METEORITES: THE VICTORIAN PERSPECTIVE
Talk by Dr Bill Birch, Museum Victoria, on Wed 26 April 2006

Dr Bill Birch started his talk with the distribution of meteorites on the Earth's surface and where they are most likely to be found. He then went on to discuss their classification, origin and age before describing some of the impact sites in Australia. The presentation ended with an overview of Victoria's meteorites.

Most meteorites have been found in arid areas and the USA and Northern Europe, reflecting their physical exposure and population density respectively. The majority of them have their origins in the asteroid belt but some can be identified as being from the Moon or Mars from their distinctive composition. Most of the 21 meteorites from Mars have been found on the surface of the Antarctic ice. Strangely, twice as many meteorites reach the Earth's surface in the afternoon and evening as at other times - a phenomenon due to the direction of the Earth's orbit and the effect of gravity.

Meteorites are traditionally classified as iron, stony-iron or stony, the latter making up 95% of all observed falls though the proportion of iron meteorites found is higher because of their unusual and distinctive form. Nearly all the main minerals in meteorites are found on Earth but the minute glassy spheres called chondrules are not. These structures can be composed of a variety of minerals. Thus the terms chondritic and non-chondritic are also used to describe meteorites.

Dating a meteorite is not as simple as one might expect. Some contain ancient pre-solar grains of diamond and silicon carbide from carbon stars and supernovae. The date of meteorite formation can be closely fixed at 4560-4555 million years ago - the creation of the Solar System. There is also the date they broke from their parent body and the date of impact on Earth.

Our speaker went on to talk about impact sites, first assuring us that something size of the asteroid that wiped out the dinosaurs is a once in 100-200 million-year event. Craters tend to be preserved on geologically old crust and Australia has 24 recognised impact sites. The oldest is the Shoemaker structure in WA, dated at 1.6 billion years old. The youngest are the group of small craters at Henbury, NT at 3-4000 years. The largest is Lake Acraman, SA where a crater 85-90 km across can still be traced despite its having been formed in the Precambrian some 600 million years ago. The impact site was on pre-existing red-coloured volcanic rocks and a layer of this material blasted into the atmosphere was incorporated in the ocean sediment at the time. This layer can now be found in Precambrian strata in the Flinders Ranges together with a tell-tale iridium anomaly.

Victoria has 16 known meteorites. Perhaps the best known is the Cranbourne iron meteorite, in fact several pieces in a strewnfield 27 km long. The largest piece, 3.5 tonnes, and first discovered (in 1854), is in the Natural History Museum in London. At the time a local resident believed an iron ore deposit had been found and had a horseshoe

made from the meteoric iron in an effort to persuade the authorities to build a rail line through Cranbourne.

The Murchison meteorite is the only one to have been seen to fall - at 10.45 a.m. on 28th September, 1969. Several hundred pieces totalling about 100 kg were collected. It has become one of the most studied meteorites of any because it contains organic molecules such as amino acids and sugars. (*Organic* in this context refers to the branch of chemistry, not that the molecules were made by living creatures.) Bill says fragments have a hydrocarbon smell. It also contains pre-solar grains as mentioned above.

Meteorites are still being discovered, the most recent finds in Victoria being in 1994 (Pigick and Rainbow) and 1995 (Willow Grove). Every find contributes to our knowledge and they should be reported to the Museum. The Willow Grove meteorite is very unusual in having a 28% nickel content.

Our thanks to Dr Bill Birch for a fascinating talk. Our apologies for the computer glitch at the end of the presentation.

Rob Hamson