The Discovery of Binary Stars

The naked eye observations show stars as point sources of light. With the advent of telescopes in the post-Galileo era it became possible to resolve a few single stellar images into doublets, indicating that stars may occur in pairs also. The first such observation was made by Riccioli in 1650 for the binary star ***Mizar*** (ζ – ***Ursae Majoris***). The credit for the observation of the closest binary system to us, in the α - ***Centauri*** star, however, goes to the French astronomer Richaud who made the observations in Pondicherry, India. In 1689 this must have been the first known modern astronomical observation from the Indian soil.

Binaries are basically detected in three ways. The first method, that of visual observations as in the above cases, gives us the so-called visual binaries. The visual method is not able to distinguish systems which are very close to each other. In such cases the spectroscopic method helps. As the two stars of a binary system go round each other their spectral lines move back and forth due to the Doppler effect. Thus even though the two member stars cannot be seen separately their combined spectrum can tell them apart. Spectroscopic binaries like these began to be spotted from 1889 when E.C. Pickering found that the bright component of the visual binary Mizar is in fact made of two stars.

The third method, that of eclipsing binaries depends on a special location of the binary orbit with respect to us : we should lie in its plane. Then as the stars go round each other they periodically eclipse one another. This causes a variation of their total brightness periodically. In 1670 Montanari detected the first eclipsing binary in the star Algol (β - ***Persei***) by observing a fluctuation in its intensity. This was confirmed by Goodricke in 1782 by demonstrating that the fluctuations are periodic with a 2.86 day period.

Binary stars have proved to be very useful objects for astronomical study. Apart from providing an additional proof that the law of gravitation applies to binary stars, they also show interesting examples of how stars evolve as they interact by one star tidally pulling matter from its companion. With the advent of X-ray astronomy, the discovery of binary X-ray sources added another dimension to these studies, including the exciting possibility of one member of an X-ray binary being a black hole. Further, the presence of a pulsar in a close binary system provides us an excellent laboratory for testing sophisticated effects predicted by theories of gravitation. But all this is for later parsecstones.