The potential arbovirus diseases in the Top End of the Northern Territory and the outlook for the remainder of the 1995/96 wet season

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Background

There have been nine different arboviruses isolated from mosquitoes collected in the Top End of the NT that are either known or suspected of causing disease in humans.[1,2] These include: the alphaviruses Ross River virus (RRV) and Barmah Forest virus (BFV), which are the most frequently confirmed causes of arbovirus disease in Australia; and the flaviviruses Murray Valley Encephalitis virus (MVE) and Kunjin virus (KUN) which can cause serious illness and have been responsible for periodic outbreaks and isolated cases of disease in the Northern Territory.[3,4,5,6]

Disease surveillance, virus isolation from mosquitoes, vector monitoring and sentinel chicken surveillance results suggest that there is a significant seasonal disease potential for these four arboviruses in the Top End of the NT. There are also a number of other alpha and flaviviruses and arboviruses in other groups that may be responsible for some of the arbovirus disease in the NT.[7]

One significant gap in our knowledge is the range and impact of the arboviruses that are causing disease in the NT. By giving general practitioners information about arboviruses and making them more aware of those known to occur in the NT, including the periods of greatest risk for disease, a better understanding may be gained. When symptoms and circumstances suggested arboviruses, more detailed antibody testing may prove useful.

Arboviruses known to occur in the NT

Since 1982 there has been a concerted program by the Medical Entomology Branch of THS (Territory Health Services), in cooperation with the Department of Primary Industry and Fisheries (DPI&F), to detect the presence of the various arboviruses in mosquitoes collected from different areas in the NT. The initial results of this program have been the isolation of nine different arboviruses including:

Alphaviruses	Flaviviruses	Bunyaviruses
Sindbis	Murray Valley Encephalitis	Gan Gan
Ross River	Kunjin	Trubanaman
Barmah Forest	Edge Hill	
	Kokobera (previously isolated)[8]	

Alphaviruses are the most frequently isolated. Among these Sindbis virus is most commonly found and primarily from *Culex annulirostris* (the common banded mosquito), which is the most abundant and widespread mosquito in the Top End of the NT. Sindbis virus has not currently been shown to cause human disease in Australia but is known to cause disease in other countries.[2] Next in abundance are Ross River virus and Barmah Forest virus, which are primarily isolated from three species of mosquito including *Culex annulirostris*, *Aedes normanensis* (the flood water mosquito) and *Aedes vigilax* (the salt marsh mosquito).

The flaviviruses are isolated infrequently, with a single isolate of MVE virus from Mataranka in March 1984 and four isolates of Kunjin from Darwin and Jabiru from April to June in 1983. These were all from *Cx. annulirostris* mosquitoes. In follow up studies an additional isolate of MVE has been made from *Ae. normanensis* mosquitoes collected at Mataranka in March 1984. Significantly the isolates of MVE and KUN were all in the post "wet"period.

Edge Hill has been implicated in cases of polyarthritic disease in other States of Australia.[2] This virus was isolated from the *Ae. vigilax* mosquitoes collected in January 1983 in the Darwin area (R Weir pers. comm.). The flavivirus Kokobera was isolated from the Beatrice Hill area from *Cx. annulirostris* mosquitoes collected in 1974 to 1976.[8] Kokobera is also suspected to be involved in polyarthritic disease.[2]

Trubanaman (TRU) was isolated from the Darwin area and Gan Gan (GAN) from the Katherine area. Both arboviruses were isolated from *Anopheles* mosquitoes collected from March to May. Both of these viruses have been implicated in polyarthritic disease.

Many other arboviruses that are neither flavi, alpha or bunyaviruses have been identified but it is not known if these are involved in human disease.

Current outlook for March and April

So far in the 1995/96 wet season there have been 24 cases of RRV and 8 cases of BFV reported in the Darwin region from December to February. In comparison there were 210 cases of RRV in the Darwin region over the corresponding period during the 1994/95 wet season. This very significant reduction in disease is due to both vector control and environmental conditions.

The single case of Kunjin virus disease this year occurred in a rural community near Darwin in January. The absence of any flavivirus disease in Darwin, with its population density, must be due to the relative freedom from *Cx. annulirostris* mosquitoes in the urban areas.

The numbers of salt marsh mosquitoes in the Darwin area are at a very low level. This situation is likely to persist except in certain areas such as sand dune habitats near coastal areas that only flood after extensive periods of rain. However, as the wet season finishes, the numbers of the 'common banded mosquito' tend to

increase. This species can transmit both RRV and BFV and the flaviviruses. While the remainder of the wet season may be relatively free from RRV disease in the Darwin urban area, the post wet to early dry season still poses a risk for alphavirus infection in other areas, and flaviviruses in the general Top End area. The areas of highest potential for flavivirus infection in the Darwin and northern coastal areas are associated with the large brackish reed swamps and the extensive and shallow freshwater swamps associated with the larger river flood plains and smaller ill draining creek systems.

In the Arnhem region and Nhulunbuy in particular there has been relatively high numbers of salt marsh mosquitoes associated with recent high tides and rainfall. The potential for both RRV and BF virus is likely to be quite high in this region during March.

The Katherine area has a history of relatively high RRV infection in the January to March period. There have been 15 cases of RRV in the Katherine district over the last few months. The potential for further RRV cases is relatively high for the remainder of March until the rain ceases. The potential for alphavirus infection is possibly below average if there is little further heavy and widespread rain.

In the Roper, McArthur and the eastern Barkly areas there has been recent high rainfall and the numbers of both the flood water mosquito *Ae. normanensis* and the 'common banded mosquito' are expected to be high for at least the remainder of March. This will lead to a relatively high risk for alphavirus infection and a higher than usual flavivirus risk.

In the VRD area recent rains are likely to lead to high numbers of the 'common banded mosquito' and there will be a relatively high potential for alphavirus and flavivirus transmission.

The Alice Springs area is relatively dry. Unless there is heavy and widespread rain in the next few weeks, the potential for arbovirus infection for March and April is very low.

Conclusion

The arboviruses which could cause disease in the Top End of the NT are: the alphaviruses Ross River virus, Barmah Forest virus and Sindbis virus; the flaviviruses Murray Valley Encephalitis virus, Kunjin virus, Kokobera virus and Edge Hill virus; the bunyaviruses, Gan Gan virus and Trubanaman virus; and a number of other known viruses which remain to be linked to human disease.

The prevalence of many of these arboviruses and the role they play in viral illness in the NT has not been accurately established. More information on case symptoms and specific requests for testing for the presence of antibodies to the arboviruses known to occur in the NT or associated with disease in other areas may shed light on these viral illnesses.

References

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Testing patients with seronegative polyarthritis

Following media attention on the "mystery" virus transmitted by mosquitoes, a number of doctors have phoned Disease Control seeking additional arbovirus testing for their seronegative patients with polyarthritis of recent onset.

Dr David Smith, State Health Laboratory Services in Perth, is collecting sera from similar patients for inclusion in a serum bank. As new panels of arbovirus tests are developed, these sera will be examined.

Any doctor interested in participating in this collection should contact Dr Angela Merianos on 22 8265. Acute sera and paired sera are preferred. Testing will be free of charge, but doctors should emphasise to their patients that reporting of results will be slow and will not change their clinical management.