groundwork for stem cell experiments. The new approach would "allow the science to move forward," Smith says.

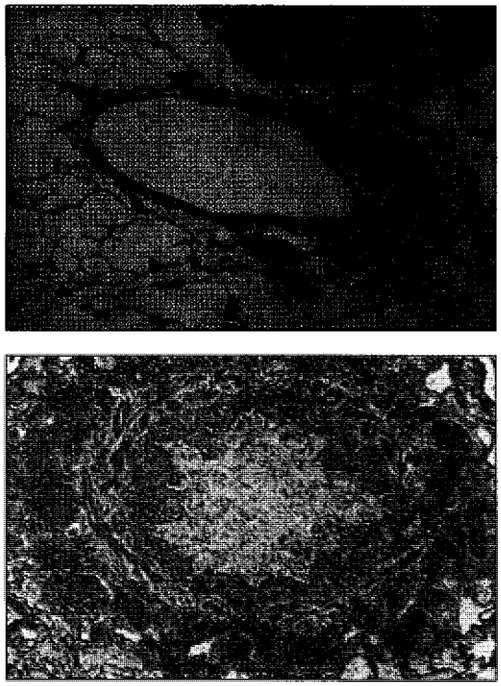
The decision on whether to accept these recommendations, however, rests with the health ministry and the HFEA, which have not announced what they plan to do.

–ELIOT MARSHALL

IMMUNOLOGY

Interleukin-13's Key Role in Asthma Shown

As any sufferer can tell you, an asthma attack is nothing to sneeze at. In a dramatic—and dangerous—overreaction by the immune system, the lungs pump out mucus and inflammatory molecules, clogging and swelling constricted airways; in severe cases, all airflow is cut off, and the attack can be fatal. Now, on pages 2258 and 2261, two independent teams present evidence that an immune system messenger called interleukin-13 (IL-13) may be a key culprit in such attacks. The results come from mouse studies, but if they hold up in humans, they suggest two promising targets for antiasthma therapies.



Taking your breath away. A normal lung is clear (*top*), but the molecule IL-13 may trigger mucus production and airway tightening, as shown in a patient who died of an asthma attack (*above*).

Although IL-13 was known to play a role in asthma, it was typically overshadowed by its better-known sibling molecule, interleukin-4, another member of the cytokines—a group of messenger molecules that help coordinate the body's immune responses. The new work suggests, however, that IL-13 was unjustly overlooked. "[The work] alerts people who have dismissed IL-13 to its importance, along with IL-4, in asthma," says immunologist Charles Maliszewski of Immunex Corp. in Seattle.

Until now it was difficult to separate the roles of IL-13 and IL-4, because they seemed to have very similar effects and dock on very similar receptor complexes at the surface of immune system cells. But a new molecule that selectively mops up IL-13 from airways has allowed the two teams of scientists to clarify the roles of these twin messengers—and show that IL-13 is a key player in its own right.

The new molecule, developed by immunologist Debra Donaldson of Genetics Institute in Cambridge, Massachusetts, is a soluble version of a recently cloned piece of a cell surface receptor that is specific to IL-13. The molecule binds to the cytokine, preventing it from attaching to its receptors.

Immunologist Marsha Wills-Karp of Johns Hopkins University and her colleagues gave the IL-13 blocker to mice already primed for an asthma attack. When the researchers exposed the mice to an allergen, the IL-13 blocker prevented airway tightening and the increase in mucus production typical of asthma. Conversely, giving IL-13 to mice not primed for an attack caused airway tightening and an increase in eosinophils, a kind of inflammatory cell prevalent in asthmatic lungs but scarce in healthy tissue.

In independent work, Gabriele Grünig and David Corry of the University of California, San Francisco, and their colleagues came up with similar results. The team applied either an inactive control protein or a drop of IL-13 blocker to the nasal passages of a different strain of mice, then exposed the animals to an asthma-inducing protein. The mice that received the IL-13 blocker had almost no airway tightening. They also had roughly one-third of the eosinophils and only half of the mucus-producing goblet cells seen in mice that received only the allergen. The team also tested IL-13 and IL-4 head-to-head by applying them directly to the mice's nasal passages. The mice that received IL-13 appeared to have worse symptoms. "While IL-4 plays a role," Corry says, "IL-13 may be more potent."

The papers present "very convincing evidence that IL-13 has a role in these mouse models," says immunologist Paula Jardieu of Genentech in South San Francisco. But few asthma researchers, including Jardieu, are ready to discount IL-4. They note that IL-4 prompts immature T cells to develop into a type of cell called T_H2 (for T helper 2), which are a hallmark of asthma and allergic diseases. These cells produce IL-13, more IL-4, and several other asthma-inducing molecules. "Maybe IL-13 does more on a quantitative basis, but you don't get T_H2 cells in absence of IL-4," says immunologist Lanny Rosenwasser of National Jewish Medical and Research Center in Denver. And without T_H2 cells, he says, there is no asthma.

Several researchers say that perhaps a more promising drug target than either cytokine is the portion of the receptor molecule on immune system cells that is shared by both IL-4 and IL-13. Indeed, in Corry's experiments, a strain of mice genetically engineered to lack this part of the receptor did not develop signs of asthma when they were given either cytokine. Several companies are already seeking an effective way to block the receptor's signaling. "[The cytokines] won't give you asthma without that receptor," Corry says. "That kind of bottleneck is the perfect target for designing new therapies."

–GRETCHEN VOGEL

FISHERIES SCIENCE

Papers Posit Grave Impact of Trawling

WASHINGTON, D.C.—A group of marine scientists has lobbed a rhetorical warning shot across the bows of the world's trawling fleets. In a press conference this week, they presented evidence that dragging heavy nets across the seafloor causes far more environmental damage than does the more visible clearing of forests. Some trawlers are returning fire, however, saying that the scientists have overstated their case and that some fishing grounds have remained productive despite more than a century of trawling. Caught in the crossfire are government fisheries officials, who believe the new findings will fuel but not settle an increasingly rancorous debate over whether to curtail trawling in some heavily fished waters.

The latest battle over sustainable fishing was triggered by a suite of seven papers released on Monday* and by a flotilla of results discussed last week at a conference in the United Kingdom.† Some seafloor researchers and the American Oceans Campaign, a Washington, D.C.–based environmental group, hope the findings will prompt an outcry against the largely invisible impact of trawling, a technique traditionally confined to shallow coastal seas that has recently extended its reach into waters up to 2

* *Conservation Biology*, December 1998.
† "Effects of fishing on non-target species and habitats: Biological, conservation and socio-economic issues," Baumaris, Anglesey, Wales, 7 to 10 December 1998.

CREDITS: (TOP) WARNOCK ET AL., *PRACTICAL PATHOLOGY OF CHEST DISEASE*, 1996; (BOTTOM) MARTHA WARNOCK

kilometers deep. At the press conference, which included Hollywood star Ted Danson, scientists and environmentalists called on governments to establish more marine reserves where trawling—but not all fishing—is banned. "We cannot continue to allow the use of trawling on such a broad scale if we are going to sustain fish habitat and marine biodiversity," said biologist Peter Auster of the University of Connecticut, Avery Point, author of one of the papers.

The most controversial paper, by Les Watling, a biologist at the University of Maine, Orono, and Elliott Norse of the Redmond, Washington–based Marine Conservation Biology Institute, equates the habitat damage caused by trawling with forest clear-cutting—long denounced by biologists as a major threat to biodiversity. Both techniques, the researchers argue, transform structurally complex habitats supporting many kinds of life into relatively flat, uniform environments that shelter fewer species. But trawlers cover far more ground than loggers, say Watling and Norse. Their estimate, based on scanty industry records, is that the worldwide fleet of trawlers drag up to 15 million square kilometers annually—an area 150 times greater than the forest cleared each year. Unlike loggers, however, some trawlers may sweep the same seafloor patches many times in a single year, leaving little time for slow-growing organisms to regain their toeholds. Trawling's long reach "was not previously appreciated," the pair concludes. "With the possible exception of agriculture, we doubt that any other human activity physically disturbs the biosphere to this degree."

Another of the new studies, led by Jonna Engel of the Moss Landing Marine Laboratory in California, is among the first to document the change in biodiversity from trawling. Using sonar, video images taken from submarines, and samples of seafloor life, it compared a repeatedly trawled seabed 180 kilometers off the central California coast with a nearby swathe that was dragged less often. Engel's team found that the heavily trawled area was flatter and harbored fewer species than the lightly fished stretch. They also found that increased trawling reshuffled sea life communities: smaller, rapidly reproducing creatures—such as nematode worms—tended to replace larger, longer-lived organisms, such as some shellfish. Other studies suggest the ecological changes can persist for months or longer after trawling ends.

The idea that trawling produces undersea winners and losers also surfaced at last week's conference in Wales, which featured work in European waters. Dutch researchers, for instance, found that a century of trawling may have reshaped parts of the North Sea's floor into perfect habitat for Dover sole, a sought-after catch, and swept away less adaptable creatures, such as delicate anemones. "It's ironic that destructive fishing activity appears to have created just the kind of flat, homogenized habitat that sole prefer," says conference organizer Michel Kaiser of the University of Wales in Bangor.

Net loss. A patch of seafloor off Swan's Island, Maine, before (left) and after the area was swept by a scallop dragger.

CREDIT: PETER AUSTER

Fishing industry officials point to such results in arguing that policy-makers need more information before establishing trawl-free zones. Trawlers and marine biologists agree that "some gear does impact some bottom types during some fishing operations," says Nils Stolpe of the New Jersey Seafood Harvester's Association in Bucks County, New Jersey. But "there isn't anything approaching a consensus on the effects, positive or negative."

And even some ocean protection advocates are uneasy about tarring trawling with clear-cutting's reputation. The analogy is "inaccurate at best and incendiary at worst," says Dery Bennett, head of the American Littoral Society, a coastal protection group based in Highlands, New Jersey. Trawled areas, he believes, generally recover far more quickly than clear cuts if left alone. In addition, he says, the comparison may poison the atmosphere for scientists and fishermen working together to ban trawling in particularly sensitive areas such as coral reefs and nursing grounds for young fish.

The United States has already taken limited steps toward protecting reefs and some nursing grounds, notes National Marine Fisheries Service deputy director Andy Rosenberg. But he says policy-makers will want more specific information before closing more waters to trawling. "The science is still spotty and too inconclusive," he says. The new studies, he adds, "should really help the policy debate move forward."

–DAVID MALAKOFF

PARTICLE PHYSICS

A Second Hint of Symmetry Violation

CHICAGO—The first glimpse of stocking may once have been looked on as shocking, as the classic musical has it, but the second one was eagerly anticipated. For more than 30 years that's been true in physics, ever since experimenters studying the decay of particles called kaons in 1964 were shocked by a violation of their beloved laws of nature. Since then they have realized that the effect, a basic asymmetry in physics called CP violation, might explain why the universe contains more matter than antimatter, and they have been eager to get a second look at it in other particles. Now another case of CP violation may finally be showing its ankle, in particles called B mesons.

The evidence is tantalizing but not conclusive, says Al Goshaw of Duke University and co-spokesperson of the Collider Detector at Fermilab (CDF) collaboration, whose paper on the work is soon to appear in *Physical Review Letters*. "If it's there, we'll see it" with more data, he adds. And plenty of data are on the way at Fermilab's Tevatron accelerator, when its Main Injector, which will increase the luminosity of the colliding beams of particles, fires up in 2000, producing hundreds of times more B mesons. The results should also be encouraging for physicists at the Stanford Linear Accelerator's so-called B factory, a particle accelerator specifically designed to study CP violation in B mesons, which could begin taking data by April next year.

The asymmetry that these physicists are so eagerly pursuing is a subtle difference in the behavior of particles when their charges are reversed and space is reflected about the three axes. Because that transformation turns matter into antimatter, any difference in behavior, such as reaction rates, under a CP transformation could help explain why there is much more matter than antimatter in the universe. Since the effect was spotted in kaons, it had not turned up in any other particle, and physi-