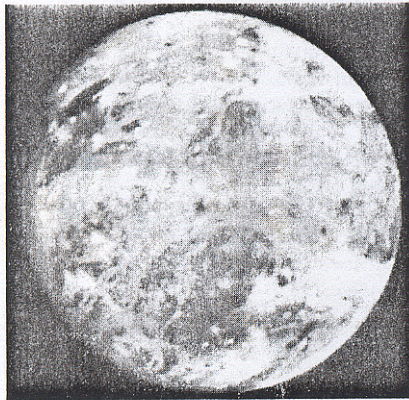


Blue moon

FOR a long time, astronomers suspected that Europa, one of Jupiter's many moons, might harbour a watery ocean beneath its ice-covered surface. They were right. Now the technique used earlier this year to demonstrate the existence of the European ocean has been employed to detect an ocean on another Jovian satellite, Ganymede, according to work announced at the recent American Geophysical Union meeting in San Francisco.

Liquid water gets people excited because wherever it is found on earth, life is found too. And water would be all the more exciting on Ganymede because it is the largest moon in the solar system (larger even than the planets Mercury and Pluto) and, like earth, it has a permanent magnetic field that protects part of its surface from bombardment by certain sorts of life-destroying radiation.

Margaret Kivelson, of the University of California, Los Angeles, and her colleagues, deduced the existence of Europa's ocean using data collected by *Galileo*, an American spacecraft that is orbiting Jupiter. Their method was based on the observation that electrical currents will be induced in a conductor (such as water)



Anyone fancy a dip?

when it is faced with a magnetic field that varies over time. Because Jupiter's axis of rotation does not quite line up with its magnetic axis, the moons that orbit the planet feel such a fluctuating magnetic force. On Europa this induces an electrical current within the sub-surface ocean. That, in turn, induces a magnetic field oriented in the opposite direction to the field created by Jupiter. It is this induced magnetic field that *Galileo* measures when it flies past.

Ganymede, too, has an icy surface—and with it the possibility of liquid water below. But when Dr Kivelson turned her attentions to the place, she met with a complicating factor. Any magnetism induced in a putative Ganymede ocean risks being swamped by the moon's own magnetic field. She was, however, able to adjust for this, and she says that an extensive analysis of the data from a number of *Galileo*'s passes of the moon is consistent with the presence of a conducting layer—almost certainly water—a few hundred kilometres beneath the ice.

There are other ways of interpreting the data, but Dr Kivelson says the chances of a watery, albeit buried, ocean on Ganymede are good. What is more, her study chimes with other work announced at the meeting. Robert Pappalardo, of Brown University in Rhode Island, and his colleagues, have been studying high-resolution pictures of extremely smooth areas of Ganymede's surface. Dr Pappalardo says that it seems that, as with Europa, these are areas where the crust has been pulled apart and water—or at least slushy ice—has risen up from beneath to fill the gap. Although the evidence suggests Ganymede's volcanic activity is much older than Europa's, it means that at some point in the past there was definitely water there. Dr Kivelson's work suggests that there still is.

Blue Moon

Match the words with the adequate definitions and translate them

1. **a current** - even though, although. This button switches the current on.
2. **to induce** - to change continually or frequently. The medicine can induce drowsiness.

3. **a conductor** - generally accepted or supposed to be or to become. Wood is a poor conductor of heat.
4. **to line up with** - to cause to have a large amount of e.g. work to deal with.. Everybody line up facing the front. Line up the glasses and I'll fill them.
5. **to fluctuate** -to be in accordance or agreement with. The price of vegetables fluctuates according to the weather. His feelings fluctuated between excitement and fear.
6. **putative** -- smth that acts as a path for electricity, heat. The chief justice listened to the testimony of the putative father of her child.
7. **to adjust** – to cause or produce. You can adjust the colour on TV by turning this knob. Your tie needs adjusting.
8. **to swamp**- to cause to form into a row, side by side or one behind the other.
We were swamped with phone calls after our advertisement in the paper.
9. **albeit** -the flow of electricity past a fixed point. It was a very important albeit small mistake. Attitudes to the question are changing albeit slowly.
10. **to chime with** - to change slightly, esp. to make right or make suitable for a particular purpose or situation. Her views on this issue chime with mine.