

Ecologists Roiled by Misconduct Case

BERLIN, GERMANY, AND OXFORD, U.K.—A Danish government committee has ruled that one of the world's leading evolutionary biologists, Anders Pape Møller, is responsible for data fabricated in connection with an article that he co-authored in 1998 and subsequently retracted. Møller, a professor at the Université Pierre et Marie Curie in Paris, has denied that his data were fabricated and has told *Science* that he plans to sue his chief accuser, Jørgen Rabøl, or the panel that issued the ruling, the Danish Committees on Scientific Dishonesty (DCSD), for defamation.

The charge, stemming from a bitter dispute between Møller and Rabøl, a former colleague, has cast a shadow over the relatively tight-knit world of behavioral ecology, the study of mating and other behaviors in an animal's natural environment. "It's a sad thing," says Malte Andersson, president of the International Society for Behavioral Ecology.

One point that's indisputable is Møller's reputation as a towering figure in the field. Møller has been a key proponent of the idea that traits such as long symmetrical tails in barn swallows, which attract potential mates, are a sign of beneficial genes. He has also shown that stress caused by environmental factors such as parasites can lead to the development of asymmetrical body parts. The failure to overcome such stress is a sign of weaker genes, he theorized, and therefore asymmetric traits are less attractive to potential mates. "He is prolific not just in papers but in

ideas and in setting trends," says Ian Jones of the Memorial University of Newfoundland in Canada. "It's hardly possible to write a paper in behavioral ecology without making extensive citations of Anders's work."

Indeed, Møller has more than 450 articles and several books to his credit. "The astonishing thing about him is the number of papers he writes with new results and analyses," says evolutionary biologist Paul Harvey of the University of Oxford, U.K. That has many journal editors pacing nervously. "We're all bemused," says Michael Ritchie of the University of St. Andrews, U.K., editor of the *Journal of Evolutionary Biology* and an officer of the societies that publish the journals *Evolution* and *Animal Behaviour*. "We need to work out what we should do and get it right. I don't think there's going to be any instant decisions."

At the center of the controversy is a study that Møller undertook while a professor at the Zoological Institute of the Univer-

sity of Copenhagen in the mid-1990s. The study tested the idea that the action of herbivores nibbling at the leaves of the stone oak (*Quercus rotundifolia*) triggers a stress-induced reaction in which later leaf growth is

asymmetric—reflecting potential developmental weakness. In the study, degrees of herbivory were simulated by removing no leaves, half the leaves, and all the leaves 3 weeks before the emergence of new leaves. A lab technician, Jette Andersen,

measured asymmetry by comparing the width of the left and right halves of new leaves. Møller and Florentino de Lope of the Universidad de Extremadura in Badajoz, Spain, published their findings in the June 1998 issue of the journal *Oikos*. Andersen was credited in the acknowledgment.

In 1999, Andersen and Rabøl, then an associate professor at the Zoological Institute, alleged in an "opinion" sent to *Oikos* that the paper was based on fabricated data rather than on Andersen's data. The editor-in-chief, Nils Malmer, launched an investigation and in a 24 November 2000 letter demanded the paper's retraction. Møller and de Lope agreed; *Oikos* in March 2001 ▶

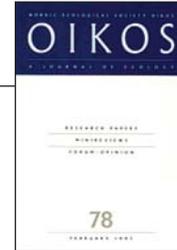


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Under fire. Data underlying a paper published by Anders Pape Møller (center) in *Oikos* are in question.

NATIONAL SCIENCE FOUNDATION

Director Expected to Step Down

The director of the National Science Foundation (NSF) plans to resign before her 6-year term ends in August. Microbiologist Rita Colwell has told several colleagues of her plans, *Science* has learned, although she has not specified a date.

Rumors were circulating in Washington, D.C., last week that Colwell planned to announce her departure as early as this week, shortly before the president's 2005 budget is unveiled, and that it was tied to her frustration with a succession of stingy White House budget requests for the agency. Arden Bement, the current di-



Early out. Rita Colwell has been NSF director since 1998.

rector of the National Institute of Standards and Technology (NIST), was said to have accepted the job as interim NSF director and was preparing to testify in that capacity at an 11 February hearing of the House Science Committee.

But the rumors appear to have been wrong. Science committee staff members say that Colwell accepted their invitation in late December and hasn't notified them of any change of plans. NIST spokesperson Matt Heyman says that Bement "doesn't have

11 February on his calendar." And NSF's William Noxon says that Colwell plans to both present the president's 2005 budget for NSF on 2 February and represent NSF at the committee hearing. Last week Colwell told *Science* that she was not leaving anytime soon.

Still, several senior science policymakers say that Colwell has decided not to finish her term. "She's leaving early, possibly in a few months," says one official who has spoken with her.

Colwell was appointed NSF director by President Bill Clinton in 1998 after a double switch. Originally chosen as NSF deputy director, Colwell moved up the ladder into the spot vacated by then-Director Neal Lane, who left to take the place of retiring White House science adviser John Gibbons.

—JEFFREY MERVIS

CREDITS: (TOP TO BOTTOM) TIMOTHY A. MOUSSEAU; SAM KITTNER

Pentagon Biodefense Program Critiqued

The Pentagon needs to shape up its biodefense research program within 3 years or ship it out to a civilian agency, concludes a new report from the Institute of Medicine (IOM). The report, released last week, recommends that the Department of Defense (DOD) create a new organization to lead the fragmented and so far largely fruitless effort to develop new vaccines and drugs for soldiers (*Science*, 19 October 2001, p. 498).

The congressionally mandated report—*Giving Full Measure to Countermeasures*—urges the Pentagon to unite \$322 million in existing biodefense and infectious-disease programs under a single new agency that would report to a top DOD official, and to provide up to \$300 million in new funds over the next 5 years to establish a “vibrant extramural program” that would fund research in academia and industry. If such changes aren’t forthcoming, DOD should transfer its programs to the National Institutes of Health, the panel says. The report raises “legitimate concerns,” says a senior DOD official. But it’s not clear if the military is ready to swallow IOM’s potent prescription.

—DAVID MALAKOFF

2004 Budget Done; Warning Sounded on 2005

Congress last week approved the final seven spending bills for the 2004 fiscal year, which began 1 October. Overall, the 13 bills that direct federal spending contain nearly \$127 billion for research, an increase of nearly \$10 billion from last year, according to an analysis by AAAS, publisher of *Science*. Over 90% of the increase, however, goes to just three agencies: the Department of Defense, the Department of Homeland Security, and the National Institutes of Health (NIH). For a full accounting, see www.aaas.org/spp/rd.

Meanwhile, biomedical science advocates are wringing their hands over President George W. Bush’s proposed 2005 budget for NIH, due out next week and rumored to contain a 2.5% boost, to \$28.7 billion. That funding level would drop the number of new NIH grants by 584 from a projected 2004 total of 10,509, according to the Federation of American Societies for Experimental Biology (FASEB), and it would result in the lowest success rate since 1996. To avoid that crunch, FASEB hopes Congress will give NIH a 10% increase, to \$30.6 billion.

—DAVID MALAKOFF AND JOCELYN KAISER

ran a retraction from the pair stating: “It now appears that the measurements and analyses behind the data in the article were flawed and misinterpreted, implicating [*sic*] that the conclusions drawn are invalid.”

The retraction failed to satisfy Rabøl, who according to DCSD felt that it cast unjustified suspicion on Andersen. In a 29 March letter to DCSD, Rabøl filed a formal complaint against Møller.

In October 2001 DCSD appointed an ad hoc committee, chaired by Arne Helweg of the Danish Institute of Agricultural Sciences, to consider the case. Møller objected to one of the two other panel members—Freddy Bugge Christiansen of Aarhus University—on the grounds that he and Møller had known each other for many years and thus Christiansen had a conflict of interest. DCSD disagreed, and that November the ad hoc committee asked Rabøl and Møller for data and other materials. According to the panel, it took nearly 6 months for Møller to submit readable data files. (*Science* viewed case documents that had been posted to the Zoological Institute’s Web site.) Møller told *Science* that his copy of the original data was lost in an office burglary shortly after he moved to Paris in 1996. The files he submitted to the committee, he says, were reconstructed from partial printouts left after the burglary.

In a 25 September 2002 recommendation, Helweg’s panel stated that it “is convinced” that the data files Møller supplied “are at least partly fabricated and cannot be based on authentic measurements.” In one data set, the panel said, 75 values stated to three decimal points recur in a second data set representing separate measurements. “Such coincidence 75 times out of 75 data points can be ruled out unless measurements are reused,” the panel stated. A third data set also showed “a large number of instances of similarity.” Meanwhile, the panel found that Andersen’s different data set supplied to the committee—which she and Rabøl asserted was the paper’s original data—did not agree with the paper’s results.

In a 31 January 2003 letter to DCSD, Møller argued that the case rested on “probability arguments”—“events with very low probabilities do happen.” He also noted that he was not the sole author of the paper and that “even more people were engaged in collecting and entering the data.” Moreover, Møller claimed that measurements by one of his students showed that Andersen’s measurements could not be replicated. (De Lope says he agrees with Møller’s characterization

of the measurements.) The ad hoc committee responded that the coincidences in Møller’s data sets “definitely cannot reasonably be due to chance” and that “there is no explanation as to why [Møller] cannot produce an authentic data material that agrees with the results of the paper.”

Møller followed with a more detailed rebuttal on 12 November, assailing the committee for “blatantly erroneous and morally and legally unjustified” conduct. Among his 10 points, Møller claimed that an unnamed expert, working with the data files he had given the committee and without his guidance, had arrived at the findings published in the original paper.

In a statement that Møller distributed widely to colleagues earlier this month, he claims his accusers were motivated by revenge. Rabøl, he says, was forced to retire after a complaint from Møller resulted in a “highly critical and damning report” from an international committee evaluating their university department. Rabøl acknowledges that he was asked to retire, but he says that

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The tail’s tale. Møller’s studies suggest that traits such as symmetrical tails of barn swallows are an indicator of genetic fitness.

this did not influence his complaint about the *Oikos* paper.

In his rebuttals, Møller also charges that Andersen “had a problem of alcohol abuse,” insinuating that “data provided by her might have problems of reliability.” Møller elaborates that he had once seen “more than 20 empty beer bottles” in Andersen’s office. An accumulation of bottles “is a distinct possibility,” Andersen told *Science*, explaining that empties from institute parties tended to collect in her office. She denies having had any problems with alcohol.

Møller insists that, in his many collaborations over the years, “never once have I had any complaints about my conduct.” However, some of his colleagues are now scrutinizing his earlier work.

As *Science* went to press, concerns had emerged over a second paper. In 1993, Møller and Andrew Pomiankowski of University College London co-authored a ▶

widely cited paper in the journal *Behavioral Ecology and Sociobiology* on why birds have multiple sexual ornaments. The paper claimed to have examined only species from the British Museum's Tring Collection that had at least 20 fully molted males, and it stated that Møller had measured the specimens. But Adrian Thomas of Oxford University says that when he and his colleagues went to find the birds in the mid-1990s to conduct an analysis for a similar study, they discovered that the Tring Collection held fewer than 20 such males for six of the 21 species cited in the paper. "The absence of specimens is clearly a major problem," says Thomas. "There's something wrong somewhere."

Thomas says that when he queried him,

Møller said that he'd also measured specimens in other European museums. But the paper spelled out that the criterion for the choice of species was those with sufficient specimens at Tring, implying that this was Møller's means of getting a random sample. Møller claims that Thomas never questioned him about the Tring samples. He confirms that he may have examined specimens from other museums and rejects the characterization of this as a problem. Pomiankowski says he now mistrusts Møller's work: "I've stopped reading anything on which Møller is an author," he told *Science*.

However, many others have rallied to Møller's defense. "I certainly support Anders in everything he's doing," says Jacob Koella,

Møller's supervisor at the Université Pierre et Marie Curie. "As far as I understand, he did a calculation wrong. That hardly means he fabricated data." De Lope, who says he has collaborated on about 35 papers with Møller, says he's convinced of Møller's probity.

Most observers are reserving judgment until Møller gets his day in court. "He has to go through hell now if he's going to get his name cleared," says Oxford's Harvey. He says that until Møller is vindicated in court, he has informed Møller that he has advised students and colleagues not to cite Møller's papers if an alternative source can be found. "It's the only sensible thing to do," he says.

—GRETCHEN VOGEL, FIONA PROFFITT,
AND RICHARD STONE

INFECTIOUS DISEASES

WHO Ramps Up Bird Flu Vaccine Efforts

Tokyo—While a killer avian influenza decimates poultry flocks in Asia, scientists in a World Health Organization (WHO) flu network have started work on a vaccine to protect humans from the often-fatal disease. Because this virus stymies traditional egg-based vaccine production methods, they are using a novel genetic modification technique to hatch a tame virus. But a flu vaccine produced this way has never before been used in humans, raising questions about safety and efficacy. Intellectual-property rights are also an issue, as is the capacity for mass production.

Addressing these issues "has to be expedited," says Klaus Stöhr, a virologist who heads influenza preparedness efforts at WHO in Geneva.

Since last December, the H5N1 strain of avian influenza has appeared in at least eight Asian countries. Human infections are rare and so far appear to result from direct exposure to diseased birds. But researchers worry that if the virus infects a person already carrying a human flu, it will reassort into a new virus easily transmissible from person to person, touching off a global pandemic. WHO hopes to get a vaccine that could help prevent not only rare human deaths from bird flu but also this potentially devastating viral reassortment. If the virus does acquire human transmissibility, however, yet another new vaccine may be required.

In either case, vaccine developers have a head start, thanks to work done on an H5N1 strain that briefly appeared in Hong Kong in 2003.

Traditional flu vaccine development relies on mixing the target flu virus and a harmless flu strain in chicken eggs and then screening for an appropriate vaccine candidate. This

doesn't work for H5N1 because it kills chicken embryos. To sidestep this problem, a group at St. Jude Children's Research Hospital in Memphis, Tennessee, adapted a reverse genetics process in which genes from different viruses are individually cloned and reassembled into an inactivated vaccine virus.



Dirty and dangerous. Workers culling diseased birds could be among the first to be vaccinated if a bird flu vaccine gets into mass production in time.

Working with the 2003 H5N1 strain, the researchers cloned the two genes that code for the virus's surface glycoproteins: hemagglutinin and neuraminidase. The remaining six genes needed for a viable virus were cloned from a "safe" influenza virus strain long used in vaccines. All the cloned genes were introduced into a cell line where replication was initiated. The resultant virus is incapable of causing disease but carries the surface glycoproteins that stimulate the immune system to produce antibodies to H5N1.

Unfortunately, the H5N1 strain circulat-

ing this year differs so dramatically from the 2003 strain that a new seed vaccine is needed. Producing it will take at least until late February, according to WHO officials. And that is just the first step. Stöhr explains that normal efficacy trials, which determine if a flu vaccine reduces deaths or hospital-

izations, will be difficult to carry out. He also worries that some countries may object to a vaccine based on a genetically modified organism.

Another challenge is that MedImmune Inc. in Gaithersburg, Maryland, holds the patent for the reverse genetics process. Although company spokesperson Jamie Lacey says that the firm offered "to license our patent rights to the manufacturers of a pandemic vaccine,"

details remain to be negotiated. And other individuals and institutions hold rights over other aspects of the process used by the St. Jude team. A final issue is how quickly drug manufacturers can ramp up mass production.

"These are humanmade problems and humans can solve them," says Robert Webster, a flu expert who directs the WHO collaborating center at St. Jude. It's unfortunate, he says, but it seems that the only way to focus attention on solutions is for "people to start dying in serious numbers."

—DENNIS NORMILE