

## U.S. leads in science Olympics, but . . .

During last year's summer Olympic games, U.S. athletes walked away with more medals—especially gold ones—than did athletes from any other nation. On a per capita basis, however, the U.S. behemoth ranked only 37th, notes Robert M. May, head of Britain's Office of Science & Technology in London.

Similarly, international rankings of research performance differ, depending on how prowess is measured. While the United States leads the pack in many measures, says May, per capita comparisons can offer "surprises."

May used data collected between 1980 and 1994 by the Philadelphia-based Institute for Scientific Information. Its Science Citation Index tracks peer-reviewed papers from more than 4,000 journals—some 8.4 million papers over the period May studied. He acknowledges that these data overrepresent offerings by industrial nations and English speakers (SN: 7/22/95, p. 55).

In terms of the sheer volume of publications, May told SCIENCE NEWS, "everybody knew that the [United] States was the leader—ahead of the total for the European Union, which is about half again as big in population." After adjusting such data for a nation's size or income, he still expected the United States to be leading. Instead, Switzerland, Sweden, Israel, Denmark, and the Netherlands topped those lists.

As one gauge of their importance, May looked at how often the papers were cited by others. Again, on a per capita basis, he reports in the Feb. 7 SCIENCE, those same five countries hovered at the top, showing "the extraordinarily high quality of these smaller players."

Then he analyzed performance by the biggest players—the seven richest indus-

trial powers. On both a per capita and an expenditure basis, he found that Canada, the United States, and the United Kingdom outperformed Japan, Germany, France, and Italy—"not just by a little bit, but by two or three times."

The underlying factor, he speculates, is where a nation conducts its published research. May says that countries with dominant research institutes may be less productive scientifically than those where the research comes primarily from universities. With their "pervasive presence of irreverent . . . students, [universities] could be the best environment for productive research."

## Ukrainian fossil sprouts modern roots

Many excavations on the Crimean Peninsula in the Ukraine have yielded stone implements and skeletal pieces attributed to Neandertals. At one of the few such sites to attract widespread scientific attention, investigators more than 40 years ago found the partial remains of a child from a species that, in their view, bridged the gap between modern humans and Neandertals.

Some bridges don't end up where expected, however. New work at the Ukrainian location, known as Starosele, indicates that the fossilized youngster is evolutionarily younger than previously thought—by about 35,000 years. Muslim mourners buried the approximately 18-month-old child at Starosele no more than 200 to 300 years ago, contends a team of Ukrainian and U.S. researchers in the February CURRENT ANTHROPOLOGY.

Stone artifacts and animal bones have accumulated at the site for as many as 80,000 years, holds project director Anthony E. Marks, an anthropologist at Southern Methodist University in Dallas. But striking similarities between the child's remains and two newly discovered, relatively recent human burials at the Ukrainian site suggest that, "short of an incredible coincidence, the Starosele child was an intrusive, late medieval burial, fully consistent with Muslim burial practices," says Marks.

Soon after discovering the child's remains, Russian investigators described them as a remnant of an occupation around 35,000 years ago by proficient hunters who resembled both Neandertals and modern *Homo sapiens*. Since the late 1960s, however, increasing numbers of researchers have considered the child's features fully modern; they have also expressed the suspicion that a modern burial intruded

Such a correlation, he says, would hold implications for the United Kingdom and other nations that are weighing whether to enlarge their university systems or to split off research centers.

While he found the new data "very interesting," economist Ariel Pakes of Yale University, an organizer of a 1995 conference on measuring scientific performance, questions what those data measure. "I don't think you know much about [research] performance without an output measure"—such as science's contribution to the gross national product—or some knowledge about the financial contributions to a nation's research by different sectors of the economy, he says. —J. Raloff

into ancient sediment layers.

Marks and his coworkers took a closer look at the site in excavations conducted from 1993 through 1995.

Stone artifacts and animal bones exist throughout the sediment layers at Starosele, Marks says. By analyzing excavated animal teeth, the researchers concluded that the four layers range in age from 30,000 to nearly 80,000 years.

The recent excavations revealed two more burials—an infant and an adult. Both bodies lay in a mix of recently accumulated soil and older, artifact-bearing sediment, according to the researchers. Each body was buried on its right side, with its head toward the west, its face to the south.

Muslims used the area surrounding Starosele as a cemetery in the 17th and 18th centuries, Marks notes. The newly discovered skeletons reflect Muslim burial practices, he states, particularly that of orienting the face toward Mecca, which lies south of the Crimean Peninsula.

The Starosele child was also a Muslim burial, asserts Marks, because it rested in a mix of modern and ancient sediment and was originally positioned like the other two bodies.

"This is essentially solid proof that the Starosele child is modern material that intruded into older deposits," remarks anthropologist F. Clark Howell of the University of California, Berkeley.

The new report follows a bitter exchange in the February 1996 CURRENT ANTHROPOLOGY over work at Starosele. The site's original excavator, Aleksandr Formozov of the Russian Academy of Sciences in Moscow, accused Marks' group of initiating work without his official permission; the group replied that they had obtained work permits from Ukrainian officials and did not need Formozov's blessing. —B. Bower

### Per Capita Performance

| Country        | Papers per person | Country        | Citations per person |
|----------------|-------------------|----------------|----------------------|
| Switzerland    | 167               | Switzerland    | 179                  |
| Israel         | 152               | Sweden         | 125                  |
| Sweden         | 147               | Israel         | 105                  |
| Denmark        | 127               | Denmark        | 103                  |
| Canada         | 127               | United States  | 100                  |
| Netherlands    | 109               | Netherlands    | 96                   |
| Finland        | 107               | Canada         | 95                   |
| United Kingdom | 104               | United Kingdom | 88                   |
| United States  | 100               | Finland        | 85                   |
| New Zealand    | 99                | Iceland        | 76                   |

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