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The comet Hyakutake

We reproduce on the cover of this issue a beautiful picture of the comet Hyakutake taken by 2.34 m Vainu Bappu Telescope at Kavalur. The comet was discovered by the amateur astronomer Yuji Hyakutake on January 31, 1996. Ms R. Vasundhara, who is responsible for the overall coordination of the activities on this subject at the Indian Institute of Astrophysics (IIA), Bangalore, writes a fascinating article (**page 1047**) about this comet. Hyakutake is not a new comet for us – so she says – its last perihelion passage occurred 9000 years ago! It is one amongst the few comets which have come very close to earth – it was only 15 million miles away on March 25, 1996. There have been only 16 comets in the last 300 years which have come closer than this. This comet has been the subject of very intensive studies. Its rate of rotation has been measured (to be nearly 6.25 h). The polarization of the light emitted by it at different wavelengths, its spectrum in the visible and infrared, its X-ray emission, its deuterium to hydrogen ratio and many other properties have been investigated. Results of the studies by IIA have been briefly mentioned, but detailed papers on these will appear elsewhere. It has also been studied by the Hubble Space Telescope.

Comets have always been big news. Pictures of one of the rarest events in recent times – the crash of the Shoemaker–Levy on Jupiter – were reproduced in *Current Science* (1994, **64**, 142). The discovery of a comet in 17th and 18th centuries brought instant fame to its observer. But many errors were made in those times as little patches of light in the sky were often mistaken for comets. The first catalogue of these permanent patches – nebulae (which Kant found so fascinating) was made between 1760 and 1768 by Charles Messier, not because he considered these important but more to warn comet-seekers that these were not comets. Messier himself discovered more than 15 comets and became famous; however his fame today is for a different reason. To the great William Herschel who felt that nebulae were important, the Messier catalogue proved invaluable.

Where do comets come from? In 1950 the doyen astronomer, Jan Oort (see *Current Science*, 1993, 25th July, special section) suggested that there must exist a spherical cloud reaching out from 20000 AU to about 150000 AU (1 AU, Astronomical Unit is the mean distance of the earth from the sun – 1.5×10^8 km) surrounding the solar system. This cloud may have 200 billion potential comets. The speculation of the existence of the 'Oort cloud' was based on the observed frequency distribution of the elongated semi major axes of the orbits of the long period comets before they enter the perturbing influence of the planets (J. C. Bhatt, *Current Science*, 1993, **65**, 145). However, the actual presence of the Oort cloud has not yet been observationally established.

Other astronomers like Edgeworth and Kuiper felt that there is yet another belt (now called the Kuiper belt) extending beyond Neptune (30 AU) and Pluto (39 AU) to a few 100 AU which may be the source of comets with periods less than 20 years. In 1992 Ms Jane Luu, a Vietnamese born astronomer, using a CCD camera was able to distinguish a faint patch of light of diameter of about 125 miles much beyond Pluto at about 44 AU right in the middle of where the so-called Kuiper belt was predicted to be. This was designated 1992 QB1. Later many such bodies have been identified by her and others. With the sophisticated image processing of the Hubble Space Telescope data, the existence of the Kuiper belt (the same discovered by Luu) has been established. It seems to be a disc-shaped swarm of cometary bodies and its discovery is another large addition to the solar system. There are many other questions about comets which have yet to be answered. Why are the Japanese the foremost in discovering comets? Why are so many women attracted to astronomy and that too to comets?

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