Microbial stowaways: Are ships spreading disease?

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Ships are inadvertently carrying trillions of stowaways in the water held in their ballast tanks. When the water is pumped out, invasive species could be released into new environments. Disease-causing microbes could also be released, posing a risk to public health, according to an article in the May issue of *Microbiology Today*.

“There is no romantic adventure or skullduggery at work here,” said Professor Fred Dobbs from Old Dominion University, Virginia, USA. Ships pump water in and out of ballast tanks to adjust the waterline and compensate for cargo loading, making the ship run as efficiently as possible. These tanks can hold thousands of tonnes of water. “Any organisms in the water are likely to be released when it is next pumped out.”

Many non-native animals and plants have been taken to new environments and become invasive, threatening the survival of local species; some fundamentally alter the ecosystem. Zebra mussels were introduced in North America and the comb jelly in the Black Sea and both have had enormous ecological and economic impacts

For more than 20 years we have known that a variety of large phytoplankton and protozoa are transported in this way, but we know very little about smaller microbes like bacteria and viruses. “It is inevitable that hundreds of trillions of micro-organisms enter a single ship’s ballast tank during normal operations,” said Professor Dobbs. The majority of these microbes are harmless, but some are a potential risk to public health.

“Vibrio cholerae, which causes cholera in humans, can be carried in ballast tanks,” said Professor Dobbs. “There have been no known outbreaks of disease associated with ballasting activities, but the water is only sampled very rarely.” Other disease-causing microbes in the tanks include Cryptosporidium parvum and Giardia duodenalis, which cause stomach upsets.

Some people say microbes are present everywhere; they may be easily dispersed because they are so small. However, many experts believe micro-organisms have a “biogeography”, a natural home, which means they could become invasive if moved and have a negative effect on different environments. There is some evidence for this argument: two phytoplankton species called diatoms were introduced to the English Channel from the North Pacific Ocean

The International Maritime Organisation, which sets rules and standards for the global shipping industry, has proposed an upper limit to the numbers of Vibrio cholerae, E. coli, and intestinal enterococci contained in discharged ballast water. A few ships are also using different treatments to reduce and even eliminate the microbes in their ballast water. “A number of techniques are being looked at for this purpose, from filtration to biocides, ultrasound to ultraviolet irradiation,” said Professor Dobbs. “Our understanding of the issues involved will increase as more studies are carried out, particularly those employing the tools of modern molecular biology.”

Source: Society for General Microbiology