In the 2 millennia since the first Olympic games, one principle has withstood the test of time: People are obsessed with pushing the human body to the limit. With the curtain set to rise next month in Athens on the latest Olympic Games, this Special Section goes backstage to explore some of the defining attributes of the world’s greatest athletes—and their Achilles’ heels.

Doping allegations against elite athletes have cast a long shadow in the run-up to this year’s games. In a News report (p. 632), Vogel examines how scientific sleuths are devising new methods to unmask athletes bent on cheating their way to the top. An STKE Perspective by Handelsman (www.sciencemag.org/sciext/sports) assesses the poorly defined physiological roles of designer androgens such as THG. And in a SAGE KE News Synthesis article (www.sciencemag.org/sciext/sports), Davenport probes the promises and pitfalls of growth hormone.

What does it take to swim the fastest, throw a discus the farthest, or jump the highest? In some sports, it would seem, athletes claim such honors by birthright. Men and women from Kenya’s Rift Valley dominate endurance running, for example, and runners from West Africa reign supreme as sprinters. Holden explores these apparent genetic edges in a News report (p. 637). The presence or absence of a Y chromosome creates a different kind of uneven playing field. A decade ago the best female runners were closing in on the times of their male counterparts. But Holden reports (p. 639) that the gender gap has plateaued or even increased over the past 15 years in all running events apart from the marathon.

Tending not to discriminate by gender are injuries sustained from pushing the limit. In a News report (p. 641), Stokstad describes how young gymnasts may be raising their risk of osteoarthritis and other health problems later in life. On a more positive note, information gained from studying how athletes’ muscles respond to training is providing new insights on muscle growth and atrophy, the topic of an STKE Review by Sartorelli (www.sciencemag.org/sciext/sports).

Ultimately, performance comes down to mechanics. On page 643, Cho profiles Mont Hubbard, a mechanical engineer who has spent his career optimizing motion in sports. New materials can reduce physical constraints to performance. At next month’s games, many of the world’s best swimmers will be wearing suits with tiny ridges modeled on sharkskin that are claimed to reduce friction and drag. In a News report (p. 636), Krieger investigates those claims.

Sports scientists may not share the limelight with their study subjects, but the discipline is gathering momentum, as overview articles and profiles of early-career researchers attest on Science’s Next Wave (www.sciencemag.org/sciext/sports). These experts toil behind the scenes of a pursuit that, in one form or another, captivates most everyone’s attention—especially every 4 years.

—RICHARD STONE
From the Ignoble to the Sublime
Richard Stone (July 29, 2004)
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Editor's Summary

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