Reference

1. T. Cho et al., *Phys. Rev. Lett.* **97**, 055001 (2006).

Hiroshi Mizubayashi
(mizubayashi@hq.tsukuba.ac.jp)
University of Tsukuba
Tsukuba, Japan

Several sports have varying surfaces

The Quick Study items are thoroughly enjoyable and a great addition to the magazine. That includes "Tennis Physics, Anyone?" by Rodney Cross (PHYSICS TODAY, September 2008, page 84).

Unfortunately, Cross begins his review of tennis physics by saying, "Tennis is unique among major sports in that it is played on a wide variety of surfaces." One can also correctly argue the exact opposite.

Baseball and American football use both real grass and artificial turf at different stadiums. Baseball goes further in having dirt, in addition to grass or turf, on the same playing field—not including the bases, which are also in play.

Each hole on a golf course changes from virtually no surface—when the ball is held above it by a tee—to the short grass of the fairway and longer grass in the rough to extremely short grass on the green. Most courses also include sand traps and water hazards. Golfers have a specialized club, the sand wedge, to play out of sand traps, and water is such a different "surface" that most players don't even try to hit out of it.

NASCAR drivers and other major motorsports participants spend days before a race testing the responses of their cars on the surface of the particular track they'll be driving on next.

Even something as supposedly standard as a basketball court can differ from arena to arena. The old Boston Garden was infamous for the pits and dead zones in its parquet flooring; Celtics players familiar with the uneven surface used it to their advantage.

Hockey rinks change the nature of their surfaces during play. At the beginning of a period, the ice is clean, solid, and smooth; by the end of a period, it is chewed up. That's the purpose of a Zamboni, after all—to return the ice to its formerly pristine state.

Some sports—track and field or soccer, for example—might attempt to regulate their surfaces, but even then there will be noticeable differences from one locale to the next.

One could perhaps argue that tennis has the widest range of surface properties among major sports. But the truth is that across sporting events, a variety of surfaces is the rule, not the exception.

Christopher Sirola
(christopher.sirola@usm.edu)
University of Southern Mississippi
Hattiesburg

Dental amalgam and mercury myths

In their Quick Study on dental composites (PHYSICS TODAY, April 2008, page 82), the authors make the following statement: "Patients and practitioners have registered an aversion to mercury based on perceived health risks and real environmental concerns."

The "aversion" is based on the unfounded suspicion that mercury poisoning can arise from dental amalgams. A popular myth-debunking website offers the following:

> More than half a century ago, Orson Welles panicked his radio audience by reporting that Martians had invaded New Jersey. On December 23, 1990, CBS-TV's "60 Minutes" achieved a similar effect by announcing that toxins have invaded the American mouth. There was, however, a big difference. Welles' broadcast was intended to be entertaining. The "60 Minutes" broadcast, narrated by veteran reporter Morley Safer, was intended to alarm—to persuade its audience that the mercury in dental fillings is a poison. It was the most irresponsible report on a health topic ever broadcast on network television.[1]

Reference

1. S. Barrett, "The 'Mercury Toxicity' Scam: How Anti-Amalgamists Swindle People" (2006), http://www.quackwatch.com/01QuackeryRelatedTopics/mercury.html.

Berol Robinson
(berol.robinson@drbsoftware.com)
Brookline, Massachusetts

Stansbury, Bowman, and Newman reply: The amalgam health risks were described as "perceived" while the environmental risks were termed "real" to convey that the former lacks credible scientific evidence to support health concerns for dental patients receiving amalgam restorations. We are in full agreement with Berol Robinson in that regard. There is a legitimate health concern for dentists and their clinical and clerical staffs who potentially are exposed to chronic low levels of mercury vapor. However, we teach our dental students the precautions necessary to mitigate that exposure and that as dentists they can reassure their patients that an amalgam filling poses no significant health risk.

Jeffrey W. Stansbury
Christopher N. Bowman
Sheldon M. Newman
University of Colorado Denver

An inner ear magneto-receptor?

After reading Sönke Johnsen and Ken Lohmann's very thorough article on magnetoreception in animals (PHYSICS TODAY, March 2008, page 29), I cannot help but think that they may have overlooked one of the most exquisitely sensitive electrical sensors in mammals and perhaps in other animals as well. This sensor is the inner ear, which is insulated to a large degree from the rest of the body. Of particular interest are the semicircular canals, located on three axes and containing a conductive fluid. Although in humans the main function of these truncated loops is balance, in the lower animals they may be usable for navigation as well. If you move a conductive truncated loop through a magnetic field, you will generate an electrical current; it follows that the semicircular canals in movement might yield the location in a magnetic field.

Alan H. Purdy
(ahpurdy@nethere.com)
San Marcos, California

Johnsen and Lohmann reply: We agree with Mr. Purdy that the conductivity and triaxial orientation of the semicircular canals, combined with their vestibular function, make them intriguing suspects in the search for a magnetoreceptive organ. In fact, we proposed exactly that hypothesis in a previous article.[1] It definitely merits further investigation, although so far there is no evidence that the inner ear plays a role in magnetoreception.

Reference

1. S. Johnsen, K. J. Lohmann, *Nat. Rev. Neurosci.* **6**, 703 (2005).

Sönke Johnsen
(sjohnsen@duke.edu)
Duke University
Durham, North Carolina
Kenneth J. Lohmann
University of North Carolina at Chapel Hill ■