teraction, and—after the latter has been classified—their use as a tool for studying nuclear structure. Accordingly, chapter 7 and parts of chapter 10 treat the nuclear structure-dependent aspects of beta decay, including the relation of Gamow–Teller matrix elements to ground-state magnetic moments and spin densities, supermultiplet theory and the spin-flip giant resonance. While beta decay, due to the low momentum transfers involved, is not of a very universal value for nuclear structure studies, muon capture promises to be much more so, especially in view of the three or four high-flux meson facilities now operating.

Chapters 8 and 9 of Morita's book deal with muon capture from just this viewpoint. In contrast to its discussion of beta decay, however, which is as complete as can be desired, muon capture in complex nuclei is only treated through the examples of ground or low-lying excited state transitions in carbon 12 and oxygen 16. A wider scope in this subject might have been desirable here. I missed in particular the topic of analog giant-resonance excitation, which has been of importance in muon capture for a number of years now.

Morita's book competes well with three earlier works on the same subject (all from 1966), namely those by C. S. Wu and S. A. Moszkowski, by H. Schopper, and by E. J. Konopinski (in this order, progressing from more experimental-minded to theoretical-abstract). It is most similar to Schopper's, having over it the twin advantage of a greater distance from the period of most rapid development of the subject, and the inclusion of more recent subject matter. R. J. Blin-Stoyle's 1973 book *Fundamental Interactions and the Nucleus* also covers much of these subjects, but appears more like a reference work rather than a textbook as compared to Morita's book.

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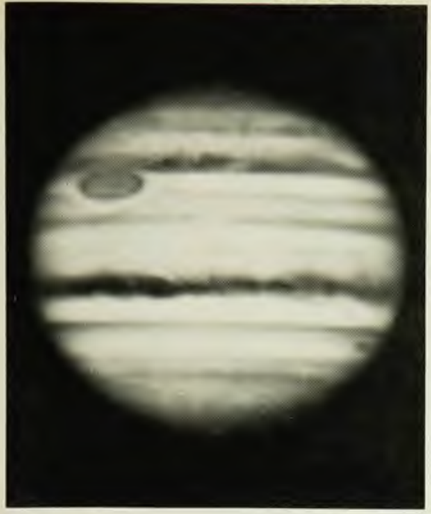
The Jupiter Effect: The Planets as Triggers of Devastating Earthquakes

J. Gribbin, S. Plagemann
136 pp. Walker, New York, 1974. $7.95

The main argument of this book may be briefly summarized. About every 179 years an approximate alignment of the

HALE OBSERVATORIES



planets takes place. The gravitational effect probably produces enhanced sunspot activity. The increased amount of solar wind (charged particles) incident on the Earth changes the weather patterns significantly. In turn, these unusual atmospheric disturbances increase stresses on the Earth's surface (such as wind pressures on mountains), and these trigger tectonic movements. In particular, the authors argue that the San Andreas fault is now strained, almost ready to rupture. Therefore, the whole causal chain might come into play during the next planetary alignment, in 1982, resulting in great earthquakes.

J. Gribbin and S. Plagemann are astronomers, both with PhD's from the Institute of Theoretical Astronomy at the University of Cambridge. The discussion is, however, not astronomical but mainly geophysical, in particular seismological.

Although the suggested trigger mechanism would apply to earthquakes anywhere, the authors concentrate on the San Andreas fault system in California. They set out to "warn the inhabitants of the imminence of a devastating earthquake about 1982." For seismologists with responsibilities in California, such a warning is not a light-hearted matter. The admirable concern of the authors will presumably lead to their publishing stricter arguments in appropriate journals.

Two key propositions are developed. First, the San Andreas fault now has sections that are "ominously quiet." Secondly, global forces are most effective along the edges of large tectonic plates such as the coast of California. The first proposition is debatable. Unfortunately, a number of seismological errors do not help. For example, on page 18, elastic rebound of the sides of a fault rupture is incorrectly defined as an overshoot "taking the sides even further" than the unstrained position. It is taken as dogma rather than hypothesis that, in slow fault creep, significant strain is being released and no great earthquake will occur. On page 60, the proposition is said to be proved that the effect of Earth tides is concentrated along plate boundaries, when this is also a speculation. In chapter 8, the crust of the Earth is confused with its mantle.

The search for earthquake periodicities in space and time has a considerable literature (not referenced in this book). Generally speaking, correlations between external events and major earthquakes have not turned out to be statistically significant. Here the authors adopt a rather different scientific method from the ordinary one. They show little interest in checking against observations. For example, on page 67 (et seq.) they give an account of large solar flares in July 1959 and August 1972. But seismicity records indicate that there were no great earthquakes anywhere in July 1959 and August 1972. Again, the planetary alignment of 1982 occurs about every 179 years. It is natural, therefore, to check seismicity catalogs within a few years of 1803 and 1624 and 1445. But California records (available from about 1800) indicate that 1803 or thereabouts was not specially active. For earlier periods, only one great earthquake (in Japan) is listed for 1445 (but 4 in 1448); and only one in 1624 (in the West Indies) but 5 in 1604! There are, of course, arguments against the hypothesis apart from difficulties with the historical record but these are not discussed.

A Jupiter effect? On the case presented—unlikely. The best prediction advice that one can now give, not only in California but in other seismically active areas, is that buildings should be constructed to resist great earthquakes on the assumption they will occur tomorrow.

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The Solid State: X-ray Spectroscopy

L. Jacob
85 pp. Halsted, New York, 1974. $10.50

Much of our early knowledge of atomic structure was derived from the results of x-ray spectroscopy. In recent years information about the valence electrons and the band structure of solids has begun to emerge from increasingly sophisticated soft x-ray emission spectroscopy. In *The Solid State: X-ray*