

# 17155 Seals, sense and sensibility

Public interest in the deaths of seals in the North Sea has provided cash to save them—and moral problems for the scientists involved. But the lessons emerging may be valuable

John Harwood and Peter Reijnders

SINCE April, more than 14 000 common, or harbour, seals (*Phoca vitulina*) have washed up dead around the coasts of Europe. The death toll is certain to rise much higher over the next six months. Scientists' attempts to identify the reasons for this disaster and to combat it have attracted enormous attention. As a result, almost every speculation has been widely reported and there is clearly much confusion, even in the specialist press, about what is happening.

The first clear signs that something was wrong came in mid-April, although with hindsight seal biologists from many countries now recall that they saw more sick seals than normal during the previous winter. First, nearly 100 common seal pups were born prematurely near the Danish island of Anholt. Researchers on both the Danish and the Swedish shores of the Kattegat soon observed sick adults with what later became the classic symptoms of the illness—nasal discharge, lethargy and severe breathing problems.

By mid-May, hundreds of dead seals had appeared in the Kattegat and the bodies of animals began to wash ashore on the island of Sylt, off the North Sea coast of West Germany. These deaths coincided with a major algal bloom which moved westwards out of the Baltic along the north shore of the Kattegat, and an almost complete failure of some seabirds at colonies in Shetland to breed.

Not surprisingly, the popular press linked all three events and blamed pollution. It is now clear that pollutants played no significant role in the formation of the algal bloom or in the seabirds' disastrous breeding season. The role of pollution in the deaths of seals remains unclear.

By the end of June, researchers had found 3800 dead seals in the area of the Skagerrak and the Kattegat, and 2700 in the Wadden Sea. A meeting of biologists in Bonn rejected overcrowding and the algal bloom as direct causes of the deaths and doubted that pollution was directly involved. They concluded that some unknown disease was the primary agent. This disease, they said, could be a picorna virus—which virologists had isolated from a significant proportion of dead animals—acting together with a herpes virus which they already knew to occur in seals.

By mid-August, there were reports of animals showing similar symptoms from the east coast of England, where almost all the common seal pups in rescue centres had died. A meeting of scientists convened in London by Greenpeace, the environmental organisation, supported the disease hypothesis but also gave some credence to the role of pollution.

By the beginning of September, people were reporting sick and dead seals from Scotland and Strangford Loch in Northern Ireland. A paper in *Nature* by Albert Osterhaus and Lise Vedder, a virologist and

a veterinary scientist in the Netherlands, presented evidence that the disease was caused by the canine distemper virus (CDV) or a very closely related virus from the morbilli family (vol 335, p 20).

This family of viruses also includes rinderpest and measles. CDV and rinderpest certainly cause symptoms that are very similar to those shown by the seals, and there now seems to be general agreement that infection with a morbilli virus, which researchers have now identified in a very high proportion of dead and dying seals, is the primary cause of the deaths.

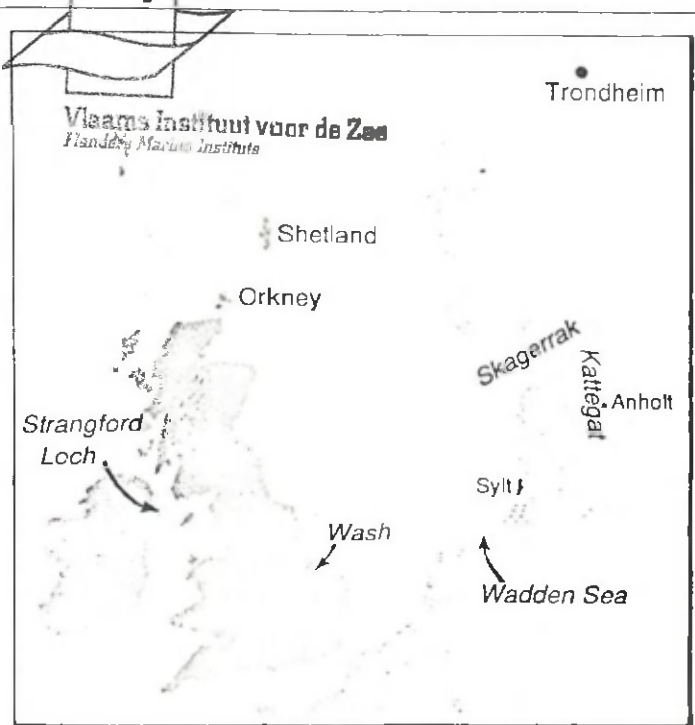
Very few dead seals are now being reported from the Kattegat, and it looks as though about 30 per cent of the animals there have survived. But the death toll is still rising in the Wadden Sea, where workers have recovered 7800 bodies, and in Britain, where the toll is approaching 2000.

Has pollution played any important part in this disaster? Certainly, under the influence of some fairly sensational coverage in the popular press, this is what most members of the public think. And the view has a legitimate scientific basis.

Seals are particularly vulnerable to pollution because they are at the top of the marine food chain and therefore suffer the full effects of the biological accumulation of toxins. In addition, seals can build up in their bodies high concentrations of contaminants that are soluble in lipids in their blubber. These contaminants are released when the animal mobilises its reserves of fat at times of stress, such as the pupping season or when it moults.

Because of these features, and because seals are mammals, like humans, seals can provide a useful early warning of the potentially harmful effects of some marine contaminants such as polychlorinated biphenyls (PCBs) and a number of pesticides which researchers have found in high concentrations in seals from the Baltic and the Dutch Wadden Sea.

There is good evidence that these contaminants are responsible for the widespread sterility and infertility among seals in these areas, but they are also known to suppress the immune systems of other mammals under laboratory conditions. So



it is not surprising that many scientists suspect that such pollutants have contributed to the severity of this epidemic.

The way the epidemic has developed suggests that pollution may have played only a small role: so far, the greatest number of deaths has not occurred in the most polluted parts of the Wadden Sea and the Baltic, and the dead seals analysed so far have not shown unusual levels of PCBs or pesticides.

However, no one has yet been able to analyse for a number of other compounds known to suppress the immune system, such as dioxins and dibenzofurans. This fact and the level of public concern are sufficient to justify a detailed investigation of the possible links with pollution.

The governments of the Netherlands and Britain and the European Commission have already indicated their support for a three-year programme of research which a number of European laboratories have just drawn up. Researchers will check samples of blood and blubber from seals from the North Sea and the west coast of Scotland for unusual concentrations of a wide range of potentially toxic organic compounds and heavy metals.

After this, biologists will carry out feeding experiments on the seals. These will be similar to the experiments that first demonstrated the effects of PCBs on reproduction (*Nature*, vol 324, p 456). The tests will determine if any of the suspect compounds do affect the seals' immune system.

Even if pollution is not directly implicated, this conclusion will not be a signal for unscrupulous industrialists to start

discharging PCBs into the North Sea. The laboratory evidence of the toxicity of PCBs was sufficient to convince ministers at the North Sea Conference in London last November that countries should reduce their inputs of the compounds by half by 1995. But if pollution is implicated and the research can identify the specific compounds that are responsible, it will be possible to make such controls much more effective.

The enforcement of controls is a long-term objective. Is there anything that can be done now? Scientists should obviously try to collect as much information as possible from the animals that die. People have

Rescue centres are likely to be more important for the recovery of populations of seals after the disease has run its course. Even before this year's epidemic, one-fifth of the seals in the Dutch Wadden Sea has been released from rescue centres over the past 15 years.

Many hopes have focused on the development of a suitable vaccine. Commercial vaccines against morbilli viruses use a live but weakened form of the virus. There is a scientific consensus that it would be extremely unwise to use them on wild seals, for fear of infecting other wildlife. Two vaccines based on an inactivated virus are now under test on seals.

hasn't it infected seals until now? CDV is known to affect a large number of carnivores in addition to dogs. It is common in populations of wild animals. Seals in the Wadden Sea and the Baltic have been carrying high levels of PCBs for decades, so if their immune systems have been weakened by these compounds, the animals should have been vulnerable to infection for some time.

Yet there is no evidence that European seals have suffered from CDV in the recent past, although there are historical records of mass mortalities of these animals in the North Sea that go back hundreds of years.

People have erected some fanciful



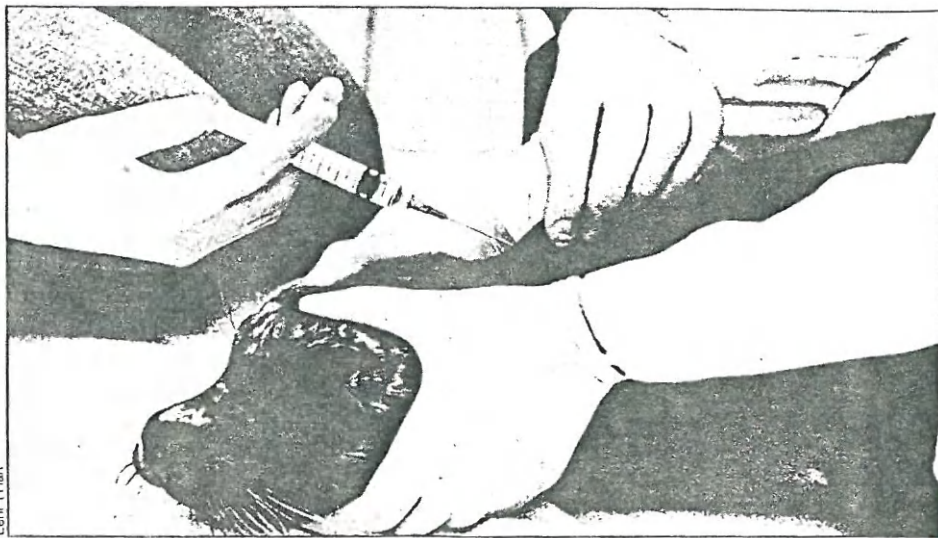
Seal appeal: can public enthusiasm help?

worked remarkably hard in most countries to establish multidisciplinary research teams at short notice.

In West Germany and the Netherlands, virtually every dead seal has been collected and deep-frozen for future analysis. It will not be practicable to collect all dead seals in Britain, because of its extended and often inaccessible coastline, but voluntary groups and organisations with funding from the government are trying to ensure that as many animals as possible are examined.

Can anything be done for the seals themselves? The Scandinavian countries decided in August that they would simply allow the disease to run its course. But newspaper appeals in Britain and West Germany have raised hundreds of thousands of pounds specifically to save seals. Such a task will not be easy. CDV is difficult to treat in dogs because it attacks both the immune system and the central nervous system. Secondary infections are the usual cause of death in the early stages, but animals which survive these infections may later succumb to problems of the nervous system.

Experience in the Seal Research and Rehabilitation Centre at Pieterburen in the Netherlands has shown that a small proportion of pups can be nursed through the disease, but most adults die. Conservation groups in Britain are now trying to bring as many sick pups as possible into a new rescue centre at Docking, on the north Norfolk coast. But this will save at most a few hundred animals.



Vaccination may protect small numbers of captive seals, but cannot help wild animals

A useful vaccine will need two key features. First, it must stimulate not only a normal antibody response, but also the T-lymphocyte system, which is known to be important in resistance to infection by morbilli viruses. Secondly, it must give some protection after a single vaccination. Most inactivated vaccines require two injections at least four weeks apart, and are thus impractical for use on wild seals.

Advising on how best to use public donations to "save our seals" has caused scientists some moral problems. One newspaper, anxious to show that the money was being put to good use, announced that it would fund the vaccination of grey seals at the Farne Islands and a research programme on common seals in the Wash. Even if researchers can develop an effective vaccine, a vaccination programme could cause widespread disturbance and do more harm than good.

Does this mean that it would be morally wrong to accept funds for a programme of research? We think not, as long as the research benefits the seal populations in the long run. Any proposal to vaccinate grey seals in Britain in the next three months will require a licence under the Conservation of Seals Act, and will be closely scrutinised. And it will be several weeks before the potential vaccines have been tested, so there is no danger that the Farne Islands face imminent invasion by over-enthusiastic volunteers waving loaded syringes.

Where did the virus come from, and why

hypotheses to explain how distemper may have spread from huskies in west Greenland, where there was an outbreak of the disease last year, or Lake Baikal in the Soviet Union, where about 10 per cent of the population of native seals (*Phoca sibirica*) appears to have died from a viral infection remarkably similar to the one now attacking seals in the North Sea (This Week, 8 September).

But the real source of the virus may be closer to home. Tests now under way in a number of European laboratories on a range of monoclonal antibodies to the different strains of virus should soon provide the final clues necessary to solve this particular mystery.

The intense and continuing interest of the media in the epidemic has exposed to public view in an almost unprecedented way the way biologists try to understand such phenomena. We feel that the obvious concern shown by all those involved in the problem has had a positive effect on the way the public sees scientists. It has also helped to heighten awareness in all quarters of the undoubted problems in the marine environment. When the time comes to evaluate the consequences of the disaster, these may be among the more tangible benefits. □

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