

Why the eye lens is transparent

For years scientists have debated why the lens of the eye is transparent despite the high concentration of protein molecules within the water-filled cells that make up the lens. Now, two French researchers have settled the debate about how these proteins are arranged so as to allow transparency. In doing this, they have also shed some light on why a lens becomes opaque when cataracts form.

Mireille Delaye of the Université Paris-Sud and Annette Tardieu of the Centre National de la Recherche Scientifique report in the March 31 *NATURE* that lens proteins are not arranged in a crystallike array, as some scientists have argued. Instead of being evenly spaced over long distances, a cell's protein molecules show only "short-range spatial order," like that found in glasses and dense liquids. Although neighboring molecules are "correlated," no overall, regular pattern occurs.

Delaye and Tardieu performed X-ray scattering experiments on intact calf lenses to rule out long-range ordering of the molecules. They also studied X-ray scattering and light scattering from prepared solutions of various lens-protein concentrations in water. They discovered that, at first, as the protein concentration increases from zero, the solution's turbidity increases dramatically. The widely spaced protein molecules scatter light ef-

fectively, acting much like water droplets in a fog. However, as concentrations increase further, the protein molecules get closer together and begin to interfere with one another. Neighboring molecules begin to take preferred positions next to one another. The nature of the light scattering process changes, and turbidity begins to decrease. Beyond this point, the protein solutions grow ever more transparent as the concentration increases.

Physicist George Benedek of the Massachusetts Institute of Technology, who had predicted that the proteins would show short-range order, says the lens cells contain "a solution of fairly closely packed proteins whose positions are correlated by the dense packing in such a way as to permit transparency." The researchers note that the spatial correlations are lost after about four neighboring layers.

Benedek says, "The really important question for you and me is not what makes the lens transparent but what makes it opaque." Because transparency involves only short-range order, "you start asking what are the actual fluctuations around that short-range order that causes ... cataracts," he says. Researchers can now focus on the biochemical basis for cataracts in order to see how to reverse or block cataract damage.

Benedek, also in the March 31 *NATURE*, writes, "The authors have forged a vital link in the chain of reasoning needed to understand the microstructural changes in the positions of proteins responsible for cataract disease." —I. Peterson

Accelerators won't hasten doomsday

There seems to be a notion going about that the next generation of particle accelerators could be the end of the world. This idea is cited by Piet Hut and Martin J. Rees of the Institute for Advanced Study in Princeton, N.J., in the April 8-13 *NATURE*.

The doomsaying arises from the suggestion of some of the latest theories of cosmology that the universe, or at least our neighborhood of it, may be in some kind of metastable state based on what is called a false vacuum (SN: 8/28/82, p. 133). Vacuum, to a physicist, is the zero energy state. Devoid of matter and energy, it is the lowest possible state of existence, the basis above which all the processes of physics take place. The vacuum should be the lowest imaginable state, but, odd as it seems, cosmologists now suggest that at certain epochs in the history of the universe, physics might base itself on a vacuum level that is not true, not the lowest one possible, a "false vacuum." The universe could remain in that state for billions of years.

If we are in fact in such a false vacuum state — we really don't know whether we are — and if the appropriate trigger should cause the formation of a bubble in which physics observed the true vacuum, that bubble would expand with the speed of light, and — whoosh — we will have had it.

The doomsday thought is that extremely high-energy collisions between subatomic particles might cause such a bubble to form and that the next generation of particle accelerators could provide enough energy to do it. Hut and Rees argue that in the past, cosmic rays and possibly other celestial processes have caused much more energetic collisions in our part of the universe than the next generation of accelerators can supply, so there seems to be no danger from that quarter — not yet.

—D.E. Thomsen

Mr. Skeleton goes to Washington

A slab of sandstone, and assorted chips, have been flown to Washington from Egypt for delicate work by a physical anthropologist. Encased in the 3-cubic-foot block and in the separate pieces is a 60,000- to 80,000-year-old human skeleton, believed most likely a Neanderthal. T. Dale Stewart of the Smithsonian's Museum of Natural History is already at work freeing the bones from the stone.

"Most of the face has been uncovered from pieces separate from the main block," Stewart told *SCIENCE NEWS*. "Work is a little slow at this stage." He plans to X-ray the block later in the week.

The skeleton was discovered accidentally a year ago when Fred Wendorf of Southern Methodist University in Dallas, Tex., was doing other archaeological work in the Nile Valley. He noticed fragments of a human skull and backbone jutting from an eroding sandstone butte. The body apparently had been placed face down in a grave pit, with arms extended at its sides and legs drawn up underneath.

If the specimen is indeed a Neanderthal, it will be the first unearthed in Egypt and one of few specimens found in the open.

Another possibility is that the skeleton represents a primitive ancestor of modern



humans. Few if any such skeletons have been reliably dated to this "extremely ancient" period, according to the museum. The distinction between Neanderthal and primitive modern will depend on features of the skull, shoulder bones and pelvis. After the first week of work Stewart remarks, "It's a little too early to say." The skeleton will be returned to Egypt after the Smithsonian studies, expected to take more than a year.

Insulation ban toppled

A federal court recently overturned the Consumer Product Safety Commission's ban on the sale of urea-formaldehyde foam insulation. The commission had banned the product last year on the ground that it "poses an unreasonable risk of injury to consumers" (SN: 2/27/82, p. 131). Specifically, CPSC had received complaints of flu-like and respiratory ailments from consumers exposed to the product; in addition, laboratory tests indicate formaldehyde causes nasal cancer in animals. The CPSC insulation ban was challenged in a federal court by several groups including the Formaldehyde Institute. CPSC officials now are reading that court's decision and deciding whether to appeal it. □