Multiple Pathways for Parasites

Species invading a new habitat often leave their enemies behind. With fewer predators, competitors, and parasites to impede them, some invasive species can be explosively successful in their new home—just like kudzu and zebra mussels. But sometimes old enemies can catch up with invading species. Sometimes they are already there waiting when the species arrives.

Mark Torchin, an ecologist at the Smithsonian Tropical Research Institute in Panama, is part of team led by Osamu Miura of the University of Tohuku in Japan that used genetic markers to follow the fortunes of the Asian mud snail, an invasive intertidal species. The snails were inadvertently brought to North America from Japan in the early 1900s when estuaries were seeded with Pacific oysters to boost the seafood industry. In their native range, mud snails are commonly infected with parasitic flatworms called trematodes. The North American immigrants have them too, but to a much lesser extent. Like many parasites, the flatworms have a complex life cycle, involving several host species. Even if the imported snails had been infected with a full complement of trematode species, many would not have been able to reproduce because of missing additional hosts that they require in the environment.

The scientists found that the North American snails were infected with two common trematode species. The snails and one of the trematode species had reduced genetic variation compared to the native populations in Japan. This was expected: The small numbers of individuals that make up founding populations will represent just a fraction of the genetic variation in the home range. The researchers were able to use the genetics to pinpoint where in the original range the snails and flatworms came from.

The other flatworm species, however, did not fit the pattern. Its genetic variation was undiminished, and its genes also seemed to indicate a broad source region. Because trematode flatworms often infect birds as well as snails in their life cycle, Torchin and his colleagues hypothesize that these flatworms crossed the ocean not with the snails, but with migratory shorebirds. If that’s the case, then the flatworms would have already been present in the North American environment when the snails arrived.

This was surely bad news for the snails. But does it matter to human beings? Yes it does, the researchers explain in a recent paper published in the Proceedings of the National Academy of Sciences. As the world becomes increasingly interconnected, we need to better understand the dynamics of how diseases and parasites of humans, livestock, and wildlife are spread by introduced species. This study shows how outbreaks can arise not by the arrival of a new parasite or pathogen, but by the arrival of a key host in its life cycle. The more new species arrive in a region, the higher the chances that infectious agents that were formerly tourists will become pervasive residents.

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