Astronomy

Ron Cowen reports from Madison, Wis., at a meeting of the American Astronomical Society

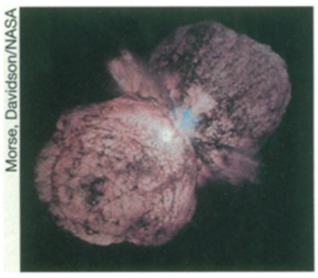
New light on an explosive star

In 1840, a dim star 8,000 light-years from Earth suffered a titanic outburst and for more than a decade reigned as the second brightest star in the southern sky. Flaunting a pair of nearly mirror-image, dusty gas clouds that ballooned into space in opposite directions, the supermassive star known as Eta Carinae has fascinated astronomers ever since (SN: 2/2/91, p. 78).

Now, the Hubble Space Telescope has taken the sharpest pictures to date of this star and its expanding, lobe-shaped clouds. Sophisticated image processing reveals cloud structures as small as 16 billion kilometers across, roughly the diameter of our solar system. Odd radial streaks and the distribution of dust show up in striking detail.

Yet one feature stands out from all the rest, note Jon A. Morse of the University of Colorado at Boulder and Kris Davidson of the University of Minnesota in Minneapolis. Violet light emanates from a disk that encircles the star and is sandwiched between the lobes. This disk—unlike the lobes—apparently contains relatively little dust, which would absorb the violet light.

Morse suggests that the small amount of dust in the disk scatters light from Eta Carinae toward Earth, giving researchers a peek at the core of this heavyweight star. Observations of this scattered light may reveal why Eta Carinae, as well as some other stars, have ejected lobes or other bipolar structures.

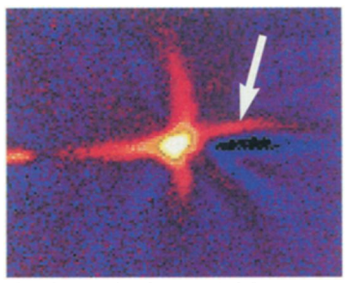


Morse, Davidson/NASA

Hubble image shows lobe-shaped clouds cast out by Eta Carinae. Violet light emanates from the disk between the lobes.

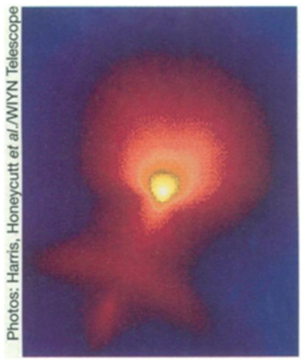
More news about Hyakutake

Comet Hyakutake has faded from view, but astronomers continue to analyze their myriad observations of this icy wayfarer. Using the WIYN Telescope atop Kitt Peak near Tucson, Walter M. Harris of the University of Wisconsin-Madison and R. Kent Honeycutt of Indiana University in Bloomington report a mysterious, arclike feature in the comet's tail. Observers in Europe saw the same feature, which has not been observed in other comets.



Jet (arrow) of material from Hyakutake points sunward.

Michael R. Combi of the University of Michigan in Ann Arbor says he is testing a model in which the arc represents a collision between gas recently emitted by Hyakutake and gas previously ejected by the comet.



Photos: Harris, Honeycutt *et al.*/WIYN Telescope

Harris and Honeycutt also report that as Hyakutake tumbled through space, rotating once every 6.5 hours, it sprayed jets of icy particles like a lawn sprinkler. Observations with WIYN show that the jets switch on and off as sunlight briefly heats successive areas of the rotating comet.

Arclike feature in the tail of Comet Hyakutake.

Food Science

Vitamin A may aid some diabetics

Large doses of vitamin A appear to improve insulin's ability to control concentrations of sugar in the blood, according to a new study. Though conducted in 52 healthy men and women, its findings hold out the prospect that supplements of the vitamin will improve some of the impaired insulin sensitivity that characterizes diabetes. This life-threatening metabolic disorder eventually afflicts about 1 in 20 adults.

Earlier studies found that large doses of another dietary constituent, vitamin E, could boost insulin sensitivity in patients with type II, or adult-onset, diabetes—in one case, a dose of 100 times the recommended daily allowance (RDA). Because this dose increased patients' concentrations of high-density lipoprotein (HDL) cholesterol, the so-called good cholesterol, researchers at the Stanford University School of Medicine decided to look at vitamin A, which also raises HDL cholesterol.

Francesco Facchini and his colleagues administered both the sugar glucose and insulin to each subject, following a night of fasting. To control the amount of insulin available, they also gave each participant a drug to shut down temporarily the body's independent production of the hormone.

When the researchers compared the results of these tests to information on each volunteer's diet, amount of exercise, and medical history, vitamin A consumption, as calculated from the dietary information, indeed correlated with insulin's ability to control glucose. Together with body weight and average exercise, intake of this nutrient accounted for roughly 40 percent of the glucose differences among volunteers, Facchini's team reports in the June AMERICAN JOURNAL OF CLINICAL NUTRITION. In fact, those consuming the most vitamin A (about five times the RDA) exhibited greater sensitivity to insulin than those taking the least (about three times the RDA).

Iodine's role in learning

For decades, physicians have known that extreme iodine deficiency during pregnancy can cause severe mental retardation in developing babies. A study of boys age 9 to 15 now indicates that childhood iodine deficiency can impair not only learning but also motivation to achieve—a barrier to learning not previously associated with this deficiency.

Banarasi D. Tiwari and his coworkers at the Sanjay Gandhi Post Graduate Institute of Medical Sciences in Lucknow, India, focused on 100 boys from villages in eastern India. Though very poor, each child had attended school, where he had learned to read and write. Roughly half of the boys had goiters of varying grades, a sign of severe iodine deficiency.

Compared to boys their age from neighboring villages who had no overt signs of the deficiency, boys from the goiter-prone areas proved slower learners on all tests except the recall of verbally relayed information, Tiwari's group reports in the May AMERICAN JOURNAL OF CLINICAL NUTRITION. Children from the severely deficient communities also improved less after practice drills than did boys from the other villages.

Although children from the more iodine-deficient villages may have suffered some nerve damage during earlier development that continues to affect their ability to learn, Tiwari's team notes that older children often performed more poorly than younger ones—suggesting a cumulative impairment.

The most dramatic difference between the two groups, the Indian scientists report, was a strikingly lower motivation to achieve in those from the most iodine-deficient villages.

"[T]hese abnormalities may prevent millions of children from achieving their full potential, even if learning opportunities are made available," the researchers conclude. Seafood and iodized salt can supply the iodine needed for normal function of the thyroid, whose hormones play an important role in cognition and learning.

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