FIG 2. Enceladus's icy surface appears to be fresh and bright, which could be indicative of volcanic activity, although none has been observed directly. This volcanism has been implicated in the development of Saturn's tenuous E-ring, which, in turn, may be a source of ions and neutral species such as OH in the magnetosphere. Jupiter's moon Io is known to be actively volcanic, and is also thought to be a local source of dust and plasma.

observations[5,6]. Their role in modifying the surfaces of Solar System bodies and their atmospheres is a source of great interest. Accelerated by gravity into a system like Saturn's or Jupiter's, they can collide at high speed with satellites and ring particles, ejecting fragments and vaporizing surface materials. Even grains from the lunar surface, collected during the Apollo missions, exhibit melting due to dust impacts. The flux of micrometeorites is also important as these particles erode Saturn's main rings, thereby supplying water to the planet's atmosphere and limiting the lifetime of the rings.

The apparently low value of the earlier estimates[2] of the micrometeorite-induced ejection rate can be attributed not only to uncertainties in the micrometeorite flux, but also to uncertainties in the amount of vapour ablated by each impact, and in the distribution in ejecta velocities. The last is particularly important, as it determines what fraction of the vaporized material escapes its source body's gravity and how far it is spread out. For instance, a fraction of the material eroded from the main rings adds to the neutral gas well beyond the edge of these rings[8]. The spatial extent depends on the tail of the velocity distribution of the ejecta, which is not known. So the physics of the impacts is at least as interesting as the mass flux of micrometeorites.

Curiously, there is very recent, Earth-bound interest in particulate impacts as a means for producing, in a controlled way, gas-phase, intact biomolecules for laboratory analysis. The ejection of intact molecules by incident heavy-ions or by laser pulses is already a useful tool in biomolecular studies[11]. But now huge molecular clusters, approaching the lower end of the micrometeorite size distribution, are being tried as impactors in some laboratories, because they are thought to be efficient at vaporizing a volume of material with relatively low internal energy. That the same physics of impacts should be important all the way from the harsh environment of the giant planets to the subtle conditions in biomolecular laboratories is indeed exciting. □

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RÉSUMÉ

Sized up

NOT only do female moths of the species *Utetheisa ornatrix* defer a decision on the paternity of their brood until after mating with a selection of suitors, but they choose between the sperm of each with a discrimination that surpasses understanding (C. W. LaMunyon and T. Eisner, *Proc. natn. Acad. Sci. U.S.A.* **90**, 4689–4692; 1993). The single significant determinant of this post-copulatory sexual selection is size: the bigger the male, the more likely it is that the female will choose his sperm to the exclusion of that of others. But why? It turns out that body size correlates with the size of the spermatophore and the strength of the males' alkaloid-based pheromone derived from the seeds of the moths' favourite food plant. This may indicate a larval preference for nutritious seeds rather than leaves — a favourable trait that could be inherited by future generations of moth.

Big difference

MEASURING the mass of the tiny neutrino is best done by observing the β-decay spectrum of tritium (^3H), which is converted into ^3He, an electron and Fermi's ghostly neutral particle. The mass difference of the nuclei is converted into the kinetic energy of the products, but needs to be known with extreme accuracy. R. S. van Dyck *et al.* have made the best measurement yet, trapping single ^3H and ^3He ions in a combination of electric and magnetic fields and timing their cyclical motion (*Phys. Rev. Lett.* **70**, 2888–2891; 1993). The mass of each is measured to within a billionth of an atomic mass unit. And the difference, 18,590 electronvolts, is accurate to just 1.7 electronvolts, which puts it in the ball park of most neutrino-mass measurements.

Wise wounds

ASSAULTS on epithelia are combated by repair processes of extraordinary efficacy and rapidity. If a wound is large, lamellipodia are thrown out from its edges; if small, its circumference narrows like an iris. Last year Martin and Lewis, writing in *Nature*, showed that the edges appear to be drawn in, as by a purse string. Now W. M. Bennett *et al.* (*J. Cell Biol.* **121**, 565–578; 1993) have brought a battery of microscopic and immunochemical methods to bear on this process, using an epithelial cell line as a model. Within 5 minutes, the borders of the wound (the purse string) begin to sequester an abundance of contractile elements — actin filaments, myosin II and tropomyosin, as well as villin and a tight-junction protein, ZO-1. The purse string evidently closes the wound and acts as a moving barrier, so as to preserve the distinction between the apical and basolateral cell surfaces. The cells can thus resume normal service with a minimum of interruption.