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Fisheries biologist makes a splash

Griffith then ran this model, assuming that the caribou would behave like another herd to the west of ANWR, staying 4 kilometers away from oil pipelines and roads.

The initial USGS report released last month discusses the model's predictions mainly for just one scenario: developing the entire 1002 region. "That's what was on the table" when the report was prepared, Griffith explains. Development of 1002 could lead to an 8.2% decline in calf survival that would likely cause a decline in the herd population, the report says.

But a few days before the report was released, USGS director Chip Groat asked Griffith to model two new scenarios. These are based on a 2001 USGS report estimating that about 85% of the oil lies northwest of a geological fold, so drilling would likely be limited to this wedge of coast (see map) and some native lands. Griffith says that one need only look at the calving map to see that the impact would be minimal, as almost no concentrated calving occurs there. As expected, under these new scenarios the model predicted essentially no decline in calf survival.

Drilling supporters have trumpeted this result, which DOI spokesperson Mark Pfeifle says "concludes that energy production would have little to no effect on caribou." But Whitten and other caribou biologists whose data went into Griffith's model say their work is being misinterpreted. Although the herd doesn't calve close to the coast, up to 19% of the herd congregates there a few weeks after calving to avoid mosquitoes and flies. If mothers spend energy avoiding the oil infrastructure, they could lose weight and produce less milk or fail to get pregnant the following year. "You've got to look at the other half of the picture"—after calving—says biologist Don Russell of the Canadian Wildlife Service, who like Whitten is a co-author on the original report's Porcupine herd chapter.

Griffith agrees, partly. Postcalving use of the land "could turn out to be unimportant or very important," he says: "There's not enough data to evaluate it." His own hunch is that "calving is most of the story." But he notes that current legislative proposals don't limit development to the northwestern part of the 1002 area. If it were written into law, "I would feel a lot more comfortable as a scientist" saying that drilling won't harm caribou, Griffith says.

The USGS "reversal," as some media reports have described it, has added fuel to allegations that Norton is distorting the science on ANWR. In a 4 April letter to Norton, Senator Joe Lieberman (D–CT), a drilling opponent, wrote that he was "gravely concerned" about Norton's request for the follow-up report and demanded an explanation for why she sought a new analysis that was not peer reviewed. For his part, Griffith—who once signed a letter ("as a citizen," he says) urging that the 1002 area be protected permanently—hasn't felt pressured to come up with a particular answer and feels free to do his science.

But even Griffith is frustrated that the Porcupine herd is getting all the attention. Several scientific societies, most recently the Ecological Society of America, have weighed in against drilling because of the overall impacts on many species and the boreal ecosystem itself. "This issue is more than caribou. There's way too much hung on this one piece," Griffith says. Unfortunately, that's not the way ANWR politics works.

–JOCELYN KAISER

ENTOMOLOGY

New Insect Order Speaks to Life's Diversity

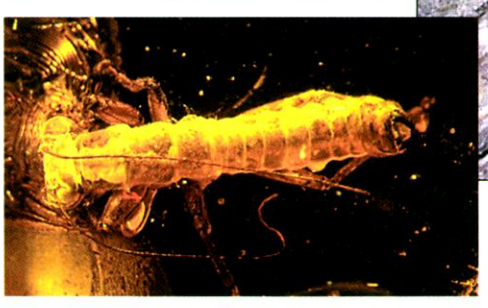
A graduate student sifting through collections in natural history museums has made the discovery of a lifetime: a new insect order. The last time the insect kingdom gained a new order was almost a century ago.

The new classification is based on just three known specimens. Two of them—one collected in 1909 and the other in 1950—have for the most part been languishing in museum drawers for decades, and the third is a 45-million-year-old fossil encased in amber. The discovery of these odd, sticklike, carnivorous creatures "is an extraordinary event," says Harvard entomologist Edward O. Wilson.

The work, reported in a paper published online by *Science* this week (www.sciencexpress.org), has spurred systematists and entomologists to comb their collections and search in the wild for additional members of this newly recognized group. Some living candidates have already turned up. Says David Grimaldi, an entomologist at the American Museum of Natural History in New York City, the naming of a new order "illustrates how poorly known the [small organisms] really are."

A series of chance encounters led to the new classification. In June 2001, Oliver Zompro, a graduate student at the Max Planck Institute for Limnology in Plön, Germany, was visiting London's Natural History Museum as part of a project looking for new species among collections of preserved stick insects. A curator showed him one that had been a mystery since it was first collected in Tanzania in 1950. In the 1980s, Roy Danielsson, a curator at the University of Lund, Sweden, had spotted this baffling male insect among his museum's collections and shipped it to the London museum for study. Even there, no one had been able to figure out its place in the tree of life, and Zompro, too, was stumped.

Just weeks later, however, an amber collector sent Zompro a similar looking amber-encased fossil, and Zompro began to suspect that he had come across a new order. That suspicion was strengthened when he soon came across a third specimen, a female from Namibia, warehoused at the Berlin Natural History Museum since 1909. Zompro's connection of the fossil to modern insects was like unearthing long-hidden treasure. "How often do you get to investigate a fossil that has



Imposing order. A recently discovered specimen from Africa (*above*) and an amber-encased fossil from Europe (*left*) indicate the new order's wide distribution.

CREDIT: THOMAS KUJAWSKI/ASA-MULTIMEDIA

come to life?" says Christine Nalepa, an entomologist at North Carolina State University in Raleigh.

Zompro turned to two systematicists and anatomists at the Zoological Museum of the University of Copenhagen, Denmark, for help. Niels Peder Kristensen and Klaus-Dieter Klass, who is now at the Zoological Museum in Dresden, Germany, evaluated how closely related the three specimens were to each other and to other insects.

Klass found that all three specimens shared some characteristics with stick insects and an obscure group called ice crawlers. Unlike stick insects, for example, females lack a plate on the underside of the abdomen to cover the egg-laying appendages. They also look different because stick insects have elongated thoraxes, with a stretched-out middle segment, but the new specimens don't have this feature. Furthermore, when Klass dissected the female to look for further similarities and differences, he discovered that the stomach was full of insect parts; stick insects are vegetarians, not carnivores, says Kristensen.

Klass, Kristensen, Zompro, and Plön collaborator Joachim Adis therefore argue that the specimens are three new species that together make up a separate new order. They have named it Mantophasmatodea because of a superficial resemblance to the praying mantis and phasmids, the stick insects. "I am glad this group has a name and a place," says George Poinar, a paleoentomologist at Oregon State University in Corvallis. Until now, he says, "anyone who looked at them really couldn't put them anywhere."

With only three members, Mantophasmatodea is the smallest insect order yet known. Of the 32 other insect orders, only one has less than 20 members and another has more than 300,000. So far, entomologists have placed about 750,000 species into these orders, "but we're probably only halfway there" in finding and classifying the rest, says Wilson.

The three members of Mantophasmatodea may soon have company. "I bet you anything that there are more specimens lurking in museums," Grimaldi predicts. Even more exciting, says Kristensen, Zompro and Eugene Marais of the National Museum of Namibia in Windhoek have just discovered two more species in Namibia. Zompro has brought living specimens of one back to his lab to study their behavior. All these finds just go to show, Kristensen adds, "that we are still very far from knowing the diversity of life on Earth."

–ELIZABETH PENNISI

CREDITS: (TOP TO BOTTOM) IAEA; GARY RETHERFORD/PHOTO RESEARCHERS INC.

AMPHIBIAN DECLINE

Ubiquitous Herbicide Emasculates Frogs

The most heavily used herbicide in the United States makes hermaphrodites of male frogs at concentrations commonly found in the environment, a new laboratory study reports. Its authors urge looking more closely at the possible role of atrazine and similar pesticides in amphibian declines, although a causal role has yet to be demonstrated. Atrazine is banned in many European countries, and some scientists expect this study to influence the U.S. Environmental Protection Agency's (EPA's) ongoing assessment of the chemical.

For more than a decade, scientists have watched with alarm as many amphibian populations have declined and some species have suddenly gone extinct. Although loss of habitat is clearly a culprit, many disappearances have occurred in undisturbed areas such as mountain rainforest reserves. Suggested causes for these mysterious declines include fungal pathogens, increased ultraviolet light, climate change, and pesticide residues.

Toxicologists had come to regard atrazine as one of the more benign pesticides around. Approximately 27 million kilograms of the chemical are applied annually to corn and other crops in the United States, and much of it makes its way into surface water, groundwater, and even rainwater. Past studies with amphibians had shown effects only at abnormally high levels. But researchers had not zeroed in on an apparent amphibian Achilles' heel: the hormone system, which can be disrupted by extremely low concentrations of compounds.

Now researchers led by developmental endocrinologist Tyrone Hayes of the University of California, Berkeley, report that in lab studies, male tadpoles develop extra gonads and become hermaphrodites at concentrations 30-fold lower than EPA's safe drinking water standard. The researchers raised

Sex change. In lab studies, male African clawed frogs become hermaphrodites when exposed to atrazine.

ScienceScope

Lethal Legacy The Republic of Georgia is about to ramp up its hunt for Soviet leftovers. In February, the International Atomic Energy Agency helped the Georgians recover two abandoned canisters (below) packed with dangerous strontium-90 (*Science*, 1 February, p. 777). So far, six of the highly radioactive Soviet-era sources, once used to power portable thermogenerators, have been retrieved from the Ingury River valley. But the agency believes as many as four remain unaccounted for. In June, atomic agency experts and member states will assist Georgia on a 2-week mission to scour the valley for the missing devices by vehicle, horseback, and foot. Also in the planning stage is a countrywide search for other "orphan" radioactive sources.

Barrier Breaker Washington, D.C., high school science teacher Douglas Tyson sees it as a unique opportunity for his students to mingle with the scientific elite. For the National Academy of Sciences (NAS), it's a chance to be a good neighbor and open doors to a group of highly motivated minority students.

This week the academy announced a new partnership program linking it with Benjamin Banneker, the district's only public college-prep high school. This summer four graduating seniors will work in the National Research Council's (NRC's) division of earth and life sciences to kick off a paid internship program, and academy staffers have agreed to spend time in the classroom and on science-related activities. The goal, says NAS President Bruce Alberts, is "to help close the gap in the number of minorities in scientific, engineering, and medical careers."

Banneker's success with a rigorous academic curriculum for students from disadvantaged backgrounds makes it the obvious partner, says NRC division head Warren Muir, who worked with Tyson to lay the groundwork. "You want a school where there's somebody on the other end who cares," he says. Tyson, coach of the school's national championship "It's Academic" team, is looking for something that he can't provide: "We can set high standards, but if students are going to succeed in this world they also need to engage in activities involving the majority population."