NEWS AND VIEWS

Icarus Passes By

THE asteroid Icarus is to pass within 4 million miles of the Earth in the evening of June 14, but, as Mrs Shirley Williams, Minister of State at the Department of Education and Science, assured the House of Commons last November, there is no danger of a collision (*Nature*, **216**, 529; 1967). Even at this distance—close by astronomical standards—Icarus will still be something like sixteen times farther away than the Moon, and will be invisible to the naked eye. Estimates of its brightness at the time of closest approach are between 13th magnitude and 10th magnitude, depending on its size and reflecting power. A 13th magnitude object needs a telescope with a six-inch object glass, larger than most amateur instruments, to be visible, but at 10th magnitude it should be seen through a pair of binoculars. During the first few days of June, Icarus will be an 18th magnitude object low on the horizon, later moving from north to south through the constellation Ursa Major around the time of closest approach.

The size of Icarus is not known precisely, but it is believed to be about 1 km across, making it substantially smaller than the 740 km diameter of Ceres, the largest asteroid so far discovered. Icarus itself was discovered about 20 years ago by Dr W. Baade at Mount Palomar and is notable for having the greatest eccentricity (0·83) of asteroids with accurately known orbits. Thus, although at aphelion its orbit is beyond the orbit of Mars, at perihelion Icarus comes within the orbit of Mercury. The eccentric orbit may have been caused by perturbations—by collisions with other asteroids or close approach to the large planets—or may mean that Icarus has a different origin from most asteroids, as a body captured by the solar system, or as an old comet nucleus. The origin of the asteroids as a whole is still in doubt. It may be that a single planet failed to condense in the gap between Mars and Jupiter, because of Jupiter's gravitational field, and that a number of smaller planets were formed there instead, or the asteroids may be the debris of a single large planet which broke up. Another possibility is that one of Jupiter's moons may have escaped and later exploded.

Astronomers in Britain are not taking a great interest in the close approach on June 14. Studies of asteroids have become the province of certain institutions in the United States and the Soviet Union. Their interest in Icarus will be in precise measurements of the orbit, which may lead to an improvement in estimates of the mass of Mercury relative to the Earth, as well as providing a possible test of general relativity.

It is an open question whether asteroids have collided with the Earth in the past. There are a number of large well-eroded depressions on the Earth's surface which at various times have been attributed to asteroid impact. The Canadians in particular seem to have become adept at spotting what seem to be impact craters in the old rocks of the Canadian Shield. Whether all such astroblemes, as these craters are called, are extra-terrestrial in origin, or whether some of them can be attributed to tectonic processes, is still not certain.

Prosthesis for the Blind

from our Neurophysiology Correspondent

READING aids for the blind have so far involved the use of intact sensory pathways and have progressed little beyond Braille and tape-recorded "talking books". Both these systems are quite expensive and therefore limited in scope, and both are slow in terms of information transfer to the reader. Various scanning devices which produce a tone modulated by print shape have been tried, but these are also relatively expensive and need considerable practice for even a modest reading speed to be obtained. At a recent meeting of the Physiological Society, Brindley and Lewin demonstrated a device for stimulating the visual cortex of man directly: they have now published a full account of their apparatus and its use (*J. Physiol.*, **196**, 479–493; 1968). Essentially it consists of an array of radio receivers, encapsulated in silicone rubber and screwed to the skull. The 80 receivers are connected one-to-one through a cable to 0·8 mm square platinum electrodes carried in a cap of silicone rubber moulded to fit the calcarine cortex of the right hemisphere. Alternate receivers were tuned to 6·0 and 9·5 MHz and were activated by the transmitting coil of an appropriately tuned oscillator when it was pressed to the scalp above the extracranial implant. Activation of a receiver stimulated the cortex: transmission was in the form of a train of short (200 μs) pulses.

This device was implanted in a blind woman whose vision had progressively deteriorated since 1962. Out of 74 working electrodes, 39 produced phosphenes when stimulated with a train of pulses. The most common appearance of the phosphenes was that of a small spot of white light—"like a star in the sky" or "the size of a grain of sago at arm's length", but phosphenes that were more peripheral than 10° from the point of regard tended to be elongated or round and diffuse. Some electrodes produced pairs of points, or even three or more points, about a degree apart in the visual field. Furthermore, some produced a phosphene in a different place when stimulated strongly, giving rise to two maps of the visual field, one roughly agreeing with that derived from data on war wounds, and one roughly the inverse. However, more observations are clearly needed before it is possible to be at all dogmatic about the second, high-threshold, map. The phosphenes behaved quite like conventional visual stimuli producing retinal after-images, remaining fixed in space when the patient's head was passively rotated, but moving in the direction of eye movements. Strong stimulation sometimes produced a persistent percept, surviving for up to two minutes after the cessation of stimulation, and flickering conspicuously before it disappeared. Unlike normal visual stimuli, there was no clear flicker fusion frequency, every