A new arbovirus in northern Australia

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Routine arbovirus surveillance has unearthed a number of novel viruses circulating in domestic and wild animals in northern Australia. One of these is a new virus named Middle Point orbivirus (MPOV). While its disease potential remains unknown, evidence suggests that this virus emerged quite recently in Australia and it has now become the single most commonly isolated animal virus in the Northern Territory. The discovery of MPOV highlights the importance of obtaining prototype data on novel Australian viruses.

Beatrice Hill research farm, Middle Point (Figure 1), is located approximately 50km East of Darwin and has long been recognised as a hot spot for arthropod-borne viruses (arboviruses). For over 30 years, the National Arbovirus Monitoring Program (NAMP) has maintained herds of sentinel cattle at this site for virus isolation and serological studies. From the mid-1990s onwards, an increasing number of viruses were isolated that could not be identified by traditional methods (such as using panels of antibodies raised against all known Australian arboviruses) and by 2005 the unidentified virus collection had exceeded 1000 specimens.

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shared a high level of similarity with a virus from China called *Yunnan orbivirus* (YUOV) \(^4\). Despite this relationship, some major differences were immediately apparent: YUOV had been isolated only from mosquitoes and would not grow in any of the mammalian cell culture systems tested, whereas MPOV was isolated from a domestic cow and grew very rapidly in mammalian cells *in vitro*. Analysis of the genetic sequence of the two viruses indicated that immunity to one would be very unlikely to confer protection against the other. Finally, the two viruses had been found in locations separated by more than 5000km of land and sea. Analysis of blood from infected animals confirmed that cattle were able to make immune responses to MPOV; however, antibody levels were consistently found to be low, leading to long-lasting infection in some animals. Furthermore, cattle with antibodies against MPOV were identified in multiple locations across the Northern Territory, indicating that the virus was much more widespread than anticipated. A diagnostic test was developed for screening further unidentified viruses in the arbovirus collection and almost half of all isolates screened to date turned out to be isolates of MPOV. In recent years, MPOV has accounted for more than one third of all arboviruses isolated from animals in the Northern Territory.

The oldest isolates of MPOV identified so far were collected in the Northern Territory in 1994 and we estimate this to have been around the time that it first emerged in Australia. There are two main hypotheses regarding the origin of MPOV in this country. The first and most likely scenario is that it arrived on the wind in the body of an infected insect blown here during a tropical storm. Alternatively, MPOV may have been present in the Australian environment much longer, but has only recently acquired an adaptation allowing it to become so widespread. Either way, it is a timely reminder that viruses are unstable entities, capable of rapid change and that their emergence in new environments needs to be carefully monitored.

The diagnostic test is now used by the NAMP to allow the ongoing identification of isolates of MPOV. Now that this virus can be quickly and easily identified, diagnostic laboratories can allocate more resources towards the diagnosis of known pathogens and towards the characterisation of additional unknown viruses. With the advent of high throughput sequencing, the net is fast closing in on the mystery viruses of northern Australia.

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**References**


Dr Chris Cowled is a postdoctoral fellow at the CSIRO Australian Animal Health Laboratory in Geelong, Victoria. His research interests include viral genomics and the interaction between viruses and the mammalian immune system.

**Figure 1.** The climate and ecology of Middle Point support very high levels of arbovirus activity, making it an ideal place to conduct arbovirus research and surveillance. *Photo: Lorna Melville.*