Table 5·7 **Mercury-Earth comparative data**

	Mercury	Earth
equatorial diameter (km)	4 878	12 756
sidereal period of axial rotation	58·65d	$23_h\ 56_m\ 04_s$
inclination to orbit	0°?	23° 27′
density (kg per m^3)	5 500	5 517
mass (Earth = 1)	0·055	1·0000
surface gravity (Earth = 1)	0·38	1·0000
escape velocity (km per s)	4·3	11·2
albedo	0·06	0·36

mean Sun-Mercury distance 0·3870987 au

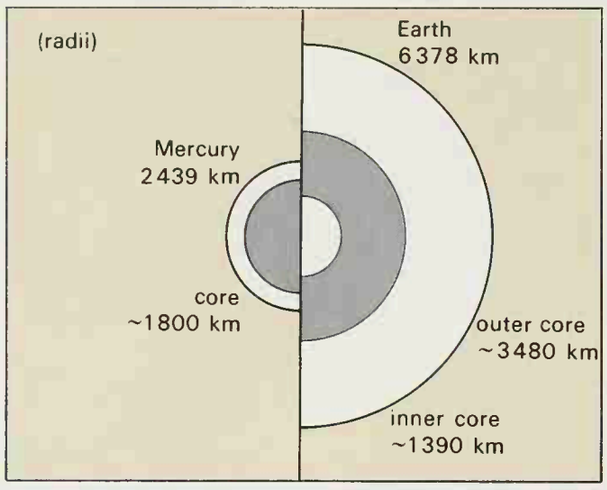
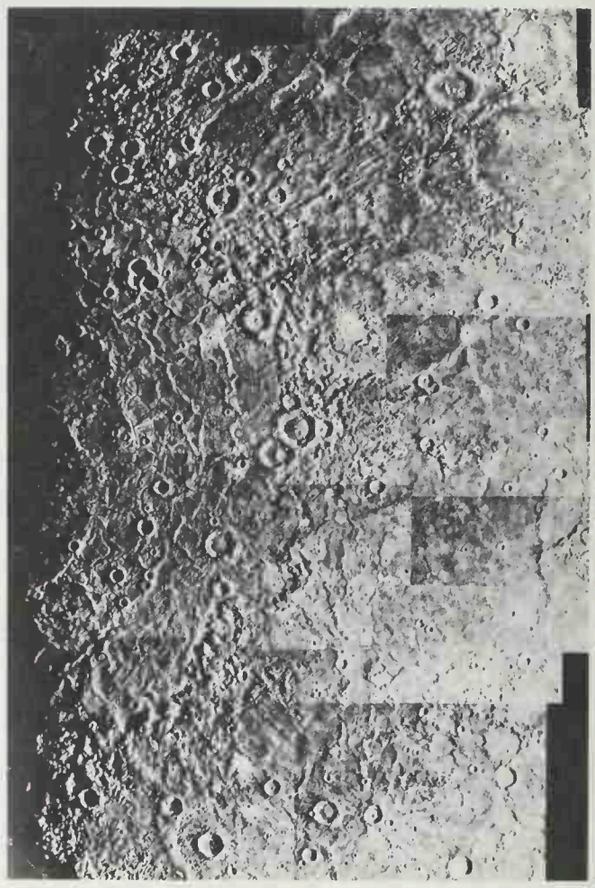


Fig. 5·9 Comparative sizes of Mercury and the Earth. Despite the relatively large core, Mercury's total mass is only about 5·5 per cent of the Earth's.

Photomosaic showing part of the great Caloris basin on Mercury (left centre). The diameter of the mountain boundary ring is about 1 300 km, with heights up to 2 km. The floor is intensely disrupted by ridges and fractures into a wrinkled appearance. The radial pattern of the surrounding ejecta blanket is evident.



Atmosphere and surface temperatures

Mercury has been found to have a very tenuous and transient atmosphere with a surface pressure of less than 2×10^{-12} ATMOSPHERES (compared with the Earth's 1 atmosphere). It is composed of helium atoms which the planet captures from the solar wind and retains for about 200 days before they gain sufficient energy to escape again into space.

Although the surface temperatures are not so extreme as had been thought previously, they reach 700 K at the equator of the sunward hemisphere and cool to less than 100 K on the dark side. Due to the orbital coupling either longitude 0° or 180° is towards the Sun when the planet is at its closest, at perihelion, while longitudes 90° or 270° face it at aphelion. At perihelion, the speed of the planet's movement along its orbit exceeds the small rotational velocity so that the Sun makes a small retrograde loop. As a result of the various motions and the orbit's great eccentricity, the 0° and 180° meridians receive about two-and-a-half times as much radiation as those at 90° and 270°.

Surface

Mariner 10 returned a series of pictures which showed that the surface of the planet is covered with a large number of craters. It was only possible to examine a little more than one-third of the surface, but as on the Moon there seems to be a division into highland and lower mare-like areas. The highlands are not as saturated with 20–50 km craters as the Moon and there remain extensive flatter areas which are known as **intercrater plains**. It has been suggested that these regions represent the original Mercurian surface which has undergone a lesser degree of cratering than the Moon, but close examination shows evidence of a large number of highly degraded craters and depressions within the plains. It therefore seems possible that the surface has gone through a process of heating and softening, perhaps somewhat akin to that which formed the Moon's original crust. Since the crust became completely rigid, insufficient impacts have occurred to cover the surface with craters.

The intercrater plains and some craters are broken by the highly distinctive features called **lobate scarps**, which are up to 3 km high and may run for hundreds of kilometres across the surface. These scarps have no counterpart on the Moon, despite resembling mare wrinkle ridges in some respects, but have apparently been caused by major crustal compression. They suggest that the planet's radius has decreased by about 1–2 km, which could have been produced by solidification of as little as 6 per cent of the planet's iron core.

The craters themselves greatly resemble those of the Moon, but secondary craters are closer to the main feature and ray systems are less extensive. This