Institut Pasteur de Nouvelle Calédonie

Mosquitoes in the Ocean:

Vectors and non-vectors in the Pacific.

Knowledge, threats and unanswered questions

Laurent Guillaumot (IPNC)

Hawaii

Tahiti

Galapagos

New Caledonia

Isla de Pascua

New Zealand

How did they get there ???

Natural long distance oceanic dispersion

- Wind blown
  - Up to 740 kms in distance (*Aedes vexans*)
  - Up to 400 m in altitude (*Cx tritaeniorhynchus*)
  - 10 species caught in a net 150m in the air (India)
- Vegetal rafts
  - Up to 8000 kms

First navigators

Alocasia macrorhiza

Speciation

The « *scutellaris* gang »

Aedes albopictus

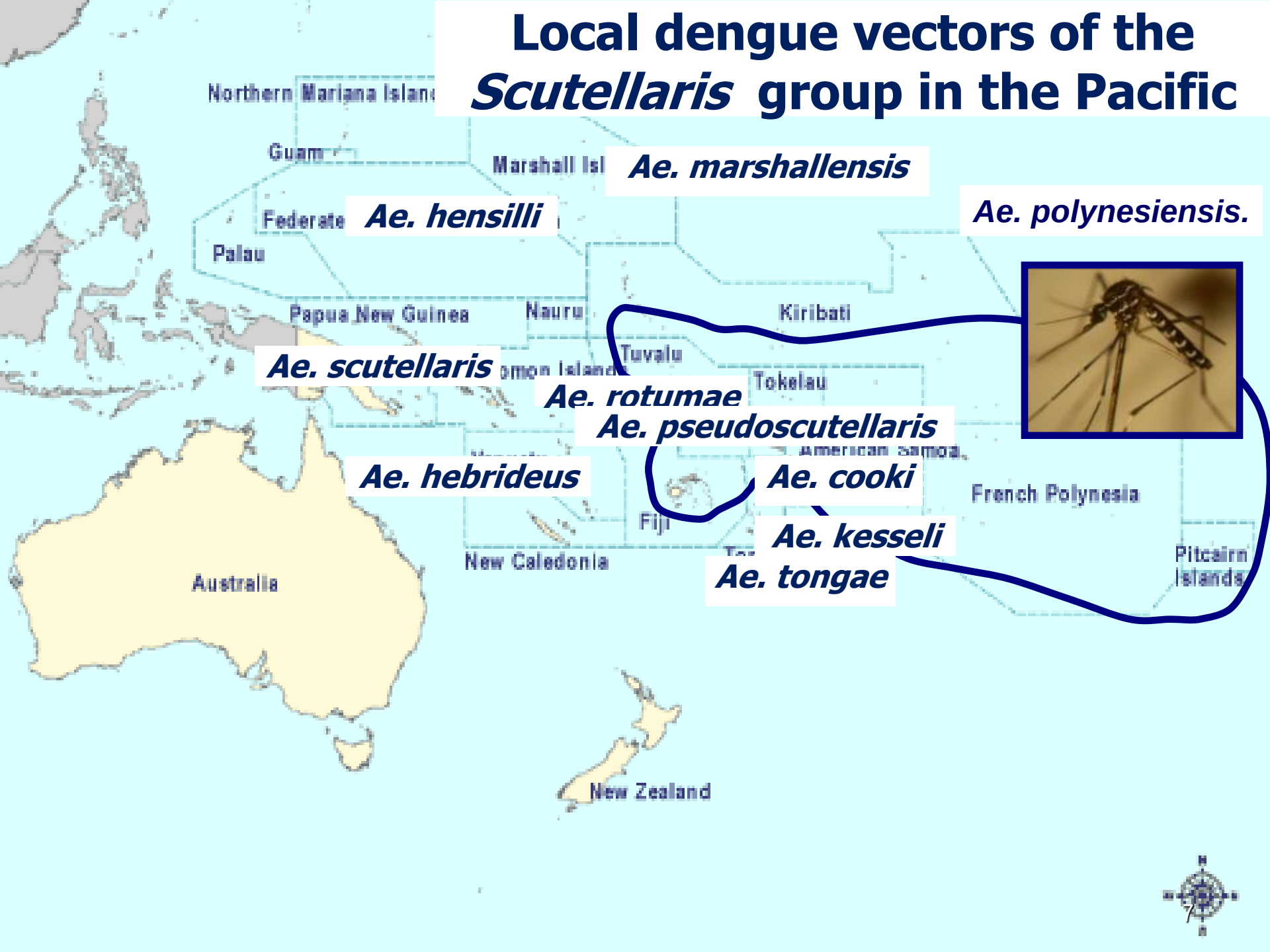
Aedes polynesiensis

Aedes hensilli (Micronesia)

Aedes futunae

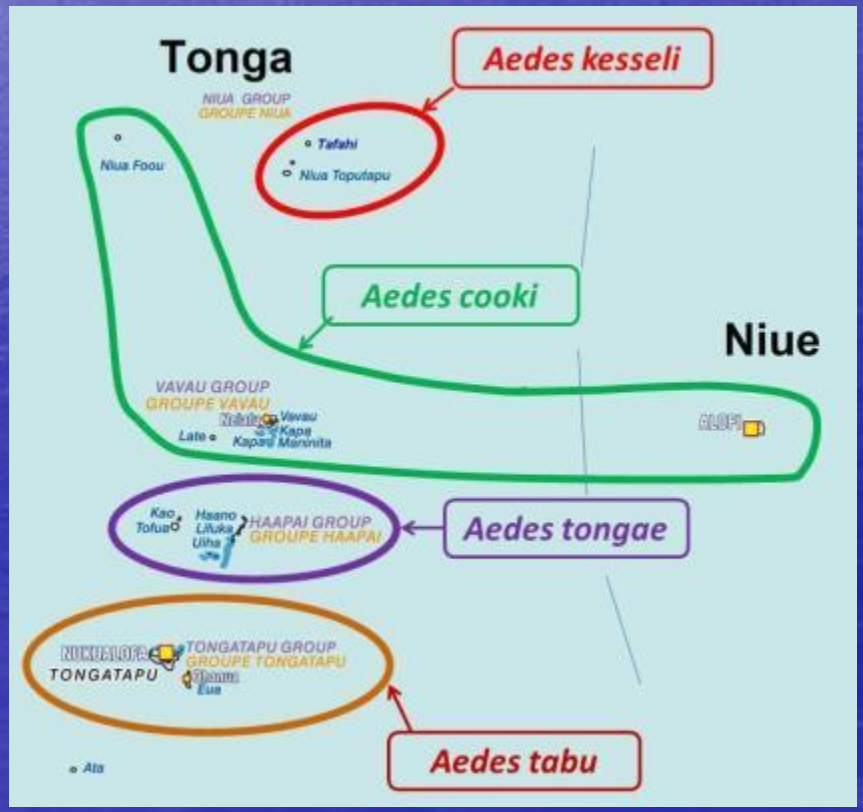
Aedes hebrideus

Local dengue vectors of the *Scutellaris* group in the Pacific



Tonga

- Local species of the *scutellaris* group: *Aedes tabu, Ae. tongae, Ae. cooki. Ae. kesseli.*



European sailors

XIXth century whaling ship

Fresh water barrel

- *Culex quinquifasciatus* in Hawaii (1820s)
  - Avian malaria

Modern invaders

- *Aedes aegypti* (1870s)
  - Dengue

Tyre trade

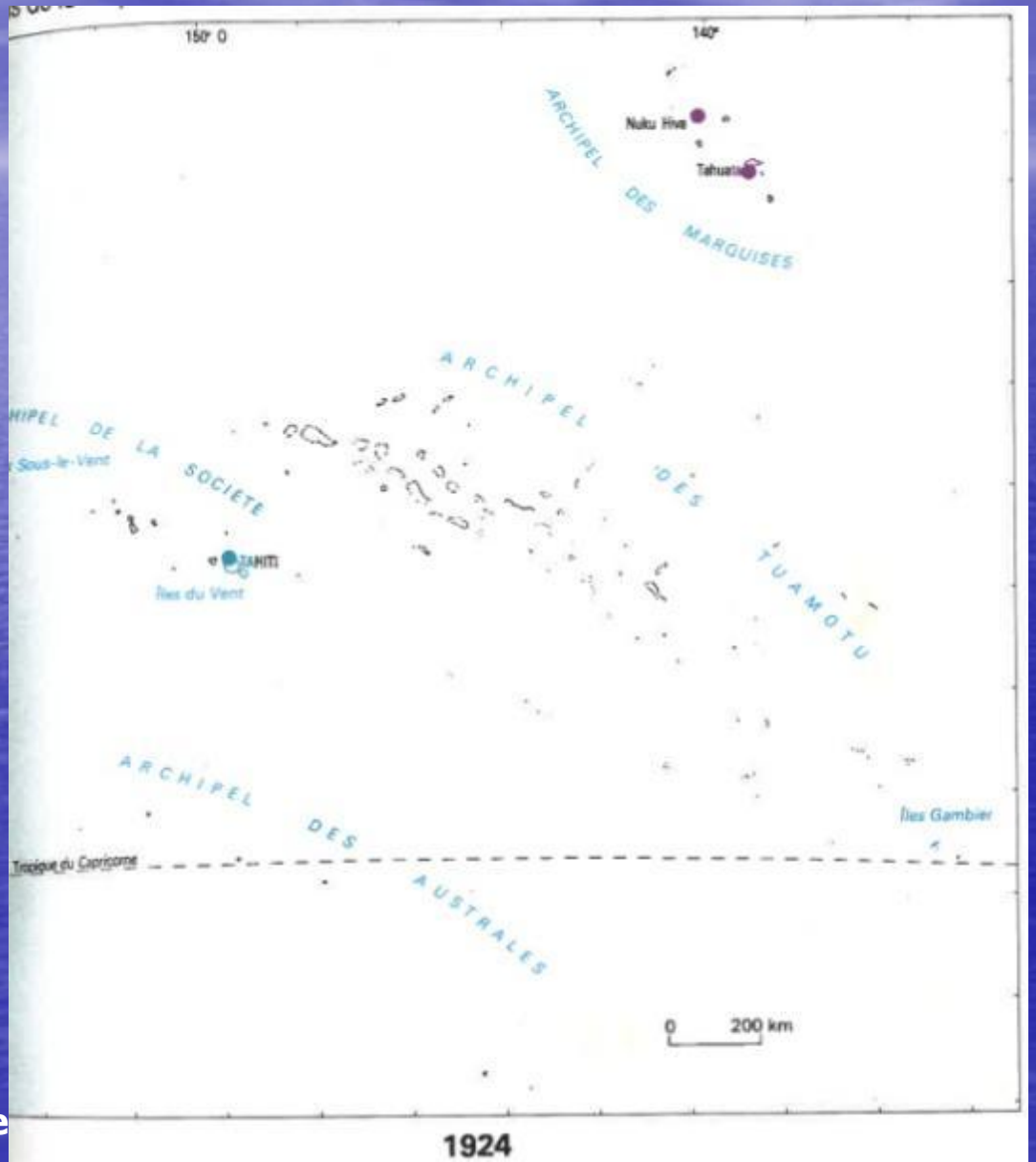
FIG. III.

Salvaged tires awaiting shipment to the continental United States were potential breeding sites of *Aëdes aegypti* not only on New Caledonia but on every island in the South Pacific. These artificial catchments were excellent means for transport of this important disease-bearing vector in the immature stages. On one occasion, quarantine inspection crews discovered hordes of adult *aegypti* in the hold of a ship entering the Noumea Harbour. Closer inspection revealed large numbers of aquatic forms developing in water held within the rims of the stored casings. (*Photo by Dr. R. B. Eads*)

1940s

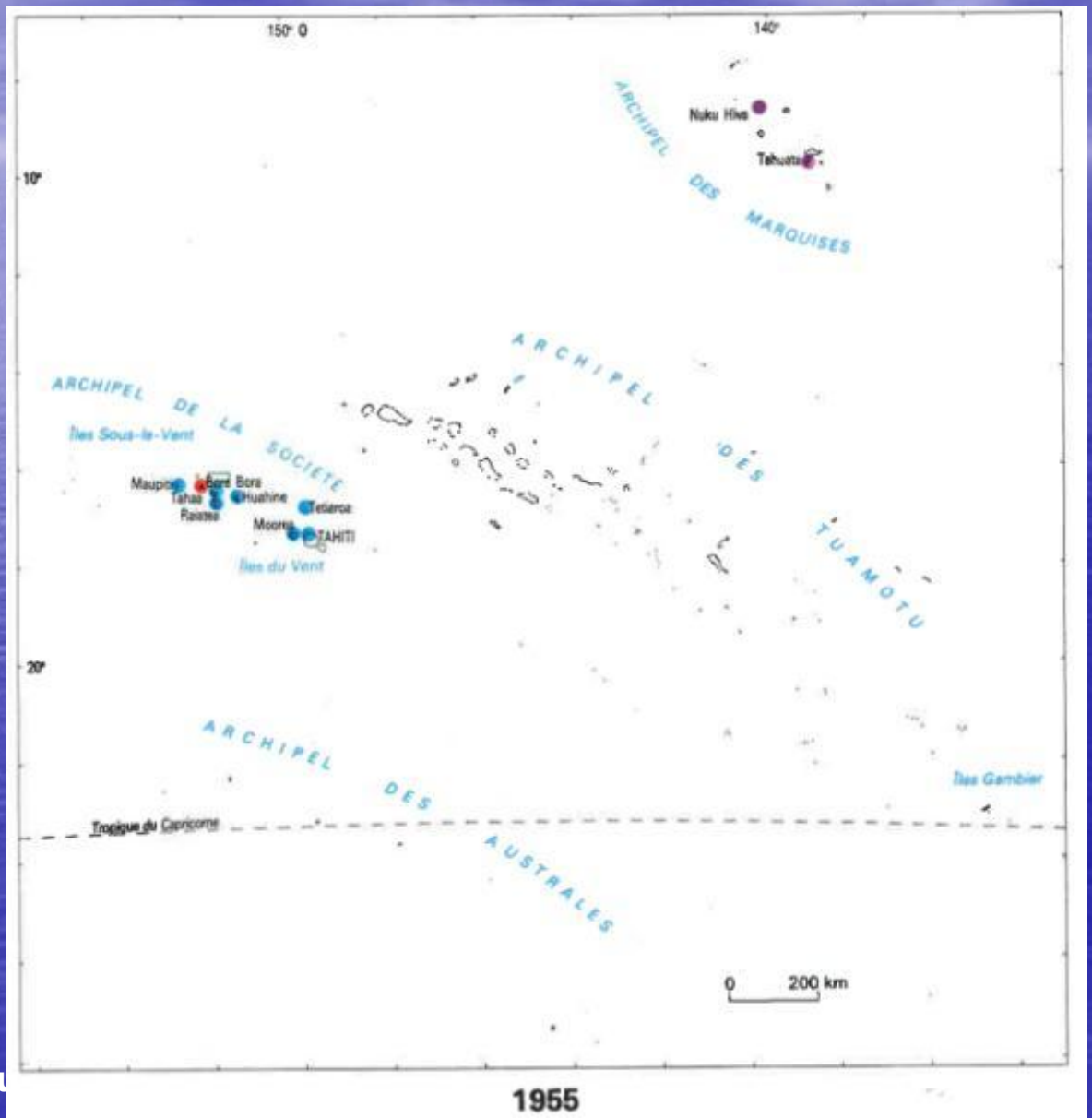
2013

Expantion of *Aedes aegypti* in French Polynesia

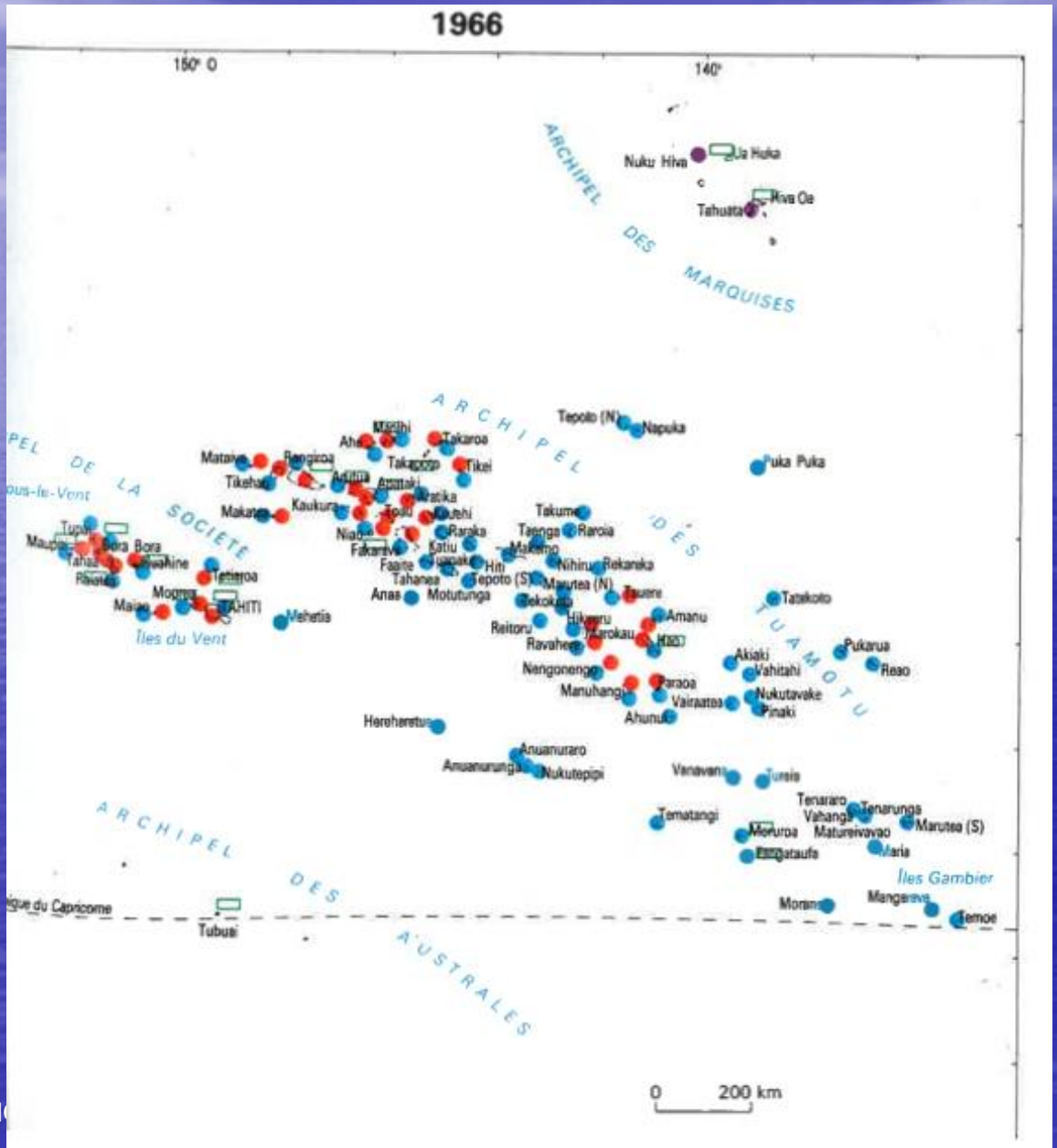


Source:
Atlas of French Polynesia
(IRD, 1993)

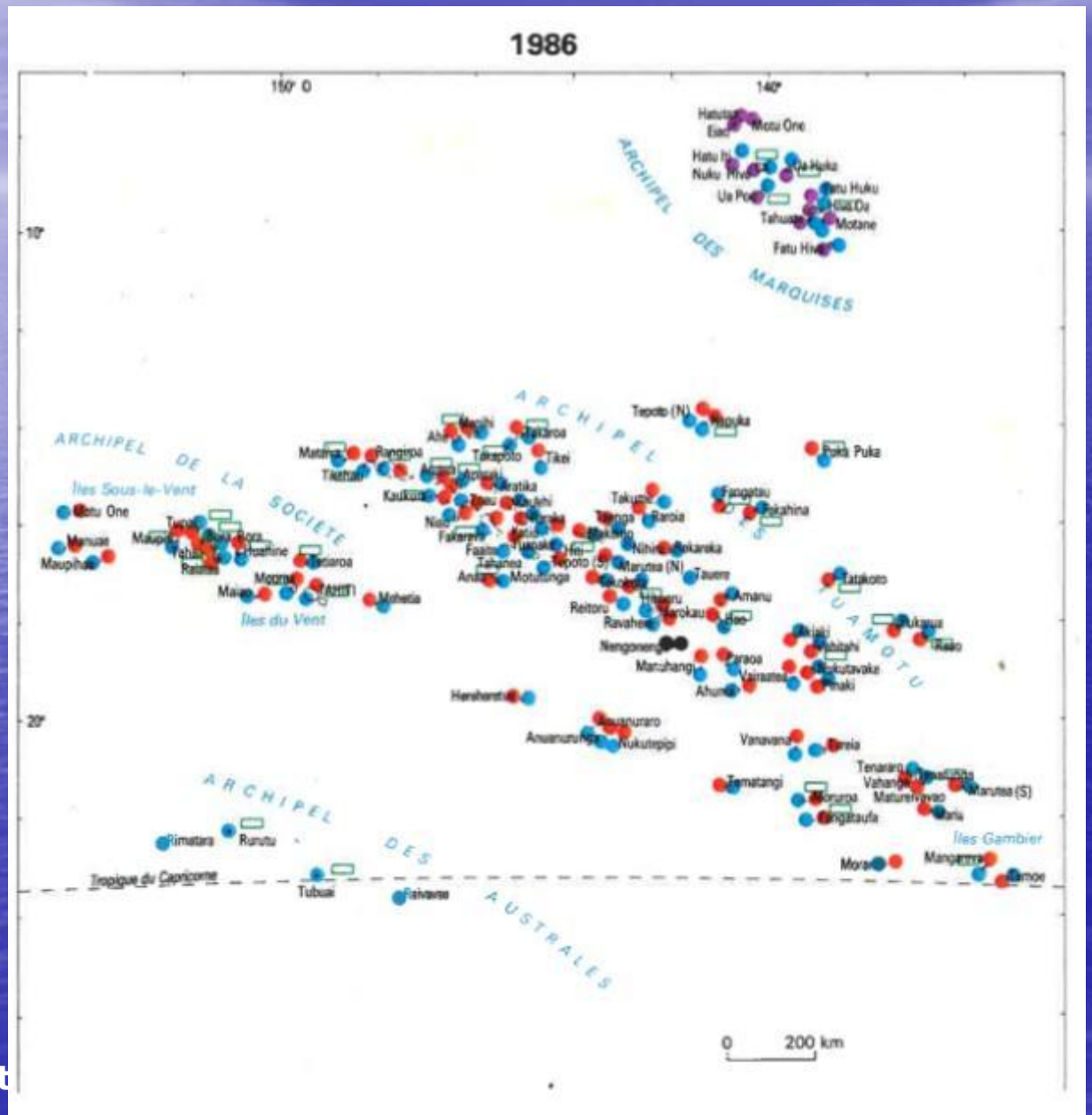
Expantion of *Aedes aegypti* in French Polynesia

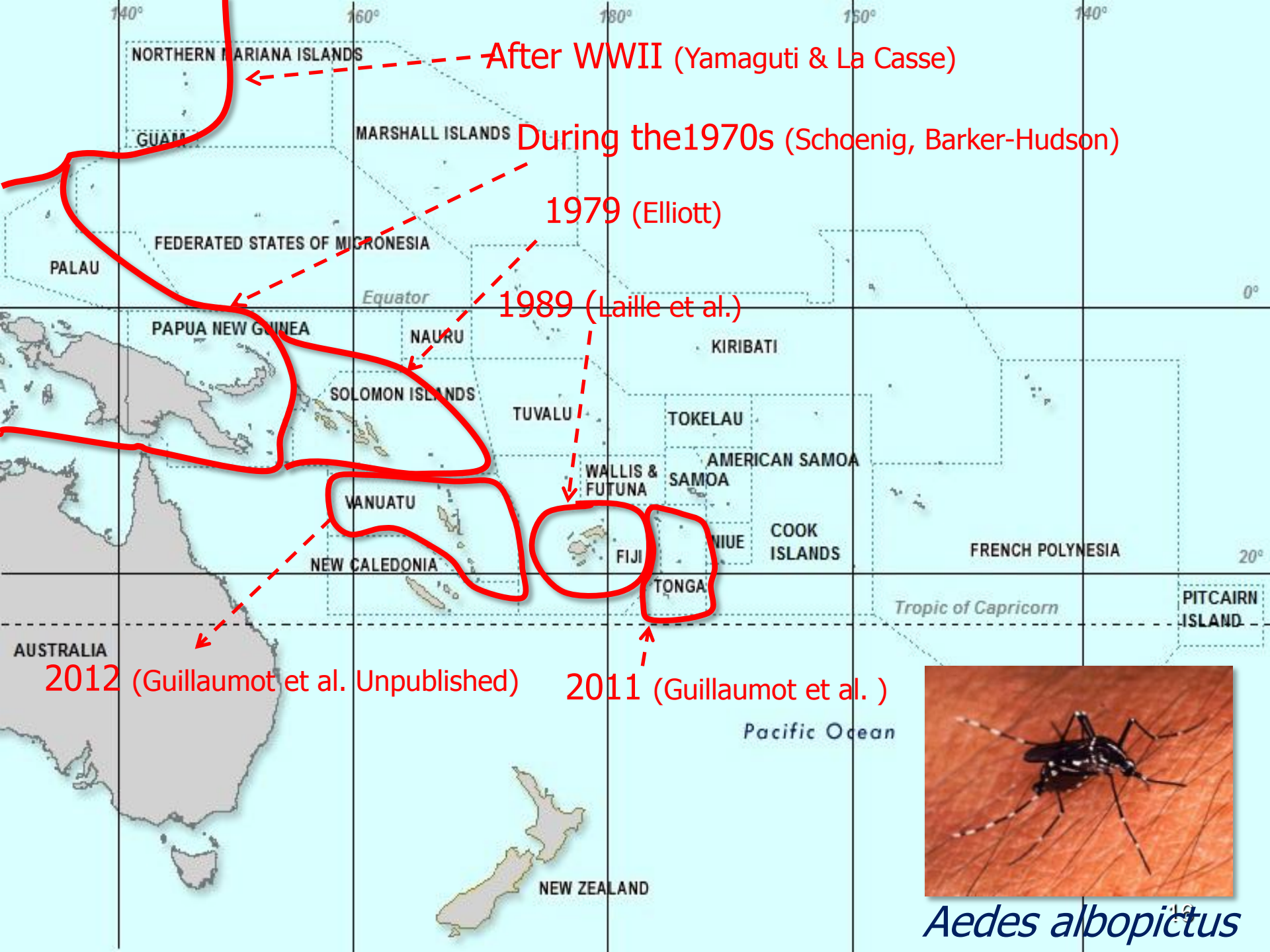


Expantion of *Aedes aegypti* in French Polynesia



Expantion of *Aedes aegypti* in French Polynesia





Aedes albopictus

When man brings more mosquitoes…

- Toxorhynchites spp.
  - Predatory mosquito

Major diseases transmitted by mosquitoes occur in the Pacific Islands:

Malaria

One of the first causes of morbidity/mortality in the affected countries

Dengue

One new outbreak every 5 to 10 years since 1970. Considerable human and economic impact

Chikungunya

Since 2011

Zika

Yap, 2007, Fr Polynesia 2013

Lymphatic Filariasis

Decreasing thanks to the PacELF program

Unanswered questions

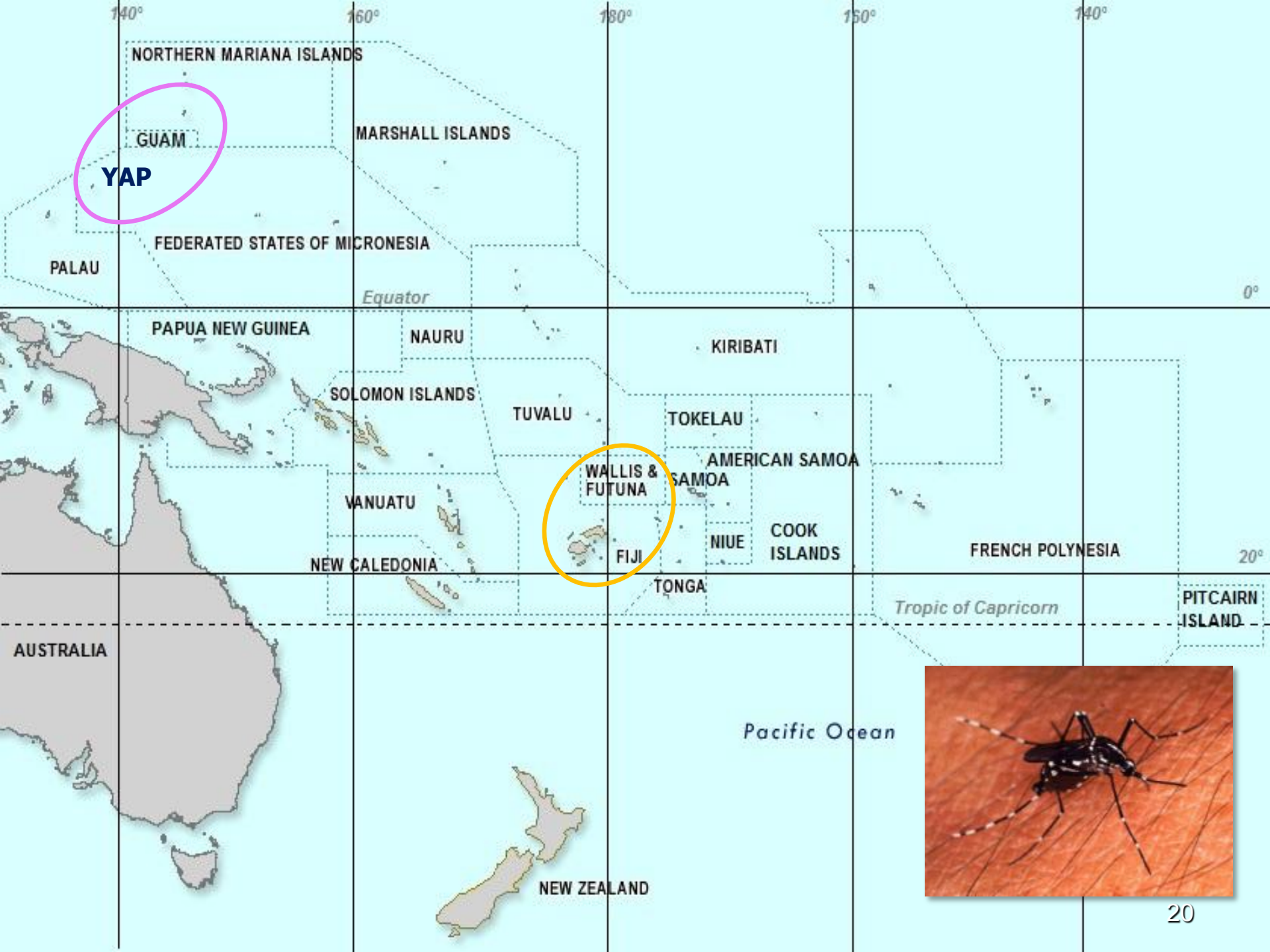
- *Aedes albopictus:*

- Why not in Yap?
  - Intense exchanges with neighbouring Guam

- Why not on Wallis Isld?
  - Intense exchanges with neighbouring Fiji

Ae. aegypti present at very low level for years

Ae. aegypti present at very low level for years


140°
160°
180°
150°
140°
NORTHERN MARIANA ISLANDS
GUAM
YAP
MARSHALL ISLANDS
FEDERATED STATES OF MICRONESIA
PALAU
Equator
0°
PAPUA NEW GUINEA
NAURU
KIRIBATI
SOLOMON ISLANDS
TUVALU
TOKELAU
AMERICAN SAMOA
WALLIS & FUTUNA
SAMOA
VANUATU
NIUE
COOK ISLANDS
FIJI
FRENCH POLYNESIA
20°
NEW CALEDONIA
TONGA
Tropic of Capricorn
PITCAIRN ISLAND
AUSTRALIA
Pacific Ocean
NEW ZEALAND

No *Anopheles* species present east of the red line (Buxton line)

***Anopheles spp.* present**

Other parts of the world *Anopheles*-free:
-Antarctica
-Iceland
Seychelles Islands (Indian Ocean)

THANK YOU FOR YOUR ATTENTION

MERCI DE VOTRE ATTENTION

Thanks to Dr Hervé Bossin for slides 13 to 16