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This Week

Articles

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Cover: Enriching the diet with soy-derived foods, like the tofu salad shown here, can reduce the risk of heart disease—even among people with cholesterol in the fairly normal range, new studies show. For those who eschew tofu, some of the most effective of these heart-healthy foods—from novel margarines to chocolate-flavored shakes—disguise their soy origins. **Page 348**
(Credit: United Soybean Board)

Letters

On the nature of tides

"Tree trunks swell in synchrony with tides" (SN: 4/18/98, p. 245) misstates the basic properties of tides. First, full and new phases of the moon produce the same effect—stronger, or spring, tides. Second, tides by their very nature are large-scale phenomena. The smaller the size of the object considered, the less relevant tides are.

It is perfectly reasonable that trees growing in a tidal swamp would swell or shrink in rhythm with the amount of water surrounding them, but the idea that tidal forces work directly on such small objects is untenable.

Donald E. Hall
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Whys and wheres of bony growths

It would appear that the primary reason for calcified buildup in and around heart valves is the unidirectional flow of the blood through the cardiac chambers and the opening and closing mechanism of the valves ("Bony growths found in heart valves," SN: 4/4/98, p. 212).

When a valve shuts, calcium and other impurities accumulate at the opening. Because the flow is in one direction only, no shearing stresses from reverse flow are available to counteract residue buildup.

Robert A. Shannon
Oregon, Ohio

To add to the interesting observation of bone forming in calcified heart valves, we have occasionally seen bone forming in the calcified plaques formed in atherosclerosis. Of even greater interest is the rare observation of hematopoietic bone marrow forming in such sites. We presume this arises from circulating stem cells.

S.M. Baird
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Cutting protons a little slack

The nuclear barrier penetration, or tunneling, by a proton when it is ejected from a nucleus doesn't have much to do with coming from "deep inside" the nucleus and "penetrating a surface shell of protons" ("Deformed Nuclei Spit Out Protons," SN: 3/7/98, p. 148). Rather, it has to do with the energy barrier caused by the very short range and very strong attractive nuclear force that tends to keep the neutrons and protons together inside the nucleus, as well as with the much weaker but long-range electrostatic repulsion that tends to push the proton away from the nucleus.

If the rules of classical mechanics applied, the proton could never escape the powerful nuclear force. However, if some energy could be "borrowed" for an instant to move a proton a tiny distance away from the nucleus, electrostatic repulsion would take over and accelerate the proton away from the nucleus.

Provided the energy imbalance is corrected very quickly, quantum mechanics provides such a loophole in the energy conservation law, and this is the "tunnel" referred to in nuclear barrier penetration.

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