

At peace with itself, an ant triumphs

Argentine ants are marching relentlessly around the globe in part because they have given up scrapping among themselves, suggest California researchers.

These ants, *Linepithema humile*, reap big benefits from a let's-just-get-along style, say David A. Holway and his colleagues at the University of California, San Diego. In the Oct. 30 SCIENCE, they report that peaceful laboratory colonies of Argentine ants spent at least twice as much time foraging and produced almost three times as many offspring as warlike colonies.

That peace dividend by itself may not entirely explain why the species has burst out of South America during the past century and spread as far as Australia. However, "it's a contributing factor," argues Holway.

At first glance, Argentine ants seem unlikely world conquerers. "They're 2 millimeters long, they're brownish, and they're not very exciting-looking for an ant," Holway admits. Yet in many countries, they crowd out native ants and disrupt the lives of other creatures (SN: 8/23/97, p. 116).

In studying the Argentines' success, Holway and his colleagues tested aggression between colonies. When the re-

searchers paired individuals from different colonies, ants collected in their original South American range often fought. "They lunge at each other; they form a ball, and in a few minutes, they're both dead," Holway explains. However, most Argentine ants collected in California remained peaceable when confronting a stranger from a distant nest.

The researchers then used California ants to create 22 pairs of colonies of identical size. Most colony pairs came from nests that tolerate each other, but some came from the rare nests known to fight each other. After 70 days, ants without same-species aggression had bigger colonies. The researchers believe that those superior numbers are the key to the ants' expansion, Holway says.

He's not the first to note the ants' neighborly manners. For an article on altruism, TRENDS IN ECOLOGY AND EVOLUTION ran a cover in March 1997 showing a French Argentine ant queen posing amicably beside a Swiss one, with their nation's flags painted on their bodies.

Behavioral ecologist Deborah M. Gordon at Stanford University says the beneficial effect of low aggression is "an idea that should be pursued, but there are other ideas that should be pursued, too." For

Marc S. Dantzer/UCSD



Small, dark Argentine ants gang up on a native Californian harvester ant.

example, in California, whichever ants find food usually keep it, and latecomers just back away. "Generally, the Argentine ants tend to get there first," she says.

Phil Ward, an ant biologist at the University of California, Davis, finds decreased aggression a plausible factor in takeover success. Once they have high numbers, Argentine ants can "both find food well and defend it well," he says. Also, the United States offers the ants freedom from Argentine parasitic flies.

Being neighborly is hardly the only path to world domination, Walter R. Tschinkel of Florida State University in Tallahassee points out. Many fire ant colonies rip apart strangers within minutes, he says, yet their spread through the southern United States isn't going badly at all. —S. Milius

Geologists anticipate an oil crisis soon

Cheap oil has helped fuel the economic boom of the 1990s. But petroleum prices will jump drastically in the near future, as the world starts to feel the pinch of tightening hydrocarbon supplies, according to several forecasts.

Some see the shock coming in only a few years, while others put it off for more than 2 decades. Nonetheless, these pessimistic predictions agree that oil production will soon peak and then start sliding downward, even as demand for oil continues to climb.

"For over 150 years, mankind has been used to an ever-growing supply of

cheap and abundant energy," says Colin J. Campbell, a former exploration geologist now doing studies for Petroconsultants in Geneva. His analysis calls for production to peak in less than a decade. "The implications of this on industry, world politics, and economics seems to me to be enormous," he said this week at the annual meeting of the Geological Society of America in Toronto.

Campbell and his colleague at Petroconsultants Jean H. Laherrère reached their conclusion by estimating the remaining underground reserves of so-called conventional petroleum—oil that is relatively easy to extract. Such oil accounts for 95 percent of the 800 billion barrels of oil that the world has burned thus far, says Campbell.

Going country by country, Campbell and Laherrère started with published tallies of oil deposits and made adjustments in cases where industry data indicates that nations had inflated their figures. Extrapolating from these numbers and past oil-discovery rates, they estimate that roughly 1 trillion barrels of oil remain in known and undiscovered fields.

Production will peak, they hypothesize, when the quantity of oil already burned equals the amount yet to be extracted. They expect that point to come within a decade but project oil prices to

jump even sooner. The economic impact will occur when nations in the Organization of Petroleum Exporting Countries gain control of the market after production begins to drop outside the Middle East.

When worldwide production starts falling, nations could tap into nonconventional sources of oil, such as heavy oil, tar, and hydrocarbons locked in shales. But these will cost more to extract and process, say the researchers.

Numbers only slightly more optimistic appeared in a March report by the International Energy Agency in Paris, which estimates there are 1.5 trillion barrels of conventional oil in reserves. The agency predicted that production would peak before 2015, so by 2020, demand will exceed supply by 17 million barrels a day.

At this week's meeting, John D. Edwards of the University of Colorado at Boulder estimated that 2 trillion barrels of oil exist in known and undiscovered fields. Though he pushes the production peak back to 2020, his result "should urge us now to consider replacement energies."

Some energy analysts, however, dispute such worrisome forecasts. Thomas S. Ahlbrandt of the U.S. Geological Survey in Denver, who leads an ongoing federal effort to estimate global reserves, finds hope in new technologies that allow companies to pursue oil in the deep sea and other areas previously unexamined. "Since 1990, the area available for exploration has doubled in the world."



The International Energy Agency projects a declining world conventional crude oil production (dark blue) after 2015. Graph also shows the global demand for oil (red), the oil production of Middle Eastern OPEC countries (light blue), and that of other countries (green).