

# The infection, immunity partnership

One of the most eagerly anticipated speakers at this year's Charles Darwin Symposium is Nobel Laureate Professor **peter doherty AC**, who will explore the interaction between infection and immunity.

Laureate Professor from the University of Melbourne, Peter Doherty AC, will open the first full day of discussion at the September Symposium, designed to celebrate, discuss and debate the contributions of Charles Darwin to science, society and the future.

Professor Doherty, who was awarded the Nobel Prize for Physiology or Medicine in 1996 and named Australian of the Year the following year, is a researcher dedicated to the exploration of the immune system. A medical researcher who trained initially as a veterinary scientist, Professor Doherty will present on the topic: The co-evolution of infection and immunity. He will explore Darwinian science at work in human populations through "interface with simpler life forms that seek to live in or on us", an interaction more commonly known as infection.

"The emergence of slowly reproducing, multi-cellular, multi-organ systems like us has only been possible because we developed a complex, adaptive immune system that uses a vast spectrum of chemical recognition units (receptors) to bind other entities (proteins, peptides, carbohydrates) that are characteristic of rapidly replicating micro-organisms like viruses, bacteria and fungi," Professor Doherty said.

"There can be no doubt that infection provided the selective pressure that drove the evolution of what we call adaptive immunity.

"Almost everyone is persistently infected with one or more types of herpes virus: herpes simplex virus (cold sores), herpes zoster (chicken pox, shingles), Epstein Barr virus (infectious mononucleosis) and cytomegalo virus.

"On the whole, we live reasonably happily with these viruses and they with us because we are their sole maintaining hosts, their only home," he said.

There are organisms, however, that are normally maintained in other hosts.

"Organisms like the rat-born, flea-transmitted *Yersinia Pestis* (plague) or the yellow fever virus that survives in wildlife reservoirs and is spread by mosquitoes have no vested interest in adapting to us, though they must have exerted a massive selective pressure in historical time.

"Up until now, we have had little direct evidence on how viruses may have changed our genomes as we had no baseline for comparison. But now that we can recover Neanderthal DNA, we should be able to probe questions



text

Row Booker

photograph

Courtesy Professor Peter Doherty

left

Peter Doherty AC

like what Europeans were genetically before plague struck, a disease that from the time it first invaded in the 14th Century and for hundreds of years afterwards killed half to one-third of the population of Europe," Professor Doherty said.

His presentation will include the "shaping" effect that pathogens have when introduced to human populations including the impact malaria had in the Mediterranean with the emergence of sickle cell disease (Thalassemia).

"In this disease the red cell is changed in a way that does not support the life of a malaria parasite but is barely able to transport the oxygen that we need to live, an evolutionary trade-off that continues to cause severe disease and death," Professor Doherty said.

He will conclude on a controversial examination of what he calls the "intriguing and indisputable fact that, as we look at the obfuscation of the creationists, they don't ever seek to claim infectious agents for their mythology-based agenda".

