Letter to the Editor

Murray Valley encephalitis

I was very interested in the paper titled *Murray Valley encephalitis virus surveillance and control initiatives in Australia*, which was published in the April 2001 edition of *Communicable Diseases Intelligence*. I would like to comment on some of the matters discussed.

The 'Forbes model' was briefly mentioned on pages 36 and 37. Since this is still frequently used to aid predictions for the occurrence of Murray Valley encephalitis (MVE) in south-eastern Australia, I would like to make some observations about this hypothesis.

Unfortunately, Forbes' paper, published in 1978, is in some places difficult to read (particularly the figures) and in others it is somewhat confusing and contradictory. I know the circumstances in which this paper was written; for the 20 years prior to 1978 I had been a close friend of Forbes and his colleague at Fairfield Hospital, Melbourne. For several years after the 1974 epidemic of MVE, Forbes tried to further refine the known association between the occurrence of MVE in the Murray Valley and excess rainfall in eastern Australia. He made a retrospective study of rainfall preceding the only three 'large' epidemics that occurred in the vicinity of the Murray River, viz in 1918, 1951 and 1974. He did not include 1956 when three cases of MVE occurred on the Murray River, because he considered this was 'a minor outbreak' compared to the others; besides the rainfall pattern prior to 1956 did not conform with those preceding the other outbreaks. Since the data he used to develop his hypothesis were only derived from three outbreaks of MVE, his conclusions must be considered to be very tenuous. If there is a firm correlation between rainfall patterns and the occurrence of MVE cases in the Murray valley, it will only be determined by observations spread over many decades to come.

I understand that Forbes' hypothesis has been used to try to predict MVE outbreaks in northern New South Wales. This is an inappropriate application of his theory, because he was only trying to use rainfall patterns which could predict epidemics of MVE 'in the region of', or 'in the vicinity of', or 'along' the Murray River. Moreover, there has been a tendency for some people to 'guess' the amount of rainfall in the watersheds of eastern Australia by simple perusal of quarterly Bureau of Meteorology maps, which depict the distribution of rainfall in decile ranges. Assessment of rainfall in this manner, does not conform to Forbes' methodology. The 7th decile range is not the same of the 7th decile value which was used by Forbes. Furthermore, he specified numbered rainfall districts from which rainfall figures were aggregated to provide total rainfall in each quarter for the four particular watersheds he selected. The rainfall in these catchments was then compared to the aggregate of the 7th decile or 70th percentile values for each of the catchments. If rainfall is not calculated in this way, Forbes' hypothesis cannot be applied legitimately.

Forbes concluded that for MVE to occur in the vicinity of the Murray River, it must be preceded by certain rainfall patterns. For all of the four main watersheds he selected, the 'pre-epidemic pluvial pattern consists of rainfall in excess of decile 7 standard for one of both quarters of the previous summer followed by similar excess rainfall in the final quarter of the year immediately preceding the epidemic'. The phrase 'one or both quarters of the previous summer' means one or both of the quarters that either precede or follow January 1 of the previous summer. Details of how rainfall figures must be computed to comply with Forbes' methodology, have recently been summarised (E Wishart, Victorian Institute of Animal Science, in the press).

On page 37 of the *CDI* paper, it is stated that the Forbes' model incorrectly predicted MVE virus activity in south-eastern Australia during the 1999/2000 and 2000/2001 seasons. However, when rainfall figures are strictly computed according to Forbes' method, his hypothesis did not predict MVE in the vicinity of the Murray River for the 1999/2000 summer but it was predictive of an epidemic in the summer of 2000/2001 (E Wishart, personal communication). Although this demonstrates that Forbes' hypothesis is unreliable, it may be still useful as an aid, since there are few, and no reliable, other predictive methods. A statement made in the same paragraph of the *CDI* paper regarding Nicholls' model, is also incorrect. Nicholls' hypothesis did not predict MVE activity in the 1999/2000 season but it was predictive for MVE in the 2000/2001 summer (E Wishart, personal communication).

My final comments are about the discussion on page 34 of the *CDI* paper, concerning the nomenclature of the Australian flavivirus encephalitities, where it is recommended to use the terms 'MVE encephalitis and KUN encephalitis'. When spelt out, 'MVE encephalitis' becomes Murray Valley encephalitis encephalitis. Surely this must have resulted from an oversight by the proof reader. The possible outcomes of MVE virus infection in humans, can be summarised as follows:

'The Murray Valley encephalitis virus (MVE virus) can commonly infect humans without producing apparent disease (subclinical infection), or it may cause a comparatively mild disease (mild infection). In a small percentage of all people infected, this mild infection may progress and result in a more serious disease of the central nervous system, which is called Murray Valley encephalitis (MVE)'.

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Chairman of the Victorian Arbovirus Task Force

Response to Letter to Editor:

The observations of Dr Bennett of Forbes' hypothesis are correct. The statements in the *Communicable Diseases Intelligence* article *Murray Valley encephalitis virus surveillance and control initiatives in Australia* that the Forbes and Nichols models predicted MVE in 1999/2000 are incorrect.

The comments by Dr Bennett in response to the article highlight an important aspect of predictive modelling of outbreaks encephalitic MVE infection, namely that neither model is definitive. Any model should only be used as a guide to public health planning, and neither should be used to provide a "yes/no" response to whether an outbreak will occur in a particular season. The take home messages are that the ecology of the virus is very complex, and human

outbreaks of disease are difficult to predict. Our article did not intend to promote one model over the other, but attempted to highlight the limitations of both models, which prohibit use of either as the only predictor of human disease.

Both theories are based on a very small data set, and were constructed on data when knowledge of mosquitoes and mosquito borne disease in Australia was still in its infancy. The ecology of MVE has changed since the outbreaks used by Forbes to develop his model. Since 1974, there have been dramatic changes in land and water use, as well as changes to mosquito control and public health education programs. As Bennett states, the correlation between predictive factors and outbreaks will only be determined over the coming decades. Any model will need to be progressively evaluated and refined as each outbreak occurs.

The abbreviation MVE refers to the virus, so the full form would be 'Murray Valley encephalitis virus encephalitis'. While it would be less cumbersome if the virus had a single name (as does Kunjin virus), it does distinguish the virus from the clinical outcome of infection with the virus. The terms asymptomatic MVE infection, non-encephalitic MVE infection and encephalitic MVE infection should be used.

Jenean Spencer, Joe Azoulas, Annette Broom, Tim Buick, Bart Currie, Peter Daniels, Stephen Doggett, George Hapgood, Peter Jarrett, Michael Lindsay, Glenis Lloyd, John Mackenzie, Angela Merianos, Rodney Moran, Scott Ritchie, Richard Russell, David Smith, Fay Stenhouse, Peter Whelan

Correction

Professor Bart Currie was unintentionally omitted as an author on the paper entitled *Murray Valley encephalitis virus surveillance and control initiatives in Australia* published in the April issue of *Communicable Diseases Intelligence*. We apologise to Professor Currie for this oversight. The full author list is as above.