protein messengers that bind with some genes, and not others. The result of this intricate process is that sets of cells end up with special genetic instructions that differentiate them from other cells nearby. Each cell group then migrates to its proper place in the growing embryo and develops into a specific body part or system.

Gehring first became aware of these special genes in 1965, while studying the developmental stages of fruit flies. Observing strange mutations—legs sprouting up where antennae should be—he and his colleagues identified a wide range of "homeotic" genes that govern the physical layout of a developing embryo. As the scientists gained a more sophisticated understanding of the chemical mechanisms underlying these unique genes, they conceived of master genes overseeing the whole developmental process. Experiments in 1983 confirmed the existence of these master genes and their homeobox mechanisms.

Do such research findings apply only to fruit flies? No, Gehring maintains. Master genes have been found in the embryos of many other vertebrates, including humans. Indeed, he notes, "the discovery of the homeobox in a wide range of species suggests that the molecular mechanisms underlying development may be much more universal than was previously suspected." However, he adds, the discovery of these controlling genes is only one piece of a terribly complicated puzzle. The biologists' next question: What regulates homeoboxes?

RESOURCES & ENVIRONMENT

San Francisco's Downtown Plan

"San Francisco's Downtown Plan: Environmental and Urban Design Values in Central Business District Regulation" by Steven L. Vettel, in *Ecology Law Quarterly* (No. 3, 1985), School of Law (Boalt Hall), Univ. of Calif., Berkeley, Calif. 94720.

Like many big American cities, San Francisco has seen its share of development in recent years, particularly of its business district. In fact, writes Vettel, an attorney in San Francisco, "the city's downtown growth rate ranks as the nation's highest."

But unlike residents in other major urban centers, Vittel contends, San Franciscans have not allowed the developers' natural desire for profits to