

## SCIENCE NEWS OF THE WEEK

# A Jet Black Hole in a Radio Galaxy

Astronomers generally believe that physical processes involving enormous amounts of energy are going on in the centers of galaxies. Evidence to support such a view is plentiful. The nuclei of galaxies look brighter than the outer regions in all ranges of electromagnetic radiation. Radio observation also reveals that many galaxies are associated with large lobes of radio-emitting matter that go far beyond the confines of the visible galaxy. Simply, the geometry of these lobes lends plausibility to the suggestion that they consist of material pumped out of the nucleus of the galaxy by whatever is going on there.

A number of theorists have suggested that the center of activity in the nucleus of a galaxy is a giant black hole, one so massive that its gravitational field dominates the center of the galaxy, compels stars to orbit around it, tears stars apart and swallows them whole (SN: 2/19/77, p. 121). Now that suggestion is supported by three observers, A. C. S. Redhead, M. H. Cohen and R. D. Blandford of the California Institute of Technology. They conclude, as a result of radio observations of the galaxy NGC6251, that the phenomena found in the nucleus of that galaxy can best be explained by the presence there of a black hole with a mass approximately 100 million times the sun's, or more. Their report is in the March 9 NATURE.

Redhead, Cohen and Blandford used radio telescopes at three observatories, the Haystack Observatory in Westford, Mass., the National Radio Astronomy Observatory in Green Bank, W.Va., and the Owens Valley Radio Observatory in Big Pine, Calif., as a long-baseline interferometer to observe NGC6251 (and several other radio sources) at a wavelength of 2.82 centimeters. Combining the signals received at the three telescopes yields much finer detail than could be obtained through the use of any single one, and such very long baseline interferometry is a standard technique nowadays for examining the fine structure of the radio-emitting parts of galaxies and quasars.

The observations reported in the March 9 paper concern the small-scale structure of the radio-emitting matter in the nucleus of NGC6251. The most striking feature is a jet of matter that seems to be emerging from the nucleus. The axis of this jet lies along the same line as the axis of two large radio-emitting lobes that lie outside the visible part of NGC6251 on either side of the galaxy. It seems likely that this jet in the nucleus and the two large lobes that lie in the same line are produced by one and the same phenomenon, something in the center of the galaxy that pumps out matter along that line.

The character of the radio waves emit-

ted by the jet and its geometry lead the three observers to make some assumptions about the dynamics of the jet, and then to calculate the probable physical conditions in the region where the pump-

ing takes place. They conclude that these are likely to be "conditions that may exist around an accreting black hole of mass [approximately or greater than  $10^8$  solar masses]." □

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## Skin test announced for breast cancer

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A skin test for breast cancer, similar to the test commonly used to detect tuberculosis, was announced by George F. Springer at last week's American Chemical Society meeting in Anaheim, Calif. The test is highly reliable for detecting all stages of breast cancer, and differentiates benign from malignant growths.

Springer, a physician at Northwestern University's Evanston Hospital, developed the breast cancer skin test during studies of the human blood group NM antigens. These NM antigens are protein markers on the surface of red blood cells. They form a second major system (after the A-B-O-system) of typing blood.

Springer and co-workers P. R. Desai, S. M. Murthy and E. F. Scanlon found that the immediate biochemical precursors to the formation of M and N antigens are the so-called Thomsen-Friedenreich or "T" antigens, and further, that these T antigens can be found in a reactive form in malignant breast tumors, but not in benign ones or in healthy human tissues. Apparently, the normal NM formation pathway is incomplete, stopping prematurely at T antigen formation.

Since red cells carry either N or M marking proteins, no anti-M or anti-N antibodies can be found circulating in the blood. Anti-T antibodies, on the other hand, are found in the blood, since the T antigen is merely a precursor in the formation of M and N in the healthy body and is not available to the immunologic marking system. These anti-T antibodies are apparently supplied by intestinal bacteria, such as *Serratia marcesans*, which carry it on their cell surfaces.

Springer's team found that the formation of anti-T antibodies is depressed in patients with malignant breast tumors. After surgical removal of diseased breast tissue, the anti-T antibodies rebound, and can become depressed again after tumor metastasis occurs. This indicates that the tumor tissue itself is involved in the antibody depression, and that T antigen must occur in an uncovered form only in breast carcinoma. There is preliminary indication, however, Springer says, that some T antigen may be shed into the blood.

The team found that by injecting additional T antigen into women with breast cancer, the women's white blood cells

react and cause the formation of red, hardened skin patches at the site of injection. This cell-mediated immune reaction does not occur in women with normal anti-T antibodies and without reactive T antigen. In tests conducted at Northwestern Hospital in 1974, 248 women suspected of breast cancer were injected with T antigen. Of them, 108 showed positive to the skin test, and malignant tumors were later confirmed by biopsy; 100 of those showing negative reactions were found to have benign tumors, and 40 negatives showed no evidence of tumor formation. In only two of the 248 cases were false positives recorded, that is, women with benign tumors showing positive skin tests. Independent tests were made at Memorial Sloan Kettering Cancer Center in New York, during 1975 and 1976. They confirmed the breast cancer skin tests to be 95 percent reliable.

A major pharmaceutical house, which insists on anonymity, has begun production of a commercial test preparation to be made available to physicians and the public "as soon as possible." In the mean time, Springer and colleagues are exploring further possibilities for treatment and detection, including using radio-labeled anti-T antibodies to attack malignant tumors, and detecting T antigens circulating in the blood. A reliable system for measuring T antigens in the blood could conceivably make the skin test itself obsolete before it has passed the long series of criteria for government approval, that lie ahead. □

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## U.S. maximum safety DNA lab set to go

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Recombinant DNA research succeeds biological warfare experiments in building 550 at Fort Detrick in Frederick, Md. After a \$250,000 renovation and equipping, and a legal battle (SN: 3/4/78, p. 133), the glove boxes are ready for action. "I am looking forward with great eagerness to getting this underway," says Malcolm Martin, one of the two scientists scheduled to do the first experiments in the facility.

While a group of protesters from the Peoples Business Commission staged a silent vigil, reporters last week toured the