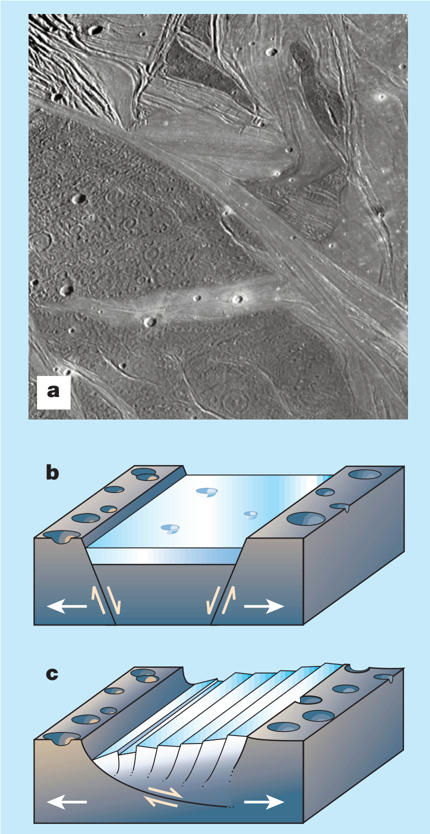

Figure 1 **Resurfacing Ganymede.** a, **An image taken by the Galileo spacecraft showing the dark ancient terrain and the bright resurfaced areas.** b, **A model, based on data from the spacecraft Voyager, in which the bright terrain formed by initial faulting of surface rock into blocks. These fractured blocks dropped down to create lower-lying regions, which were flooded by water-ice magmas seeping to the surface by cryovolcanism[5].** c, **A Galileo-based model in which the bright regions formed through the disruption of dark terrain by tectonic activity. That activity caused loose surface material to fall down hill, revealing the brighter, ice-rich substrate. Schenk *et al.*[4] conclude that both volcanic and tectonic processes were involved, but that they operated at different heights.**

allow the authors to identify vertical variations of about 200 m on Ganymede's surface. Topography can be a useful tool for finding out how and when surfaces formed and deformed.

By studying several areas on Ganymede, the authors find a number of smooth swaths of bright material that are also the lowest topographically; the most heavily fractured material tends to be much higher. Their findings are consistent with cross-cutting relationships among bright swaths, in which older segments of bright terrain are overprinted or destroyed by younger swaths. The authors propose that the smoothest areas of bright terrain are the result of resurfacing through icy volcanism, whereas the higher-standing, heavily fractured regions were resurfaced tectonically.

The difficulty with the notion of icy volcanism is that negatively buoyant liquid-water magma must have come up through a solid, ice-rich crust. By showing that the smooth swaths are up to a kilometre lower than their surroundings, Schenk *et al.* propose that this is the height to which liquid water can rise up through Ganymede's crust before it stops at the level of neutral buoyancy. They suggest that the higher topography was heavily grooved by faulting and tectonic deformation, but was too high for water-ice magma to reach and flood its surface.

These findings draw together two differing schools of thought. But although Schenk and colleagues' models show that the smoothest bright swaths are low-lying, there is little evidence that they were subsequently flooded with water-ice magma. If such a plentiful source of icy magma exists at shallow depth, why is it so shy that it fails to show itself? And what is the relationship, if any, between the caldera-like features and the smooth swaths? Only one such feature shows associated flow-like patterns in the Galileo images[10].

It was only quite recently, in May 2000, that Galileo took its highest-resolution images of Ganymede, so they have not yet been fully analysed. They should tell us more about the relative effects of volcanic and tectonic activity on this giant among moons, and so about the evolution of both its surface and its interior. ■

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NATURE

100 YEARS AGO

A circular letter has been sent out seeking an expression of opinion from experts as to the advisability of founding a journal for the statistical study of biological problems… *Biometrika* is the proposed title of the journal; thirty shillings the estimated cost of the first volume. Statistical work in biology, to be of service, must be far-reaching and extensive, and it cannot be dissociated from morphological enquiry of the better kind. Progress must necessarily be slow, and the accumulation of results worth publishing only be expected after protracted research; and in these circumstances we are doubtful if the desire to burden the already over-crowded literature of biology with a new serial is not somewhat premature. It might be borne in mind that existing periodicals and the organs of societies are available for purposes of publication; and we could well desire for some of these that much of the so-called "systematic" work and quibbling over priority in nomenclature, fast becoming intolerable, might be replaced in work of the statistical and experimental order.
From *Nature* 28 February 1901.

50 YEARS AGO

The successful use of antibiotic substances against human disease is one of the most fascinating developments of modern medical science. Seven such substances are now commercially available, and the one recent introduction — terramycin — formed the subject of a recent conference under the auspices of the New York Academy of Sciences. A considerable part of the report collects information on the action of terramycin against human diseases… Those diseases in which positive action is recorded include pneumococcic pneumonia, rickettsial diseases, brucellosis and some venereal diseases. Terramycin appears to be ineffective against infections of *Pseudomonas aeruginosa* and *Bacillus pruteus*; and of virus diseases, mumps, measles, chicken-pox and smallpox do not respond to treatment. Terramycin is only a very recent discovery from the biochemical research laboratories of Chas. Pfizer and Co., Inc. It was found as a result of a carefully planned research programme involving the examination of micro-organisms in soil from various parts of the world. The present imposing report of available information reflects a very speedy reaction to its implications within the medical profession.
From *Nature* 3 March 1951.