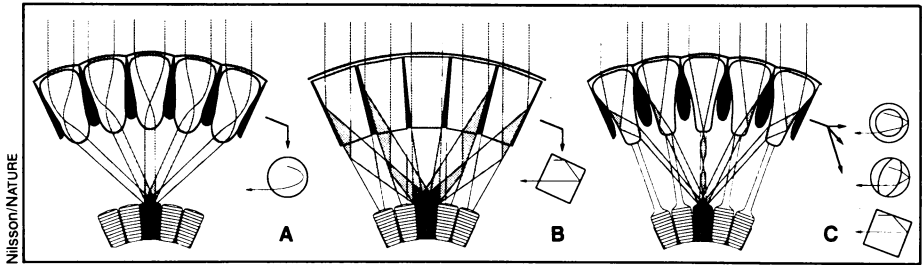


## Taking a crab's-eye view of the world

Some of the earth's simplest creatures have a most complicated way of seeing the world. In trying to explain how certain crabs see, a Swedish scientist has described the most complex eye structure known to exist. The newly discovered eye – which the researcher calls “a remarkable combination of ordinary lenses, cylindrical lenses, parabolic mirrors and light-guides” – joins eight other imaging systems found in animals.

In a paper published last week, Dan-Erik Nilsson at the University of Lund reports that many crabs and hermit crabs, plus a few mayflies, have eyes more complicated than previously thought. Their eyes – deluxe models of the imaging systems called compound eyes – collect light beams through an array of lenses and focus them at a point inside. Nilsson, who calls this imaging system a “parabolic superposition” eye, found that it combines reflection, different lens shapes and slim light-guides that carry light from the lenses to the retina.

While looking at crab eyes that had been in the dark, Nilsson accidentally discovered the system, which he says may have remained hidden from other scientists because studies are ordinarily



Above, two compound-eye models, seen here from the side, either use just one type of cylindrical lens (A) or lack lenses altogether and simply rely on reflection to focus light (B). But the parabolic superposition eye (C) uses a collection of lenses and light-reflecting structures. As shown in the cross-section photomicrograph at right, the newly discovered eye contains cylindrical lenses held inside crystalline cones.



done in the light. “If you look at these eyes just anatomically [structurally] and look at them in ordinary light, they all act as ordinary compound eyes,” he says. But when using dark-adapted eyes, Nilsson noted that different units did not process light as expected – suggesting an unknown mechanism was responsible.

In a commentary accompanying Nilsson's March 3 NATURE article, Michael F. Land of the University of Sussex in Brighton, England, says the novel eye is so difficult to decipher be-

cause of its “real deviousness” in bending light differently in different planes.

Such eyes probably exist only in crustaceans and insects, says Nilsson, who suspects the system evolved because it was more efficient in collecting light in darker environs. Although previous imaging systems found in animals have been translated into fiber optics and X-ray telescopes, Nilsson says it is too early to tell whether the parabolic superposition model will likewise illuminate the field of optics. — D.D. Edwards

## New name and identity for mysterious Epstein-Barr syndrome

Faced with confusion and controversy about the definition and cause of chronic Epstein-Barr virus syndrome, a group of 16 physicians and researchers from around the United States has published a working definition of the mononucleosis-like illness, renaming it chronic fatigue syndrome. By doing so they hope to begin finding out if this is one disease or many diseases and what might be causing it.

In 1985 medical researchers first made a case for a connection between Epstein-Barr virus and a mysterious collection of symptoms – including fever and persistent fatigue – which seemed unconnected to any specific illness. Since then, extensive media coverage has led to wide interest in the virus, even as physicians and researchers have become more skeptical about whether the syndrome is a discrete disease. Some doctors have called it a “fad” disease.

“A lot of people were diagnosed in error,” says one of the researchers, medical epidemiologist Gary Holmes of the Centers for Disease Control in Atlanta. Doctors were mistakenly under the impression that a diagnosis of Epstein-Barr syndrome required only a non-specific illness and a positive test

for the virus, says Holmes.

The authors of the new definition, which is published in the March ANNALS OF INTERNAL MEDICINE, point out that while there seems to be some correlation between the syndrome and Epstein-Barr virus, the virus is not found in all people diagnosed with the syndrome, and there are equally strong or stronger associations between the syndrome and other viruses, such as herpes simplex and measles viruses.

Furthermore, an estimated 90 percent of the adult U.S. population harbors the Epstein-Barr virus and most of these never become ill, according to psychiatrist Leonard Zegans of the University of California School of Medicine in San Francisco, a coauthor of the report. “There's a real question about whether this has an organic basis or whether it's a variant of depression,” he says.

The working definition states that a diagnosis of chronic fatigue syndrome can be made only when the physician notes persistent fatigue over six months. The patient should have no prior history of these sorts of symptoms, and the physician must rule out infections, parasites, endocrine diseases, AIDS and other diseases that

might cause similar symptoms.

In addition to these major criteria, the patient must report at least eight of 11 symptoms that persist or recur over six months: a mild fever, a sore throat, painful lymph nodes, general muscle weakness, muscle discomfort, fatigue for more than 24 hours after light exercise, headaches, joint pain without swelling, depression or other neuropsychological complaints, sleep disturbances and development of the initial symptoms over a few hours to a few days. The diagnosis can also be made if the patient reports six of the 11 symptoms and the physician observes at least two of three physical signs: a low-grade fever, inflammation of the pharynx and noticeably swollen lymph nodes.

The definition is intended mostly as a restrictive diagnostic tool for researchers so that they can study only the most clear-cut cases and maximize the chance of finding a causative agent.

“In order to identify a disease agent you have to have a clear clinical syndrome,” says Zegans. “Once you answer the question of whether there is a phenomenon, then you can begin to ask the question of what causes the phenomenon.” — C. Vaughan