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Dengue in Queensland, Australia, 1981-83

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ABSTRACT

Although local transmission of dengue has probably been known in Australia since 1879, a break of 26 years from 1955 was thought to signify a cessation. However, from March-April 1981 initial transmissions with inapparent to classical symptoms appeared in Cairns and Townsville; by September 1982, 455 cases had been serologically confirmed from 19 north Queensland localities. During May 1983, two probable cases were recorded from southern-central Queensland. Survey data suggest that up to 3,000 infections of dengue type 1 occurred. There may be serological evidence of other types.

Entomological survey indicates that *Aedes aegypti* is widespread and prevalent in many Queensland towns. Control, based on health education and environmental sanitation, has met with mixed success. With increased international traffic through north Queensland, an
important tourist asset, future epidemics of dengue and possibly dengue haemorrhagic fever, seem assured.

HISTORICAL

Australia is a relatively young country with first colonization of the eastern seaboard in 1788 where Sydney stands today: Queensland was first colonized in 1824 at Brisbane. Although Ferguson (1928) believed that *Aedes aegypti* had probably been introduced to Australia via Sydney Harbour on countless occasions and Taylor suggested Macassan sea-going prahus as a means of northern introduction, it is likely that this mosquito did not become established until around the time of northern Australian settlement in the 1860s. Darwin, Burketown, Karumba and Normanton in the Gulf of Carpentaria became major ports through which supplies and Asian immigrants arrived to service the gold fields of the Cape and Palmer Rivers, Cloncurry and Charters Towers.

Lumley and Taylor (1943) have documented regular epidemics of dengue, commencing in 1873 when 8 clinical cases were imported into Sydney from Mauritius. Local transmission was probably first recorded from Townsville in 1879 but the outbreaks on the Charters Towers gold fields during 1885–86 are better remembered because of their (i) extensiveness and (ii) the description by Hare (1898), of what is considered by many to be the first dengue haemorrhagic fever case.
By 1926, clinical dengue had been recorded in 4 Australian States, Queensland, Northern Territory, Western Australia and New South Wales extending as far south as Gosford just north of Sydney. This distribution was almost coincident with that of Ae aegypti (Fig. 1) which was breeding in rainwater storage tanks, water drums, wells and railway station fire buckets.

According to Lumley and Taylor (1943), although dengue had occurred frequently in Queensland, it was not until the 1941-44 epidemic which once again spread southwards into New South Wales, that dengue received any prominence. Doubtless, one factor involved in this spread was the movement of armed services personnel. In 1942, the Queensland Mosquito Prevention and Destruction Regulations were promulgated which, coupled with diligent health inspection and the advent of reticulated water and residual insecticides led to progressive reduction of the vector, Ae aegypti.

From 1954-55, north Queensland was stricken by dengue type 3. Some 15,000 of 40,000 residents of Townsville were infected (Rowan, 1956). No locally-transmitted dengue occurred in Brisbane as by 1956, Ae aegypti had been eradicated (Hooper, 1967). In ensuing years, Ae aegypti was reduced to localized populations in widely scattered areas throughout provincial Queensland. Distribution maps for 1965-66, 1974-79, 1979-81 probably reflect two things, (i) a population decline and more alarmingly (ii) the decline in interest by local authorities
in seeking such data (Figs. 2-4).

THE CURRENT EPIDEMIC

Vector distribution and densities. Conversely, the apparent upsurge in *Ae. aegypti* numbers throughout Queensland from 1981-83 surveys (Fig. 5) indicates both real population increases through neglect, despite two relatively poor wet seasons, and the renewal of interest. Through extensive health education, media coverage and training programmes, both the general public and local authority health officers now are fully aware of the problem, and of the potentially more serious prospect of dengue haemorrhagic fever/dengue shock syndrome.

In 1981-83, Breteau indices of over 100 were not uncommon, a level said to be twice that of high risk category for yellow fever (WHO, 1972). Although breeding in smaller outback towns has been associated with traditional sites e.g., rainwater tanks, wells, tyres, drums, undoubtedly two of the main contributing factors have been the increased popularity of indoor and green house pot plants and the availability of great quantities of discarded plastic containers provided by our throw-away society.

The occurrence and distribution of dengue. From April 1981 until September 1983, survey data based on antibody prevalence, clinical
symptoms and notifications suggest that at least 3,000 infections of dengue type 1 occurred in 19 north Queensland towns, particularly Cairns, Townsville and Thursday Island. In April 1983, two isolated cases were recorded from Kingaroy and Rolleston in southern-central Queensland.

Accurate estimation of the extent of infection has been complicated by several factors, namely (1) because dengue had been absent for 26 years, many medical practitioners did not recognise it, (ii) paired sera were only taken occasionally, (iii) despite the Health Act, only some medical practitioners were notifying the authorities of suspected diagnoses and (iv) because of the mildness of symptoms and the free availability of paracetamol without prescription, many of those infected did not seek medical attention.

Symptoms. Many infections (Kay et al., submitted), especially in children, were asymptomatic. Mild cases suffered malaise, low grade temperature, evanescent skin rashes and headache but were able to continue their normal lives without interruption. Perhaps 30% of cases suffered an incapacitating illness with all or a combination of the following symptoms: (1) malaise, (2) severe headache, (3) retro-orbital pain, (4) severe backache, (5) generalized muscle and joint pains, (6) excessive sweating, (7) almost total anorexia, (8) marked weight loss, sometimes up to 13kg, (9) dehydration, usually following vomiting and occasional diarrhoea about day 3, (10)
hypotension and severe peripheral shutdown in some cases, (11) extreme muscular weakness with an inability to walk, frequently occurring on day 3 and persisting 24-28 h, (12) variable splenomegaly, hepatomegaly, lymphadenopathy in a minority of cases, (13) variable skin rashes, from scarlatiniform to morbilliform, were present from day 3 in almost all patients. The rash disappeared in most patients by day 5-6. In a few, it persisted and led to the more severe and distressing itching on the soles of the feet and palms of the hands, (14) irregularities of menstruation were reported in a few patients. No fatalities occurred.

In Cairns, Dr Roger Guard, Commonwealth Department of Health unpublished report noted that 13 of 98 patients showed some haemorrhagic manifestations i.e. skin petechiae only (10 cases), skin petechiae plus gingival bleeding (1), above symptoms plus epistaxis 1. above symptoms, plus haematuria, gastrointestinal haemorrhage (1). Because 12 of the 13 cases were in adults and because symptoms did not fully comply with diagnostic criteria (WHO, 1980), Dr Guard did not regard these as being DHF.

Control programme. Initially, there was a reluctance to accept that dengue had reemerged in northern Queensland after an apparent absence of 26 years. As with the last epidemic (Doherty, 1957), a delay of approximately three months preceded recognition,
Some 15 months after the initial cases were confirmed, an official State Government-sponsored control campaign was launched, based on environmental sanitation, house to house survey and extensive health education and public awareness. Because of the isolated nature of many cases, insecticide applications were not a feature of the control programme, but it is noteworthy that at least one local authority instigated active programmes of treating all swamps and lagoons! Of course, it is well known that *Ae. aegypti* never breeds in such sites.

During September 1982, the Mosquito Prevention and Destruction Regulations were modified to increase penalties from A$40 to A$400 for backyard mosquito breeding. Although some local authorities have utilized this provision, many were loath to do so because of political and other ramifications. Preliminary assessments of the health education programmes would suggest that although public awareness and local authority awareness is high, motivation is at the very best, moderate.

Larval monitoring of selected towns and suburbs had demonstrated that the environmental sanitation-health education approach does work but that more extensive coverage and effort is required. The outbreak would now seem to be over but it probably is fortunate that the 1981-82, 1982-83 wet seasons were poor ones.
PROGNOSIS

This epidemic should serve as a gentle reminder that Queensland is receptive to dengue, DHF and DSS (and yellow fever) and that future introductions may have fatal consequences. Because of the possibility that 3 dengue types were active in north Queensland within the first 12 months of the outbreak, we can only assume that, with increased international travel through newly-opened points of entry in north Queensland to service a rapidly expanding tourist industry, such introductions will become more common. Therefore, neglect of full responsibilities towards *Ae aegypti* control would be folly.

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REFERENCES


**FIGURES**

1. Map of Australia showing all known distribution records of *Aedes aegypti* up until 1956, after O'Gower (1956).


3. Distribution records of *Aedes aegypti* in Queensland, 1974-79.


Fig. 1

DISTRIBUTION OF Aedes aegypti
: 1956

Fig. 2

Aedes aegypti
1965-66
Fig. 3

*Aedes aegypti*

1974-79
FIG. 4

Aedes aegypti
1979-81
FIG. 5

Aedes aegypti
1981-83