shops to buy and sell gold. The airport services hundreds of small planes and helicopters, which are used as air taxis to ferry the gold panners from Boa Vista into the jungle, which is dotted with clandestine air strips. Everything, including guns, ammunition, prostitutes, and drugs, is bought and sold with either gold or U.S. dollars. The miners compound their impact on the environment by using mercury to extract the gold from the stream and river beds.

The miners bring with them not only mercury and a hunger for gold, but tuberculosis, influenza, malaria, measles, and venereal diseases. "Many Indians have died in the areas where the miners are," says Dom Aldo Mangiano, Bishop of the Diocese of Roraima. But, says Saffirio, "It is not just the Indians. The poor prospectors, they die like flies, too." The miners are killed by the dangerous work, or by disease, or by fighting among themselves.

"It's like the Wild West down there," says Hames, who with Saffirio authored a paper on the dramatic changes that occurred among Yanomamö Indians living near the newly constructed Northern Perimeter Highway in Roraima. Many Yanomamö along the road now dress in Western clothes, smoke cigarettes, buy their hammocks, shoot guns, wear watches, and use outboard motors in aluminum canoes. Some stop using their kinship names and say they are no longer proud to be Yanomamö.

In the fall of 1987, at least one miner and four Yanomamö were killed in an exchange. The Brazilian government ordered outsiders, including missionaries, journalists, and anthropologists, out of the area. Missionaries and anthropologists were accused of inciting the Yanomamö to violence. During the year that the priests and scientists were kept out, the miners kept coming into the region. "The government has lost control of the area," says Saffirio, who was recently allowed to return to his mission in Indian territory.

A spokesman for the Brazilian embassy in Washington says that the government intends to remove miners from the Indian lands, but concedes that enforcement is difficult over such a large area. The government is also trying to restrict the use of mercury. The Brazilians are committed to developing the resources of the Amazon.

"The questions of fierceness are now meaningless," says Saffirio. "The fierceness of the Yanomamö is nothing to compare with the terrible and powerful violence being done to them by the outside world."

■ WILLIAM BOOTH

Eric Stover of AAAS Office of Scientific Freedom & Responsibility did Spanish and Portuguese translations for this article.

And Now for a Real Crab Nebula . . .

The mysterious object shown here, serendipitously discovered during a routine survey and previously known only as the star He2–104 in the constellation Centaurus, has now been given the inevitable name of "The Southern Crab": unlike its famous namesake in the northern sky, which is an imaginatively named supernova remnant in the constellation Taurus, it is the very image of a crustacean.

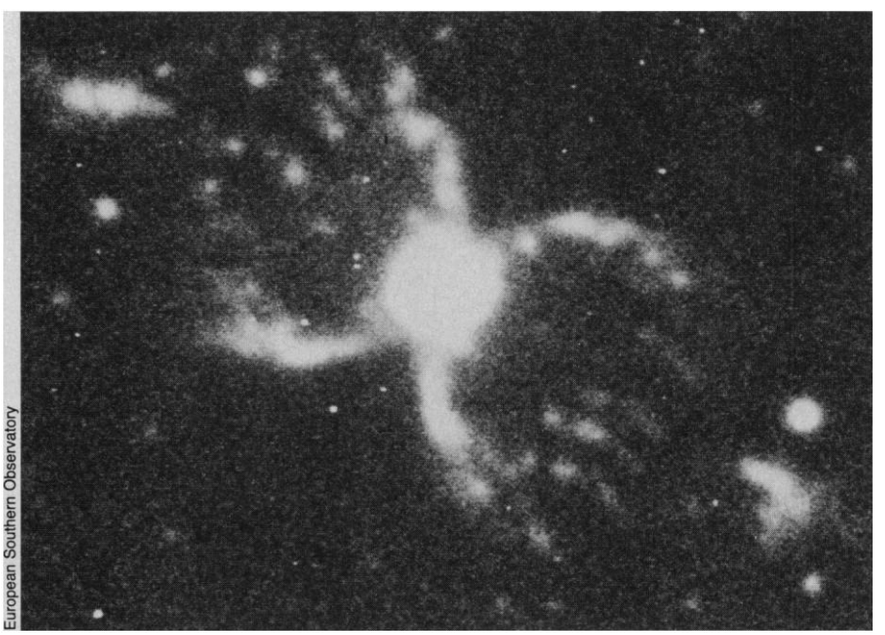
"We're still discussing our interpretation," says Colin Aspin of the United Kingdom Joint Astronomy Centre in Hawaii, who discovered the object along with Julie H. Lutz of the Washington State University and team leader Hugo E. Schwarz of the European Southern Observatory. One clue comes from spectra of the crab, which suggest that the bright central component is a "symbiotic binary": a hot, compact star in close orbit around a cool, distended red giant star. Such binaries are fairly common, says Aspin, although no others are known to have these appendages.

In trying to understand what makes this binary different, the three astronomers start from the fact that a red giant is just a normal star that has exhausted its supply of hydrogen, and that is going through a brief period of expansion before subsiding into a cosmic cinder. At its maximum, such a giant will spend a few thousand years emitting a dense, smoky "wind" of gas and dust, which expands into interstellar space to form one of the delicate, glowing bubbles known as a "planetary nebula."

To understand how such a bubble could have been distorted into a crab, says Aspin, assume that, before the red giant began to emit a wind, it had already expanded so much that its outer layers began to spill across to its compact companion. If so, the orbital dynamics may very well have swirled the material into a huge disk surrounding both stars, he says. Once the wind did start, moreover, such a disk would have naturally channeled it into back-to-back streams flowing out along the path of least resistance: the axis. These streams would then tend to expand as *two* bubbles, one above and one below the disk. And this is precisely what we seem to be seeing: the legs of the crab are just the edges of the bubbles.

The three astronomers are the first to admit that this model does not explain everything. Between both pairs of arms for example, there are faint, curving lines. What are they? To the upper left and lower right, furthermore, there are two elongated blobs of material that are moving away from the center at roughly 100 kilometers per second. They seem to have been shot out of the center by narrow, high-speed jets. Does this mean that something has focused the billowy red giant wind into a pair of back-to-back cosmic fire hoses? Or has some new energy source been activated?

■ M. MITCHELL WALDROP



European Southern Observatory

The Southern Crab.