Astronomical autopsies

One of the most frustrating subjects in astrophysics is the supernova — none has been seen in our Galaxy since before the invention of the telescope. Studies must rely on the wispy remains of these exploded stars, remains which are often elusive and difficult to locate. A long standing student of supernovae, Dr. Sidney van den Bergh of NRC's Dominion Astrophysical Observatory, in Victoria, B.C. has proposed a new classification system for young supernova remnants to aid in their study.

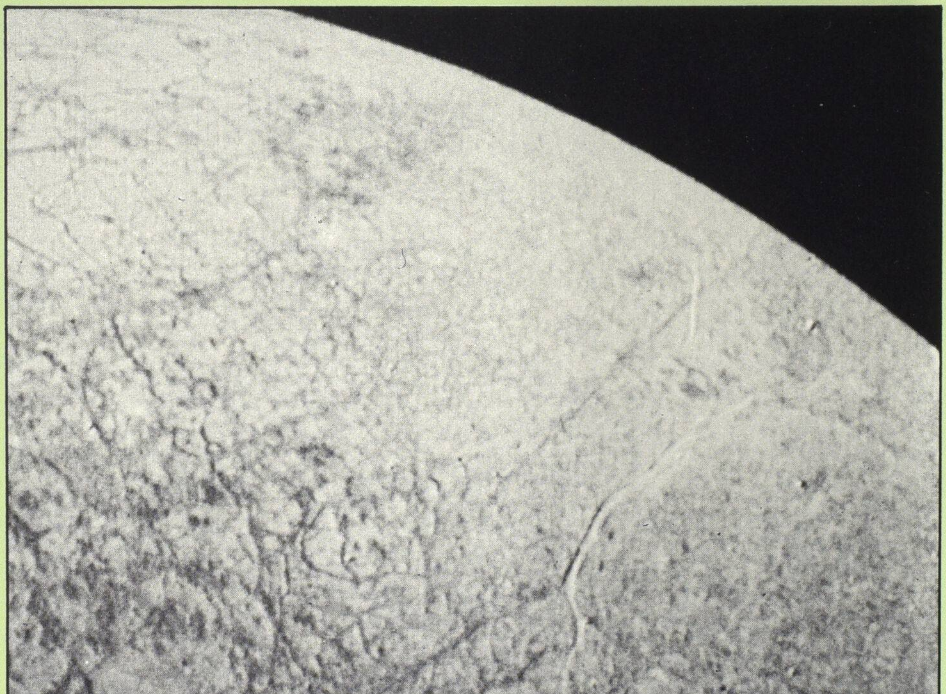
Until now, supernova remnants were graded by the probable size of the star that produced them. Type I SNR's were produced by stars about 4 times larger than the sun, while the Type II were 10 times larger than the sun. But this classification system relies strongly on conjecture since so little is known of the conditions leading to a supernova.

Van den Bergh's proposed groups are based on the radiation signals we

receive from these remnants. Each produces radio waves and x-rays, but not all are optically visible. By balancing the signals we receive from them against what is known about certain chemical elements in excited states, he has established three classifications for remnants.

The first class typified by a well-known remnant, Casseopia A has the form of arched gas plumes and produces strong oxygen signals. The second is represented by the most familiar supernova remnant, the Crab Nebula, which is a rapidly dispersing cloud of gas driven by a central pulsar — a neutron star emitting a narrow band of radio signals. Many of the supernovae of our Galaxy exhibit this structure and three have recently been found in the nearby Magellanic Clouds. Finally, there are the "heavies" — nearly perfect spheres of expanding gas that contain large amounts of iron. Iron is considered the heaviest element a star can generate through the nuclear fusion process, and is believed to be produced during the supernova explosion.

Although van den Bergh concedes his classification system flies in the face of current identification ideas, his proposal should provide a foundation for further supernova studies. Until astrophysicists have the opportunity to witness a supernova in our Galaxy with modern instruments, theories concerning them will remain at least partially conjectural.



NASA

Europa, the solar system's best maintained skating rink resurfaces itself automatically.

Europa's global sea

Europa, smallest of Jupiter's four Galilean satellites, appears to share a feature with Earth previously thought to be unique to our planet — it may possess liquid water. Allan Cook, visiting scientist at NRC's Herzberg Institute of Astrophysics, made the discovery during a photometric analysis of Europa. The study not only resolves one of the questions of the moon's composition, but also raises a scientific controversy normally confined to the realm of fiction.

When the Voyager space probes cruised through the Jovian system, they glanced backward for "over the shoulder" views of Jupiter and its family of satellites. (The images revealed lightning and auroras on the planet, as well as a ring backlit by the sun.) Among the pictures taken of Europa, Cook detected an anomaly that computer enhancement exhibited as a plume 100 km high and 200 km across. Europa's neighbour, Io, had previously displayed plumes, produced by active volcanoes. But Europa, dubbed the "billiard ball of the solar system" for its bright,