



TEMPERAMENT TEST IN FOCUS—This is the in-focus print of the photograph shown on page 170. For camera fans, the picture on this page is made first. Then the bellows of the enlarger is extended to throw the image out of focus for the test print.

are separated somewhat according to their charges. This separation of charge is due to the slight magnetic field.

Dr. Hoyle's theory would also apply to the sources of radio noise in Cassiopeia and the Crab nebula.

Science News Letter, September 12, 1953

QUESTIONS

GENERAL SCIENCE—What are three definitions of a calorie? p. 166.

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MEDICINE—Why should doctors learn about folk cures? p. 166.

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PSYCHOLOGY—How can what you see tell what you are? p. 170.

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PUBLIC SAFETY—What are the objections to use of "bug" deflectors? p. 164.

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SURGERY—How can cancer patients be spared useless operations? p. 168.

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Photographs: Cover, pp. 170 and 175, Fremont Davis; p. 163, U. S. Air Force; p. 165, Sperry Gyroscope Co.; p. 167, Picker X-Ray Corporation; p. 176, Semco Research, Inc.

RADIO ASTRONOMY

Collisions of Galaxies

► **GIGANTIC COLLISIONS** of galaxies may cause the powerful radio waves reaching earth from outer space. Such galactic clashes result in violent motion of the tenuous gas between the stars.

Dr. Fred Hoyle of St. John's College, Cambridge, Eng., working temporarily at the Dominion Astrophysical Observatory, Victoria, B. C., upholds this theory of the origin of cosmic noise.

Drs. Walter Baade and Rudolph L. Minkowski of the Mount Palomar Observatory, Calif., have recently discovered in Cygnus,

the swan, one source of radio noise from outer space that appears to be two galaxies in collision. While the stars of one galaxy are passing between the stars of the other, the extremely thin gas between them must be stirred up into very violent motion, thus generating the powerful radio waves.

The two galaxies are rushing at each other at a velocity of perhaps 1,800 miles per second, Dr. Hoyle believes. Such a very high velocity probably means that the ions, or electrically charged particles of which the neutral gas is composed, have a high temperature. It is this high electron temperature, Dr. Hoyle says in *Nature* (Aug. 15), that causes the radio wave radiation.

The two galaxies in collision are surrounded by a great gas cloud, perhaps 200,000 million million miles across at an electron temperature of 100,000,000 degrees absolute. Radiation from such a source, Dr. Hoyle calculates, would be at least as intense as that which has been found coming from the source in Cygnus. Such radiation would be sufficient to be detected even if the source were so far away that it was beyond the range of the greatest optical telescopes.

The rate of radiation is very much increased because the electrically charged particles are not found evenly distributed, but

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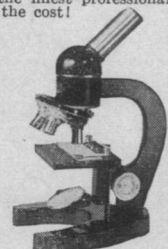
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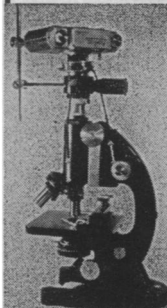
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