of brightness over time for the nova during its conspicuous period. With nothing as exact as modern photometric measurements, they had to interpret such terms as *obtusior,* duller or blurred, and *rubicundior,* ruddier. The result shows that the nova was conspicuous for an exceptionally long time (three years) and its peak brightness varied a lot.

According to accepted theory, a nova is a binary star system containing a white dwarf and a more ordinary star. They are so close together that matter is pulled from the companion star by the white dwarf's gravity. The inflowing matter eventually causes an unstable condition, and the white dwarf explodes, blowing away the excess. Immediately the flow of matter starts again, building up to another explosion. Not so, say Shara, Moffat and Webbink. Instead, they say, the explosion separates the stars, stopping the matter flow for a while. Eventually the stars move back together as they lose angular momentum through gravitational radiation or magnetic interactions, and *then* the matter flow starts again. The difference leads Shara, Moffat and Webbink to suggest that the time between nova explosions is more like 100,000 years than the 1,000 to 10,000 postulated by accepted theory.

— *D.E. Thomsen*

A flash of blue

Tsuji/PNAS

Every spring, bright blue flashes light up the bay in Toyama, Japan, as billions of firefly squid gather to breed. Now Frederick I. Tsuji of the Scripps Institution of Oceanography in La Jolla, Calif., describes the biochemistry of that brilliance. The reaction, reported in the July Proceedings of the National Academy of Sciences *(No. 14), is the second distinct example of luminescence that requires ATP, one of biology's most common energy-storing molecules.*

The well-studied luminescence of fireflies, and of a few related insects, uses ATP, but the firefly squid (above) employs it differently. In the squid, Watasenia scintillans, *the ATP reaction appears to transfer sulfate groups onto a chemical called coelenterazine. Tsuji proposes that the sulfated compound then serves as the substrate for the enzyme "luciferase" in the light-producing reaction. Previous work by other scientists has demonstrated that coelenterazine, without the sulfate groups, is the substrate of the bioluminescence reaction of some coelenterates and a decapod shrimp.*

Why doesn't the body reject the fetus?

Researchers from the National Cancer Institute have isolated a compound from the urine of pregnant women that has immunosuppressive capabilities. The compound, which the Bethesda, Md., scientists have named uromodulin, may play a role in preventing rejection of the placenta and fetus.

Because half of the placenta's genetic makeup comes from the father, the placenta is, in effect, a graft. Yet the mother's system does not reject the placenta as it would a transplanted lung or kidney. This "graft acceptance" has evaded scientific explanation.

That's not for lack of suggestions. Various biochemicals isolated from the urine of pregnant women have been put forth as immunosuppressives that could inhibit the mother's rejection response. But none has stood the test of time.

To isolate their immunosuppressive candidate, Andrew V. Muchmore and coworker Jean M. Decker started with urine from pregnant women and ran it through an exacting series of steps that separated the compound based on its characteristic size and biochemistry. They identified the compound in each step by measuring the ability of various fractions to inhibit the proliferation of immune cells stimulated with tetanus toxoid.

Having isolated the compound, a feat they detail in the Aug. 2 SCIENCE, the researchers' next step is to determine exactly what it does during pregnancy and in the normal regulation of the immune response. "We're not willing to say uromodulin is [totally] responsible for the maintenance of the placenta," says Muchmore. "How the placenta is protected is an open question. But uromodulin is much more active than any other factor isolated from pregnant women's urine."

Muchmore and Decker have found that when certain white cells are isolated and grown in culture, uromodulin inhibits their activity only when added at the beginning of the culture. This suggests that it interferes with an early stage of the immune system process. If the immunosuppressive capability holds up under further inspection, uromodulin could join such recently discovered immune system modulators as interleukin-1 and 2, interferon and tumor necrosis factor, all of which are just now being placed on the scientific map. "Uromodulin is intrinsically interesting as an immunosuppressive compound even if it turns out to play no role in pregnancy," Muchmore says.

— *J. Silberner*

Folding into a pure paraffin crystal

The spaghettilike molecules of polyethylene have a remarkable ability to disentangle themselves and settle, as neatly folded chains, into the form of crystals. This chain-folding behavior, found to be characteristic of many flexible polymers, is still largely unexplained. Recently, researchers discovered that shorter molecular strands, containing as few as 150 carbon atoms, also fold when they crystallize.

"Such behavior can be considered characteristic of the crystallization of ... flexible chains in general," conclude Andrew Keller and his colleagues at the University of Bristol in England. Their paper appears in the July 26 SCIENCE.

Polyethylene molecules typically consist of 10,000 or so linked carbon atoms, each also bonded to two hydrogen atoms. To understand the behavior of polyethylene, Keller's group looked at a family of simple hydrocarbons called alkanes, also known as paraffins. Polyethylene is simply a large number of these alkanes strung together. Using a newly developed method for synthesizing alkanes with a uniform, precise number of carbon atoms in each chain, the researchers produced sets of alkanes containing 150 to 390 carbon atoms.

By measuring various properties of the crystals created when the molten form of these alkanes cooled or when they crystallized out of solution, the Bristol team found that chain folding occurs as long as 150 or more carbon atoms are present. In each case, the molecules fold exactly in half or into thirds, quarters or fifths. The folds also prove to be very tight.

In a typical thin, platelike crystal, the folded molecules sit almost perpendicular to the crystal's flat upper and lower surfaces. The tendency of pure alkanes to fold in fractions of the extended chain length indicates that chain ends are kept out of a crystal's interior, the researchers say. The end groups lie even with the top or bottom surfaces. This reduces the incidence of imperfections that disturb the orderliness of these crystals.

For longer chains and for mixtures of molecules with chains of different lengths, the picture is somewhat more tangled. In this instance, the regular, sharp folds normally found are disrupted by intervening neighbors or by the trapping of remote parts of the same chain elsewhere in the crystal. Formations like "loose loops," "hairs" and "tie molecules" would give fold surfaces a disorganized look despite an orderly crystalline interior.

"Yet," reports Keller's group, "the existence of such imperfections should not obscure the intrinsic trend of long chains to fold in a regular manner." Even complex biological polymers often show some chain folding.

— *I. Peterson*