PANORAMA

When was the Crab Nebula Created?

The Crab Nebula, which houses one of the first pulsars discovered, is the product of a supernova, the explosion of a star several times the sun's mass. The Chinese recorded the new star and the usual date, based on the Chinese observations, is about 4 July, A.D. 1054. What is a bit unusual about that is why are there no other observations of the supernova?

Three astronomers from Case Western Reserve University think that they have found the answer.[1] Their abstract of a paper presented at the Ohio Association of Science reads as follows:

> In this paper we present a sequence of astronomical events which minimize the apparent conflicts among various 11th century references to celestial events associated with the appearance of the supernova of 1054 A.D. We find that virtually all conflicts can be removed if the explosion date for the supernova is several months earlier than the commonly noted date of July 4th. The earlier date allows a number of recently noted European references to be connected to a stellar event prominent in the evening sky of April and May. An explosion date of April or early May of that year combined with the Chinese observations suggest that the phenomena was a Type Ia supernova at the present location of the Crab Nebula. The presence of European references to an evening event only serves to heighten the mystery surrounding the lack of references to the subsequent appearance of the supernova in the morning sky during June and later. This supports the view that the absence of late European records of the morning event may be associated with the Eastern Schism of 1054 A.D.

1. G. W. Collins II, W.P. Claspy, J.C. Martin, 1999. "A Reconsideration of the Historical References to the Supernova of 1054 A.D.," *Ohio Journal of Science,* **99**(1):A-30.

Was Tycho Brahe Murdered?

The following was from a web page sent your editor from Marshall Hall. The original article was written in 1996 by Jan Pallon of Sweden. More I do not know.

The astronomer Tycho Brahe (1546-1601) garnered a reputation as the keenest observer before the invention of the telescope. His observations were so good that Kepler was able to detect that the basic motion of the planets was not circular (as Copernicus and Ptolemy had assumed), but instead was elliptical.

Tycho made his careful observations intending to discredit Copernicus's heliocentric model. On his death bed he made his protegé, Kepler, promise to present his observations in Tycho's own geocentric model (see front cover). Although Kepler did present Tycho's model, he also included a disclaimer distancing himself from his master's geocentric model.

Although Tycho was a favorite of the Danish king, Frederick II, and after leaving his protectorate for the protectorate of the emperor Rudolf in Prague, Tycho was not very popular. He had a bad temper because of which he lost his own nose in a duel. He is also characterized as arrogant and proud. Yet in the last year of his life he softened considerably, so much so that it puzzled Kepler. (This is partial evidence that he may have come to faith in Christ, the only major astronomer of the time to do so.) Now new evidence has surfaced surrounding the circumstances of his death.

While in Prague, Tycho attended a banquet. Not surprisingly after several hours of eating and drinking, Tycho needed to let out water, but it was impolite to simply leave the emperor's banquet for such a reason. So Tycho suffered and did not leave until it was too late. He developed a fever and attacks of giddiness and finally died on 24 October, 1601. Most historians think he died of urinary poisoning; that his bladder burst.

About three or four years ago, strands of his beard, which had been stored in Prague, were analyzed by atomic absorption analysis for lead, mercury, and arsenic, by the Laboratory of Forensic Chemistry in Copenhagen. The lab found high levels of lead and, especially mercury. Additional strands were sent to Lund University's nuclear microprobe facility in Sweden, which device allows three-dimensional analysis of the the concentrations of the poisonous chemicals.

One of the strands, which still had the hair root, showed a very high local concentration of mercury (Hg). The mercury was concentrated close to the hair root. Scanning across the hair showed further concentration in the middle, where the blood flowed, so that the source of the mercury must have been the blood. If the hair grew up to the time the hair was removed from the body, the mercury entered Tycho's body no more than a day before his death.

Now we do know that Tycho was working with elements such as mercury and arsenic in his chemistry and pharmaceutical experiments, but that in itself would not explain the sudden rise of mercury at the root of the hair (exposure of less than one hour). There are three possible explanations. He may have tried some concoction in the hope of curing his sickness, or he may have accidentally ingested it, or he was murdered. (It is unlikely he committed suicide because there were more pleasant ways at his disposal.

Hubble Refines Hubble Constant

In a May 25, 1999 press release, NASA reported that one of their teams refined the value of the Hubble constant, the rate at which the universe expands in the region about the Milky Way. The values usually published range from to 25 to 100 kilometers per second per megaparsec. This gives an "expansion age" for the universe of 8 to 20 billion years. From the press release:

> [The] spiral galaxy NGC 4603 [is] the most distant galaxy in which a special class of pulsating stars called Cepheid variables have been found. It is associated with the Centaurus cluster, one of the most massive assemblages of galaxies in the nearby universe. The Local Group of galaxies, of which the Milky Way is a member, is moving in the direction of Centaurus at a speed of more than a million miles an hour under the influence of the gravitational pull of the matter in that direction.
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> ... Only the very brightest stars in NGC 4603 can be seen individually, even with the unmatched ability of the Hubble Space Telescope to obtain detailed images of distant objects. Much of the diffuse glow comes from fainter stars that cannot be individually distinguished by Hubble. The reddish filaments are regions where clouds of dust obscure blue light from the stars behind them.

This galaxy was observed by a team affiliated with the HST Key Project on the Extragalactic Distance Scale. Because NGC 4603 is much farther away than the other galaxies studied with Hubble by the Key Project team, 108 million light-years, its stars appear very faint from the Earth, and so accurately measuring their brightness, as is required for distinguishing the characteristic variations of Cepheids, is extremely difficult. At this distance some non-variable stars may by chance appear to grow brighter and fainter in the same fashion as Cepheids due to the physical impossibility of perfect measurements of such dim objects.

Determining the distance to the galaxy required an unprecedented statistical analysis based on extensive computer simulations. Researchers found 36-50 Cepheids and used their observed properties to securely determine the distance to NGC 4603. These measurements indicate that when the expansion of the universe and the motion of the Local Group are accounted for, the Centaurus cluster is very nearly at rest compared with the surrounding regions. It is part of the cause of the rapid motions in the nearby universe, rather than being strongly pulled by other concentrations of matter. Observations of distant Cepheids such as those in NGC 4603 also help astronomers to precisely measure the expansion rate of the universe.

The conclusion of the team was that the Hubble constant is 70 km/sec/Mpc, a value which leads to an uncomfortably young universe as far as evolutionary theory is concerned. Evolutionists, particularly evolutionary astronomers, feel more comfortable with 25 to 30 since then the "oldest" stars are younger than the universe, at least.