

SCIENCE NEWS®

The Weekly Newsmagazine of Science

Science Service Publication
Volume 146, No. 6, August 6, 1994

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SCIENCE NEWS (ISSN 0036-8423) is published weekly on Saturday, except the last week in December, for \$44.50 for 1 year or \$78.00 for 2 years (foreign postage \$6.00 additional per year) by Science Service, Inc., 1719 N Street, N.W., Washington, DC 20036. Second-class postage paid at Washington, DC, and additional mailing office. POSTMASTER: Send address changes to SCIENCE NEWS, P.O. Box 1925, Marion, OH 43305. Change of address: Four to six weeks' notice is required — old and new addresses, including zip codes, must be provided.

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Editorial and Business Offices:
1719 N St., N.W., Washington, DC 20036
(202-785-2255)

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Subscription Department:
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Letters

Size, density of black hole

"Repaired Hubble Finds Giant Black Hole" (SN: 6/4/94, p.356) states that evidence now confirms the existence of "a black hole with a mass of 2.5 to 3.5 billion times that of the sun . . . occupying a space no larger than the solar system."

By my calculations, the solar system has a volume over 400 billion times larger than the sun. This would make the black hole far less dense than the sun, not the many times more dense it should be.

Peter Jeming
Seattle, Wash.

According to my calculations, any black hole is probably much, much smaller than our solar system.

A.E. Stinson
Homestead, Fla.

Holland Ford, the principal investigator on the black hole finding, notes that the usual way to define the size of a black hole is by a Schwarz-

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Cover: Enlargement of a false-color image taken by the Hubble Space Telescope shows filaments of gas blasted into space when a massive star exploded as a supernova. The filaments, part of a structure known as the Crab nebula supernova remnant, are far more complex than astronomers had thought. These and other new data should enable scientists to model the structure of the Crab more reliably and to understand better the chemical legacy of the exploded star. (Image: John J. Hester, Paul Scowen, Univ. of Ariz./NASA)



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schild radius. This radius is the distance at which any approaching light will be permanently trapped inside the black hole. In the case of M87, it corresponds to a distance no greater than that of the solar system — something on the order of 70 astronomical units, a little less than twice the distance to Pluto.

Ford notes that inside that radius, the black hole might well have infinite density. He thinks of the black hole as a singularity within the Schwarzschild radius, a tiny point of mass that has unimaginably high density. From that point of view, it's incorrect to calculate a density based on the volume of space that the black hole's Schwarzschild radius occupies. — R. Cowen

Lauds early language theory

It seems to me that it is the organization of our motor nerves rather than the shape of our throats that gives us the ability to speak ("Talking Back in Time," SN: 6/11/94, p.376). If a crow or a parrot can do a reasonable imitation of modern human speech sounds, it seems likely that a Neandertal child would have been able to.

Humans use an enormous variety of sounds to make speech. Khoi-san, Hawaiian, and Kwakiutl sound very different from each other. Perhaps "Mousterian" sounded a bit different from English and had fewer or different vowels, but it could have been just as sophisticated.

The early origin of language makes sense to me. It is hard to see how such a complex ability could have arisen in a mere 100,000 years.

Robert Engstrom-Heg
Oneonta, N.Y.

Shorts subject

The possibility raised by readers Wiese and Easton that testicular cancer may be related to the increased testicular temperature in wearers of jockey shorts (Letters, SN: 5/14/94, p.317) is real indeed. In the late 1960s a short item appeared in the American Medical Association publication *Today's Health*, reporting a convincing Swedish study which suggested precisely this relationship.

Karl H. Raab
Nancy Cedex
France

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