

Flore & faune terrestres de la Polynésie française : connaissance & compréhension



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Diversité/richeesse spécifique - *Species richness/diversity*

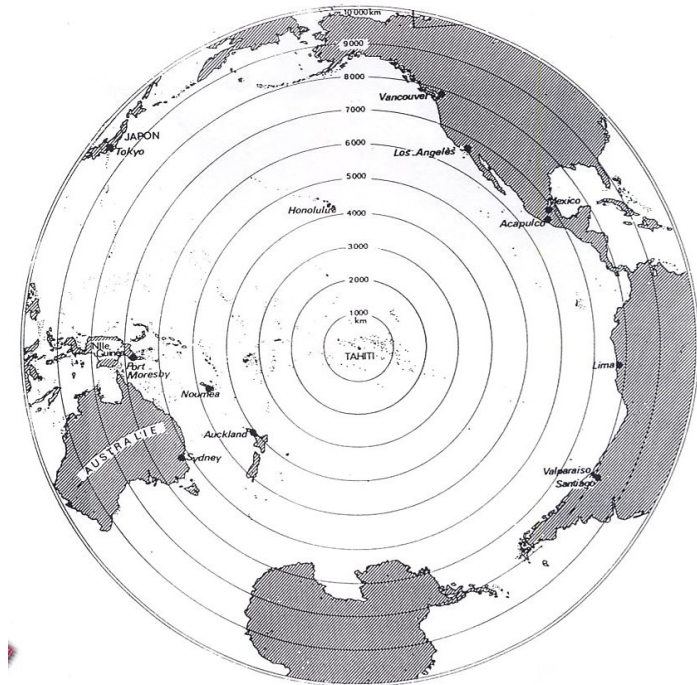
- **Arthropods = ca. 3000 native taxa** incl. 1570 endemics (61% endemism) (+ 420 introduced) incl. **1406 endemic insects***
- **Vascular plants > 900 native taxa** incl. 570 endemics (62% endemism) (+ 1700 introduced)
- **Land molluscs > 525 native taxa** (95% endemism) (+ 26 introduced)
- **Freshwater fishes = 37 native taxa** incl. 15 endemics (+ 3 introduced)
- **Land birds = 36 native taxa** incl. 27 endemic species (+ 13 introduced)
- **Seabirds = 26 native taxa**
- **Reptiles = 9 native** geckos & skinks (+ 3 introduced)
- **Amphibians = 0** (+ 1 introduced)
- **Mammals = 0** (+ 12 introduced)

(*Ramade 2017. *Zoosystema* 39(2): 213-225)

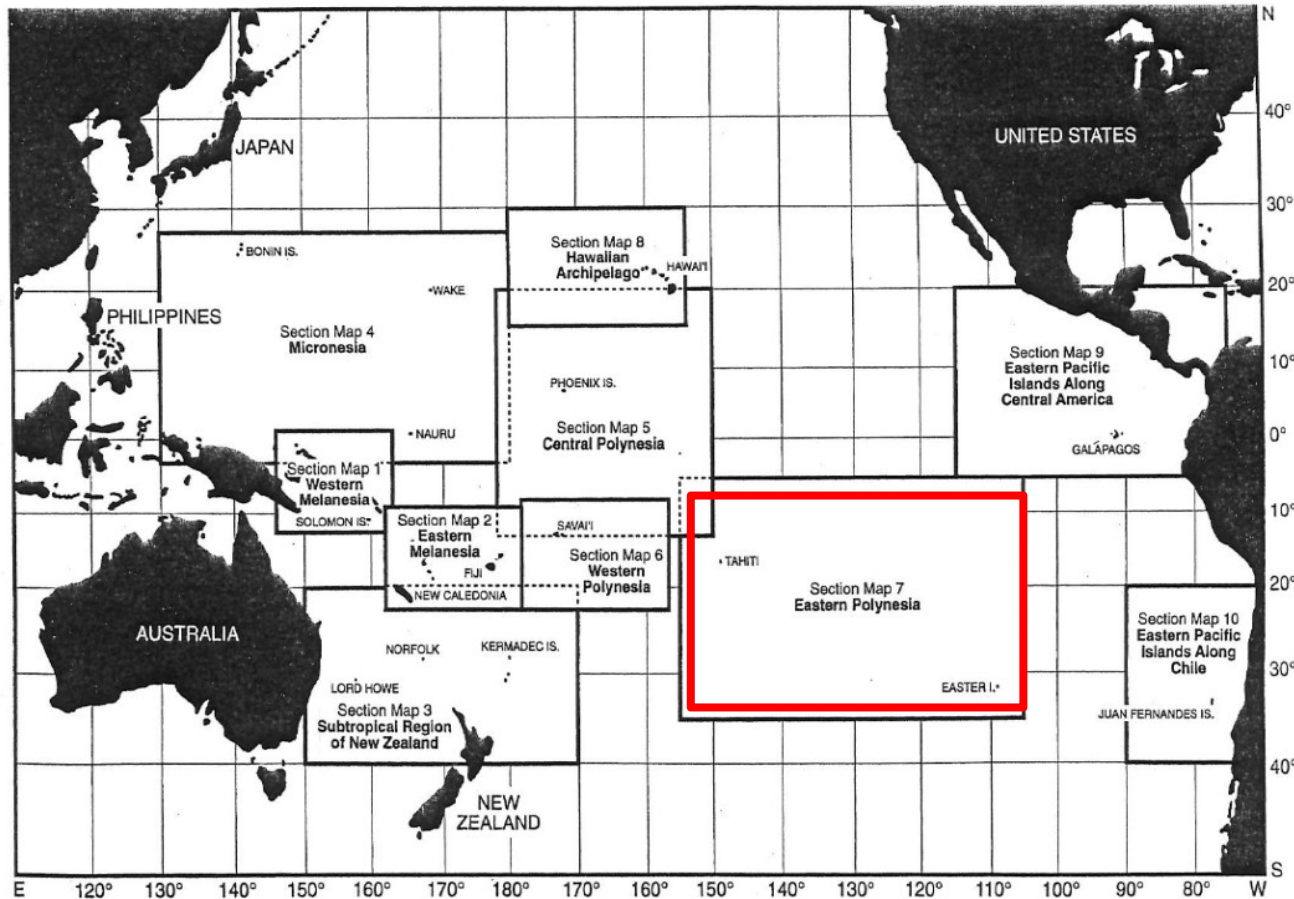




- **Fort isolement géographique** (> 5000-6000 km des continents)
- **Faible surface des îles** (< 4000 km²)



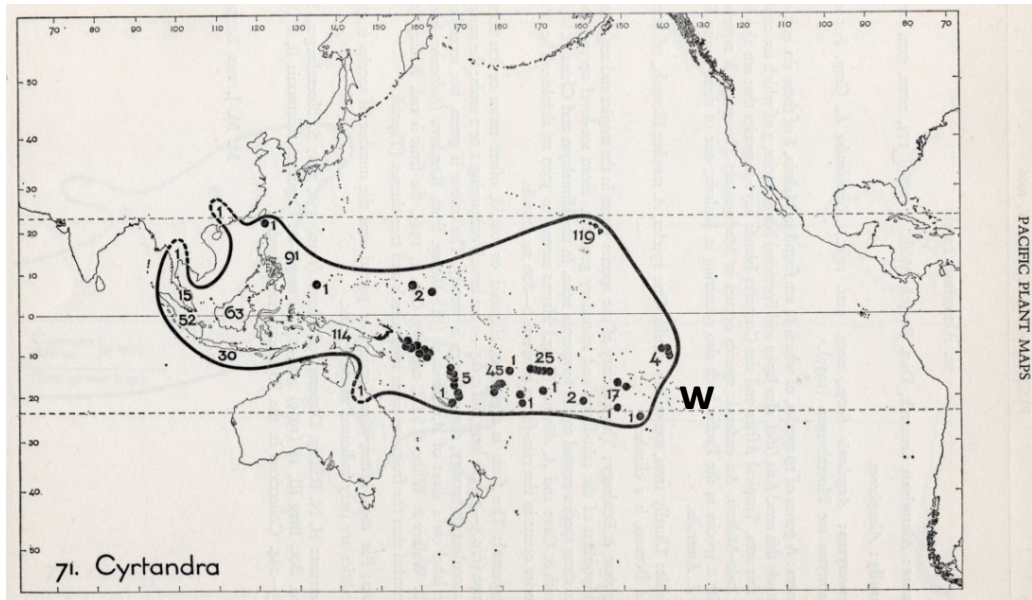
- **Polynésie orientale – *Southeastern Polynesia***



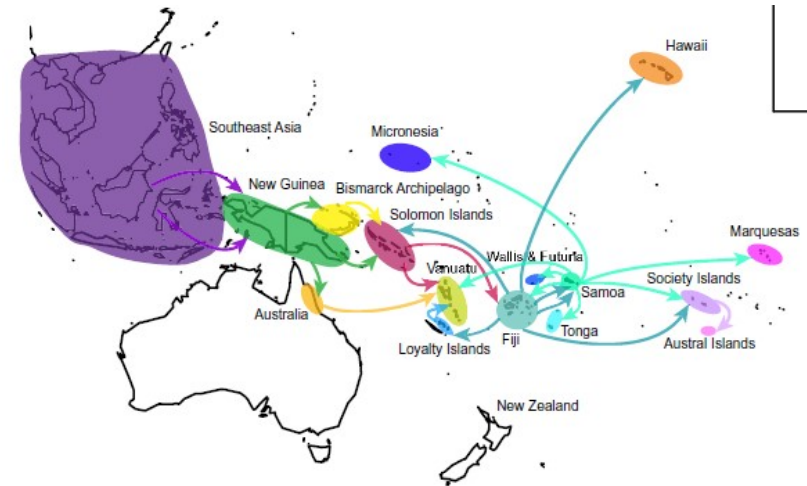
(Mueller-Dombois & Fosberg 1998. *Vegetation of the Tropical Pacific Islands*)

Gradients de richesse spécifique

- *Cyrtandra* (Gesneriaceae)



(Van Steenis & Van Balgooy 1966. *Pacific Plant Areas*)



(Johnson *et al.* 2017. *Molecular Phylogenetics & Evolution* 116: 30-48)



Fiji



Futuna



Society



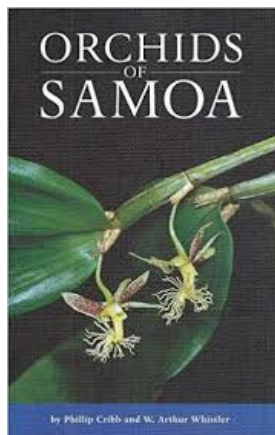
Marquesas



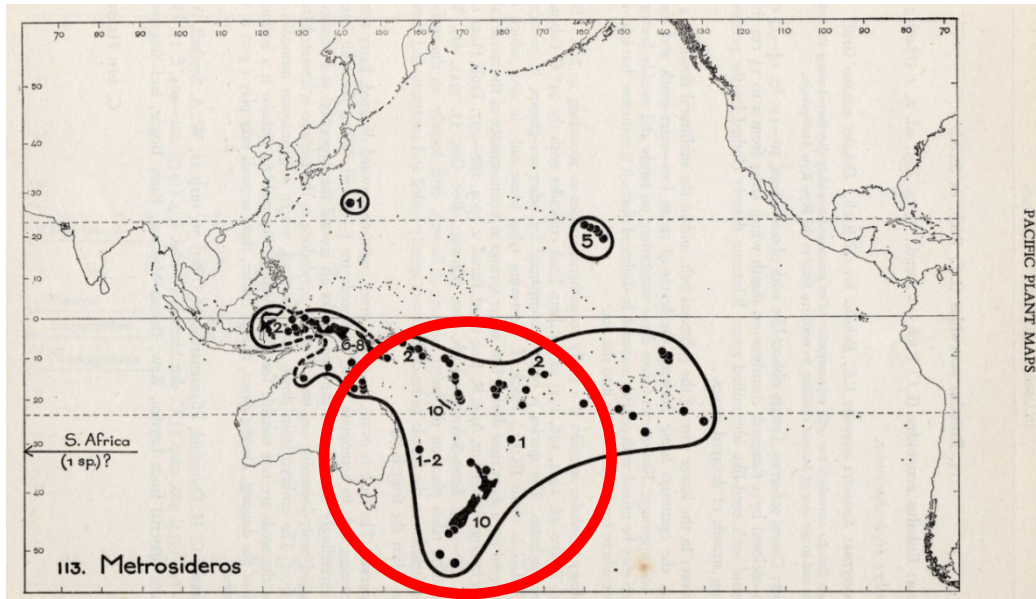
Austral

- Orchidaceae

Island/Archipelago	Native taxa	Endemic taxa	Source
New Caledonia	205	99	Jaffré <i>et al.</i> 2004
Samoa	101	15	Cribb & Whistler 1996
Tonga	43	1	Cribb & Whistler 2011
Wallis et Futuna	39	0	Morat et Veillon 1985, Meyer 2016
Cook	13	1	Cribb & Whistler 2011
Society	28	16	Meyer <i>et al.</i> 2006
Marquesas	5	3	Lorence & Wagner 2019
Hawaii	3	1	Wagner <i>et al.</i> 1990



Center of plant diversification



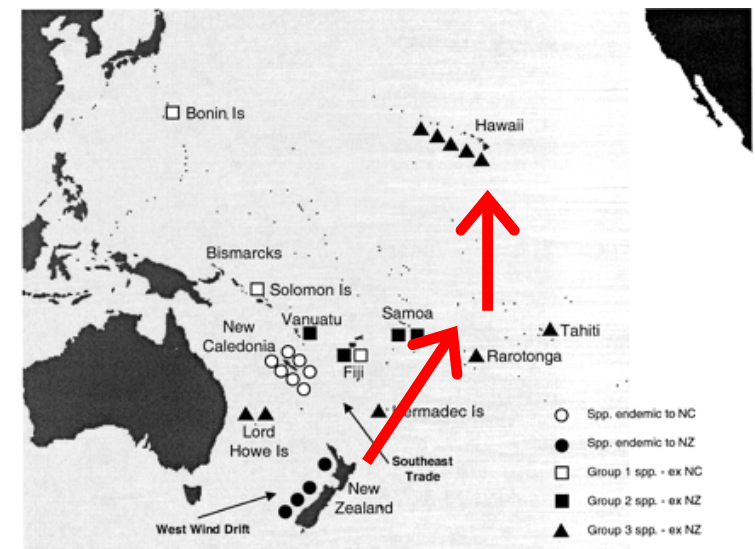
“ohi’a lehua” *Metrosideros polymorpha*
(Maui)



“rata” *Metrosideros kermadecensis*
(Kermadec Is., New Zealand)



“puarata” *Metrosideros collina* var. *collina* (Tahiti)



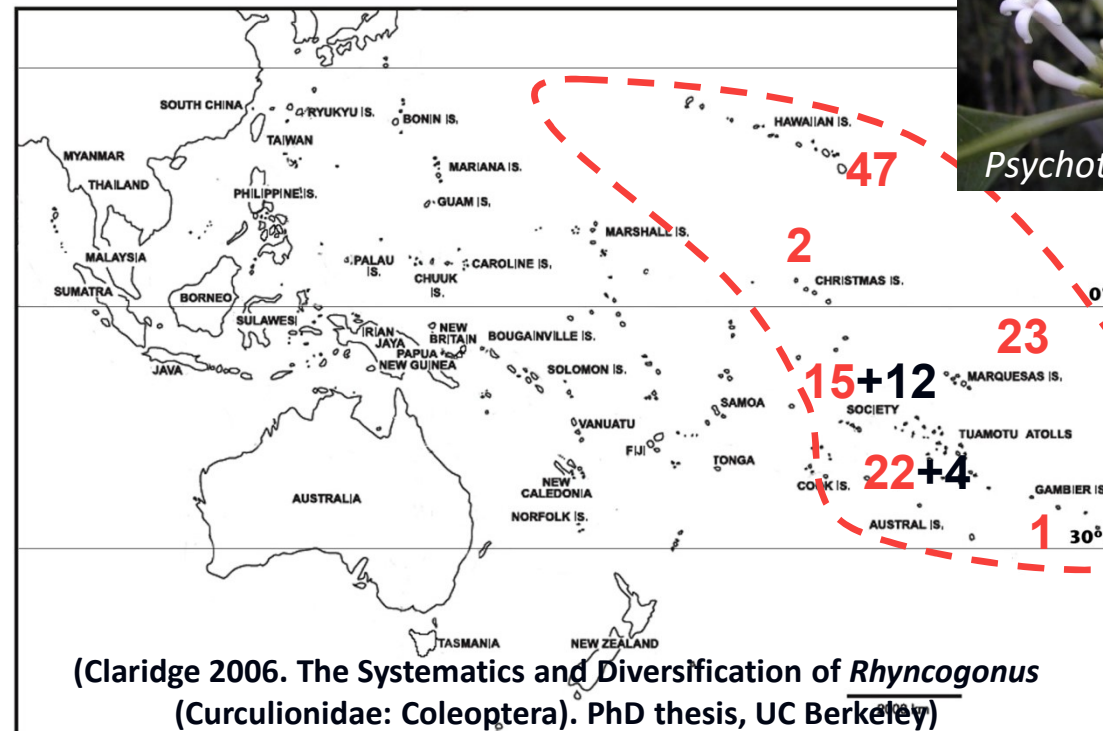
(Wright *et al.* 2000. *PNAS* 97(8): 4118-4123)

Comparaison de la flore des plantes à fleurs

Île/Archipel (surface terrestre)	Plantes à fleurs	Espèces endémiques	% Endemisme	Genres endémiques
Nouvelle-Calédonie (19,060 km ²)	3,063	2,448	80	100
Fidji (18,250 km ²)	1,302	799	61	6
Hawaii (16,880 km ²)	966	859	89	32
Polynésie française (3,520 km ²)	659	478	72	9
Wallis et Futuna (142 km ²)	297	7?	2	0
Rapa Nui (166 km ²)	30	7?	24	0

Radiation évolutive

Archipelago	<i>Cyrtandra</i> (Gesneriaceae)	<i>Psychotria</i> (Rubiaceae)
Hawai'i	53	11
Fiji	37	76
French Polynesia	28	27+



Plant speciation and evolutive radiation

- **Most speciose genera:**
 - *Psychotria* = 27+ endemic species
 - *Myrsine* = 27 spp.
 - *Cyrtandra* = 28 spp.
 - *Phyllanthus* = 22 spp.
 - *Bidens* = 20+ spp.



Psychotria (Rubiaceae)



Myrsine (*Rapanea*,
Primulaceae)



Cyrtandra (Gesneriaceae)



Bidens (Asteraceae)



Phyllanthus (*Glochidion*,
Phyllanthaceae)

Primary flora of French Polynesia

	Total	Indigenous (non endemic)	Endemic	Endemism
Vascular flora	881	335	546	62%

(Florence *et al.* 2007, Nadeaud Plant Database)



Apetahia/Sclerotheca

(Southeastern Polynesia endemic genus)

Fitchia

(SE Polynesia
endemic genus)



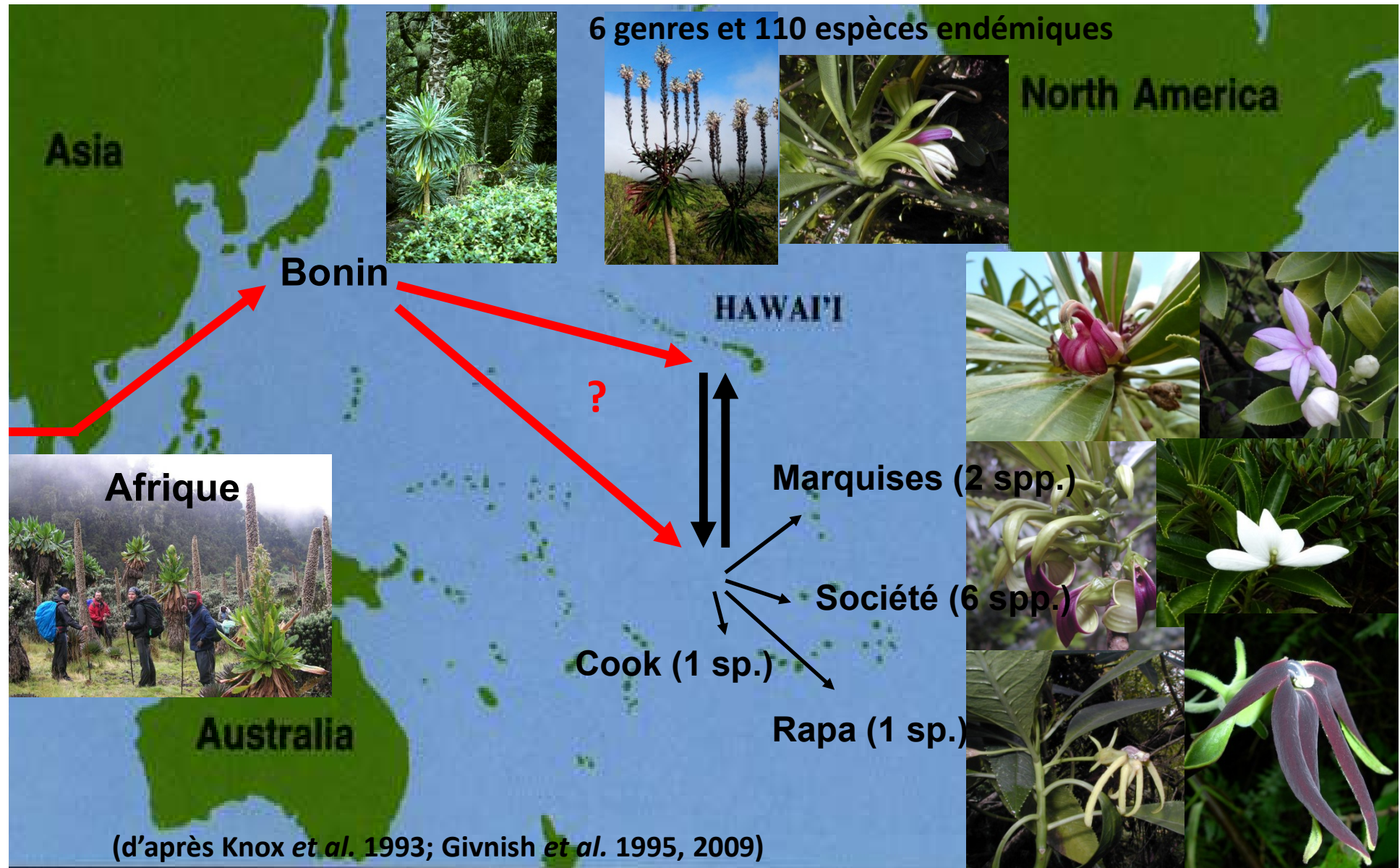
Oparanthus
(French Polynesia
endemic genus)



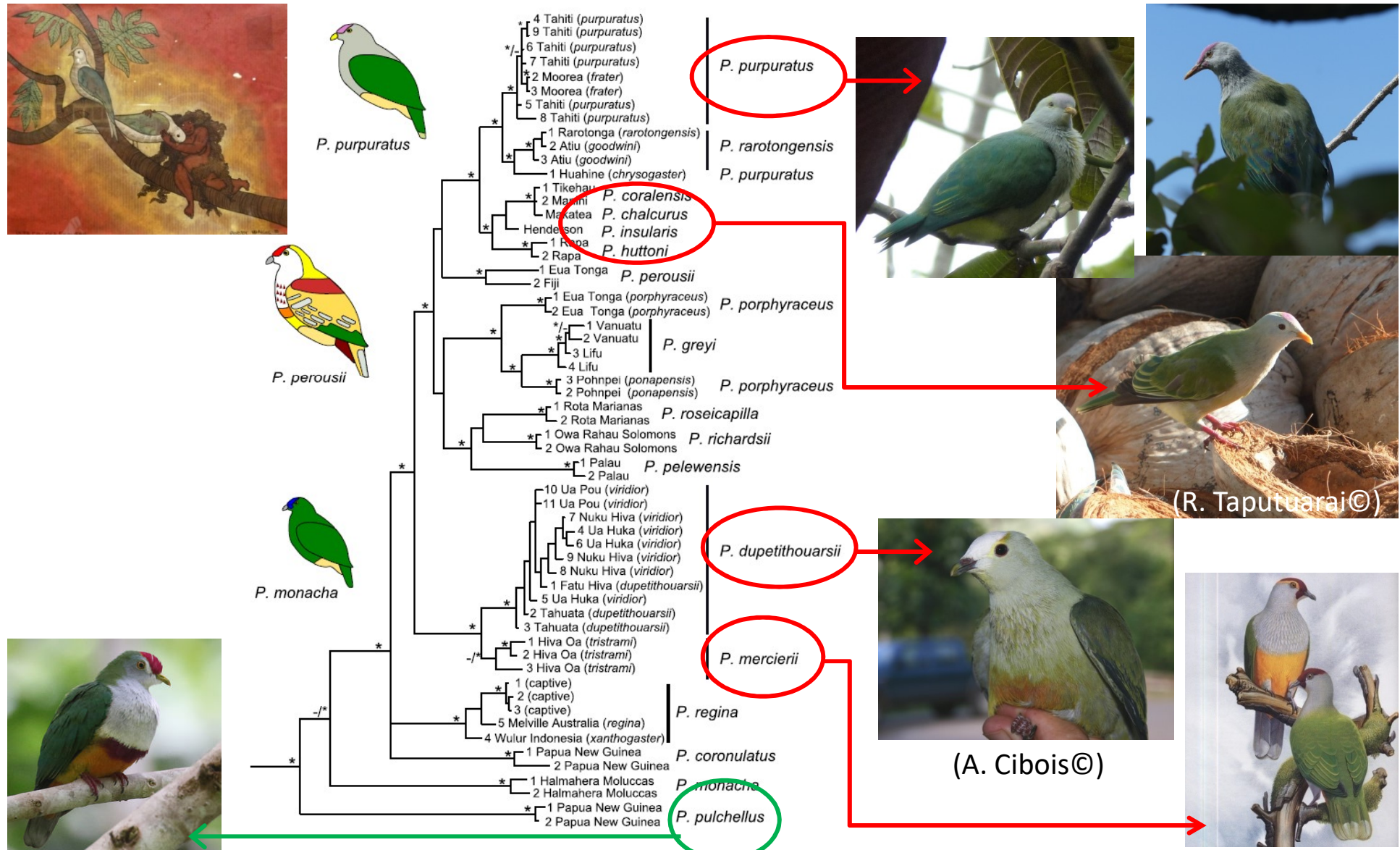
Pacifigeron

(Rapa endemic genus)

- Origine des Campanulacées arborescentes de Polynésie orientale



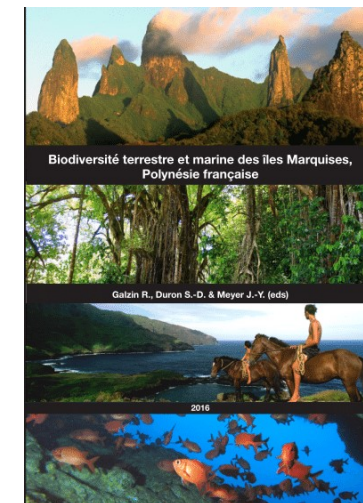
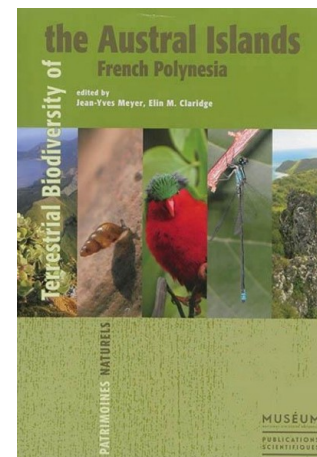
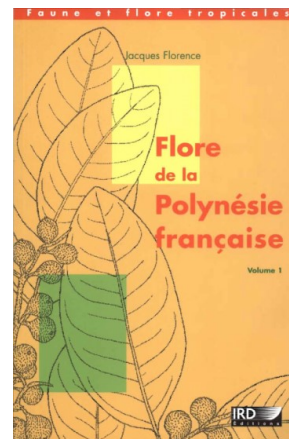
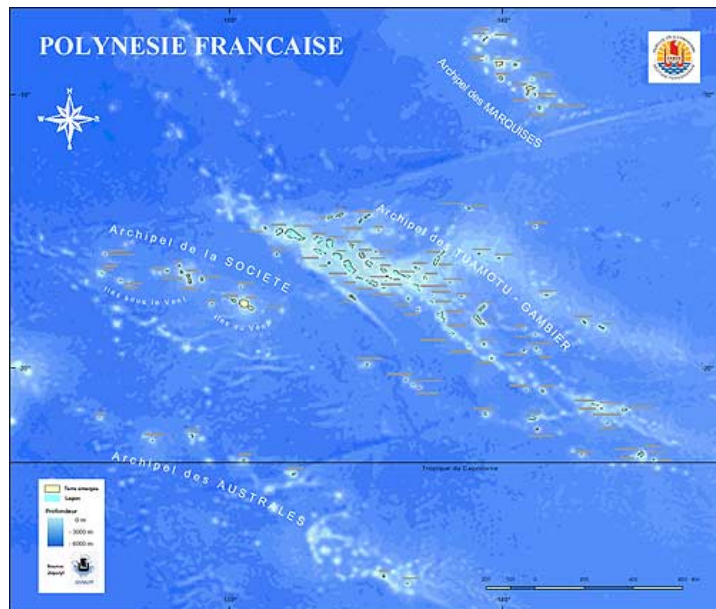
• Phylogénie des ptilopes des îles du Pacifique sud



(Cibois et al. 2014. *Molecular Phylogenetics and Evolution* 70(1): 442-453)

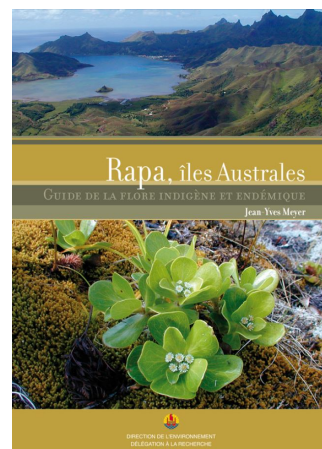
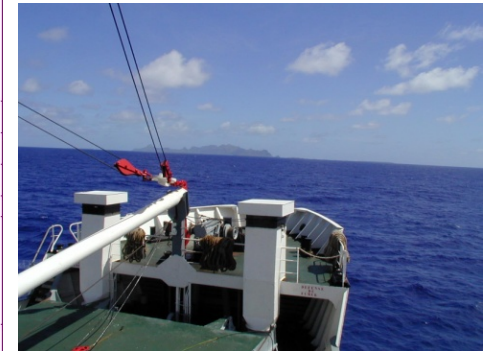
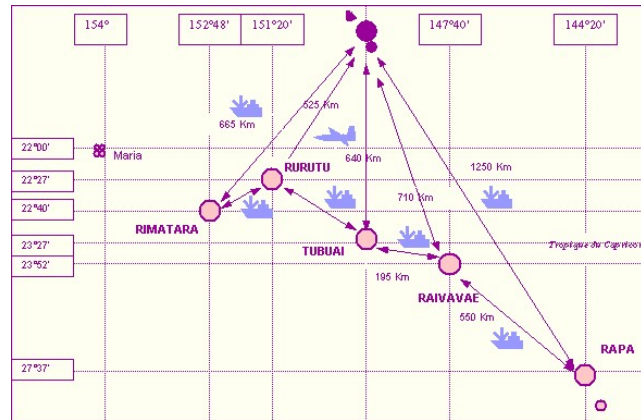
Comparaison de la flore vasculaire des archipels

Archipels	Flore primaire	Indigènes non Endémiques	Endémiques	% Endémisme
Société	581	285	296	51
Marquises	333	174	158	48
Tuamotu	102	80	22	22
Gambier	85	69	16	19
Australes	230	205	25	11
Rapa	191	131	60	31

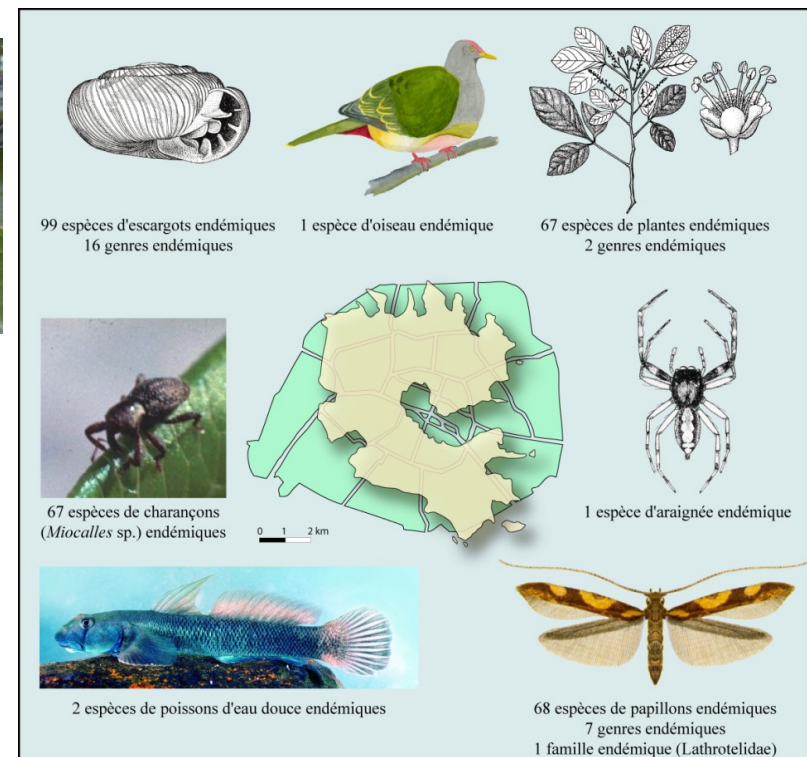


• Rapa Iti (Austral)

- A small (40 km²) and high (650 m) volcanic island with a subtropical climate
- Floristic affinities with New Zealand, Chatham Is., Lord Howe & Norfolk (Australia)



(Meyer 2011)



(Gargominy (ed.) 2003. Biodiversité et conservation dans les collectivités françaises d'outre-mer. Comité français UICN, Paris)

- **Marquises**

- **Genres endémiques**

5 sur les 9 genres endémiques de Polynésie

Lebronnecia, *Pelagodoxa*, *Plakothira* (endémiques Marquises) + *Apetahia*/*Sclerotheca*, *Oparanthus*

- **Espèces endémiques**

13 *Psychotria* (sur 27+ en Polynésie française)

8 *Cyrtandra* (sur 25+)

6 *Bidens* (sur 20+)

7 *Melicope* (sur 11)



Plakothira (Loasaceae)



Lebronnecia (Malvaceae)

Photo : K. Wood, NTBG©



Psychotria (Rubiaceae)



Cyrtandra (Gesneriaceae)



Bidens (Asteraceae)

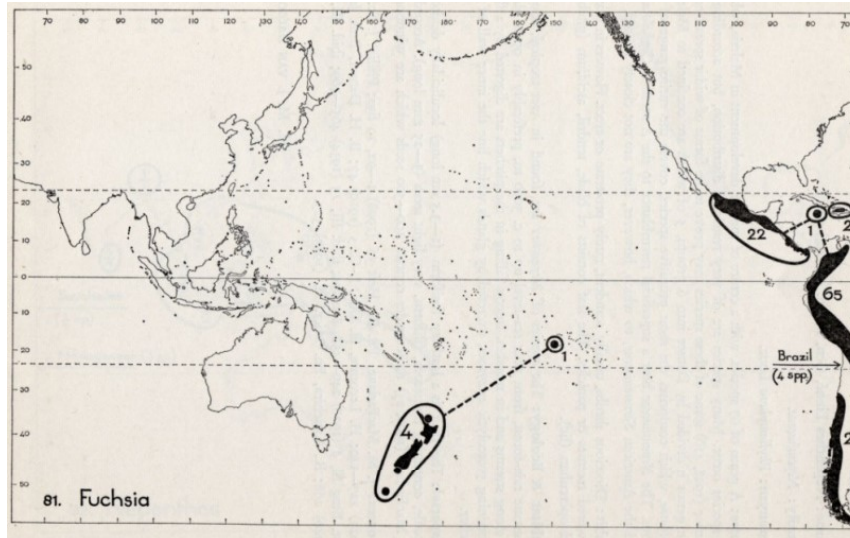


Melicope (Rutaceae)

Taxa with peculiar distributions



Fuchsia magellanica
(Chili)



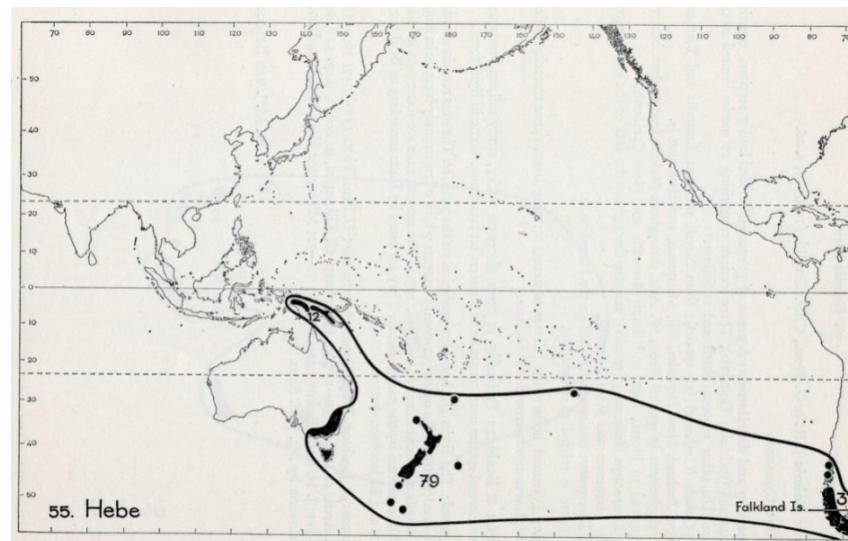
(Van Steenis & Van Balgooy 1966. *Pacific Plant Areas*)



Fuchsia cyrtandroides (Tahiti)



Hebe stricta (New Zealand)



Hebe rapensis (Rapa) 17

Taxa with disjunct areas

- *Astelia* (Asteliaceae)



Astelia tovii
(Marquesas)



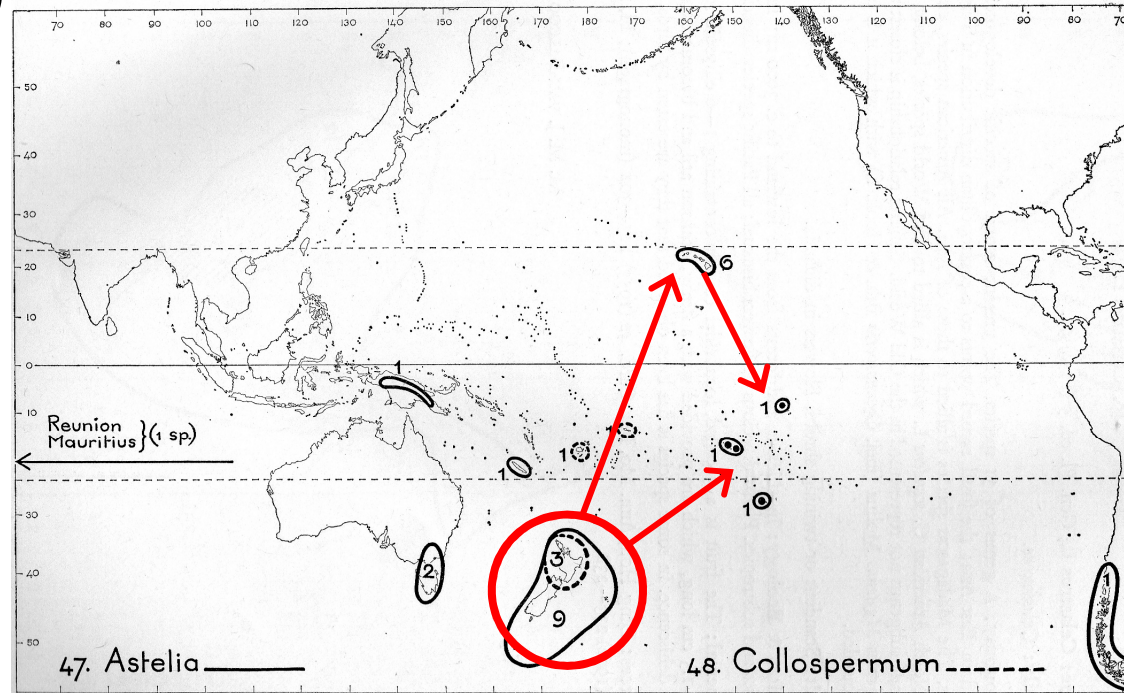
Astelia rapensis (Rapa)



Astelia sp. (New Zealand)

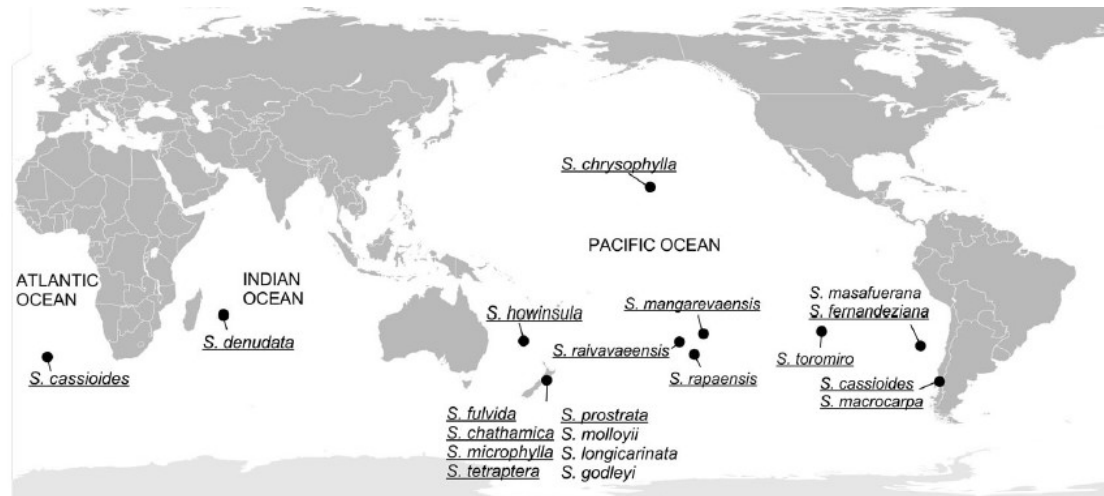


“'ānae”
Astelia
nadeaudii
(Society)



(Birch & Keeley 2013. *Journal of Biogeography* 40: 1914-1927)

- *Sophora* (Fabaceae)



(Shepherd & Heenan 2017. *New Zealand Journal of Botany* 55(3): 334-346)



Sophora raivavaeensis
(Raivavae)

Sophora chrysophylla (Hawai'i, “māmane”)



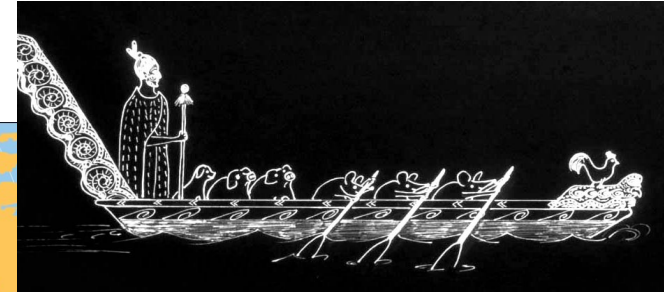
Sophora denudata (La Réunion)



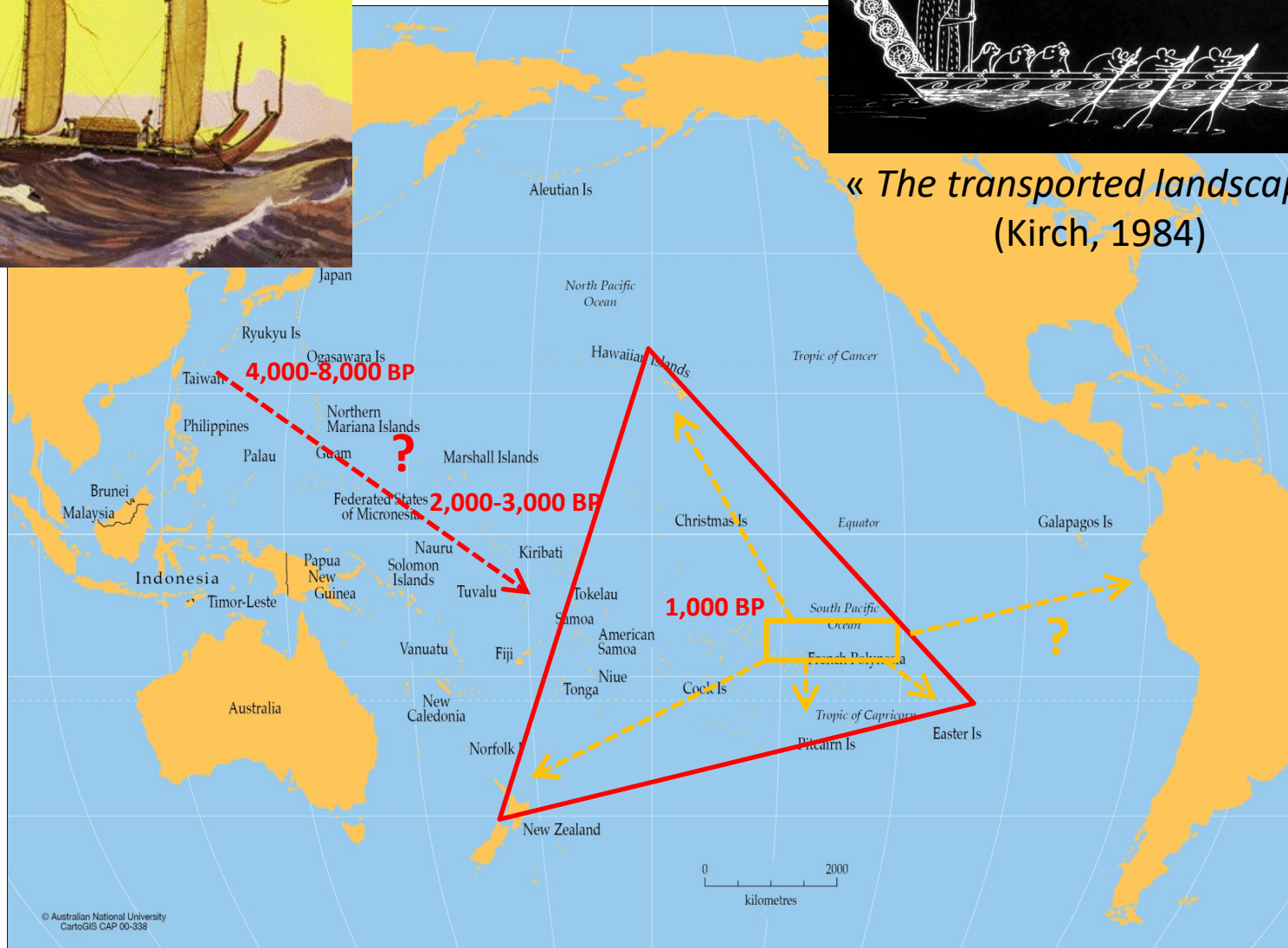
Sophora tetraptera (New Zealand, “kowhai”)



Sophora toromiro (Rapa Nui,
“toromiro”)



« The transported landscape »
(Kirch, 1984)



(Trejaut *et al.* 2005, *PLoS Biology* 3(8): e247)

Introduced plants in French Polynesia

	Polynesian (« Aboriginal ») introductions	European (« Modern ») introductions	Naturalized species
Alien vascular flora	ca. 30 intentional + 50 accidental (« weeds »)*	> 1700**	> 590**

(*Florence 1987, Whistler 1991; **Fourdrigniez & Meyer 2008)



Sydney
Parkinson
(Tahiti in
1769)



Genetic diversity of Polynesian plants

- **> 430 named cultivated varieties/cultivars/cultigens of plants introduced and cultivated by Polynesians in the Society and the Marquesas Is.** (after Cuzent 1860, Henry 1928, Brown 1931, 1935):
 - *Musa x paradisiaca* (banana)= 75 Marquesas, 34 Tahiti
 - *Cocos nucifera* (coconut)= 50 Marquesas, 16 Tahiti
 - *Colocasia esculenta* (taro)= 30 Marquesas, 29 Tahiti
 - *Artocarpus incisa* (breadfruit)= 40 Tahiti
 - *Piper methysticum* (kava)= 21 Marquesas, 14 Society
 - *Musa troglodytarum* (fe'i)= 18 Tahiti, 3 Marquesas
 - *Saccharum officinale* (sugarcane)= 14 Marquesas, 7 Society
 - *Cordyline fruticosa* (ti)= 13 Tahiti, 6 Marquesas
 - *Ipomoea batatas* (sweet potatoe)= 6 Tahiti, 5 Marquesas
 - *Ananas comosus* (pineapple) = 6 Marquesas



- ***Broussonetia papyrifera* (Moraceae)** : mûrier à papier, *paper mulberry*, « aute » (Society), « ute » (Marquesas), « wauke » (Hawai’i), « mahute » (Rapa Nui)

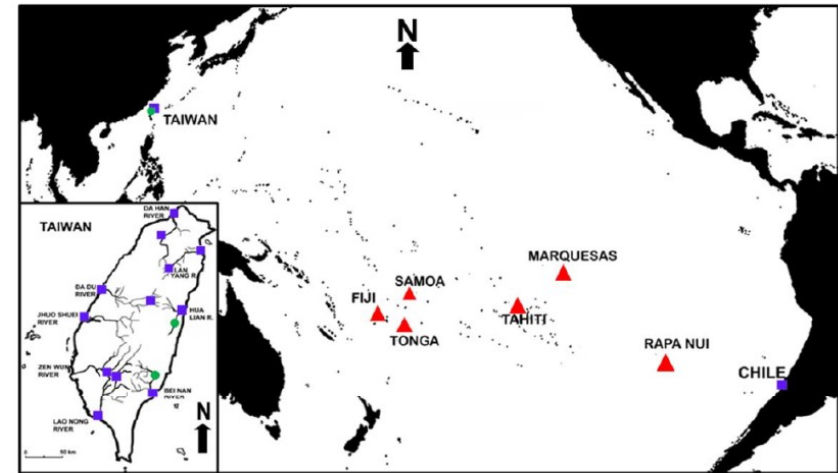
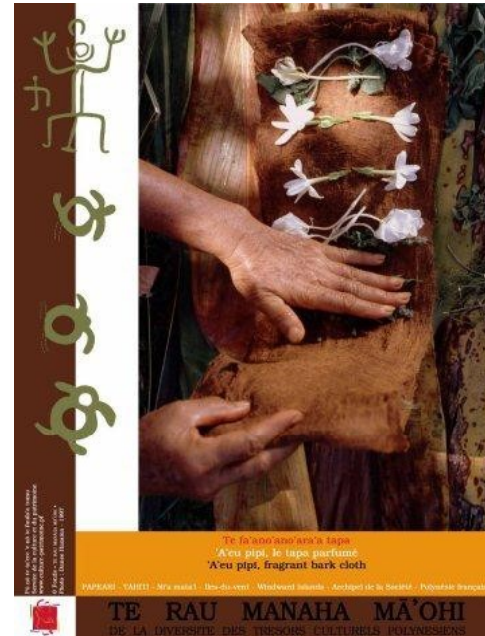


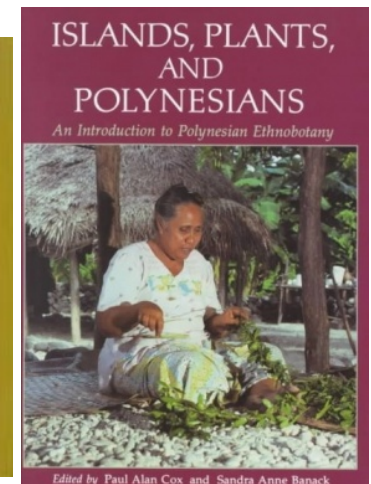
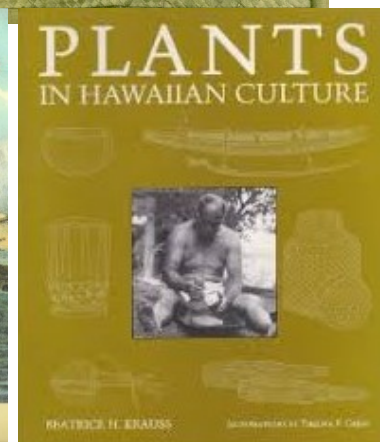
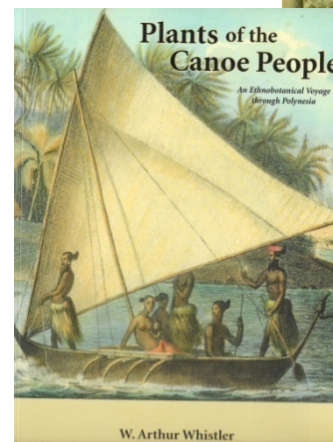
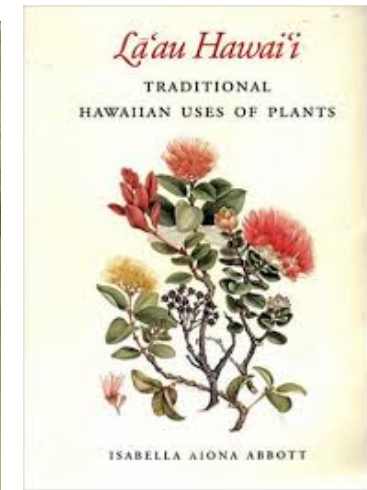
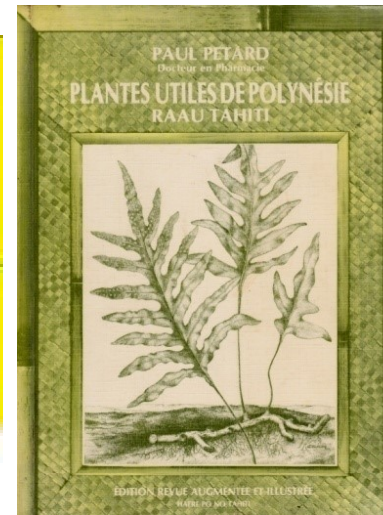
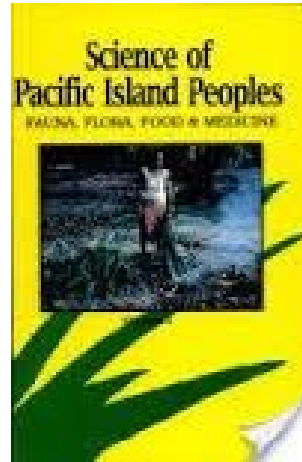
Figure 1 Map of the Pacific and Taiwan showing *Broussonetia papyrifera* sampling locations. Codes (▲, ■) indicate different genotypes as discussed in the text and also shown in Figure 2.

(Gonzalez-Lorca *et al.* 2005.
New Zealand Journal of Botany 53(2): 75-89)



Multiple uses of Pacific Islands plants

- medicine
- general construction
- body ornamentation (tattoos)
- fuelwood
- ceremony and ritual
- toolmaking
- food
- boat or canoe making
- dyes or pigments
- magic and sorcery
- fishing equipment
- cordage and fibre
- games or toys
- perfumes and scenting coconut oil
- fertiliser and mulching
- woodcarving
- weapons or traps
- food wrapping, domesticated and wild animal feed, handicrafts, cooking equipment, clothing, fish poisons, adhesives or caulking, and musical instruments
- subjects of legends, mythology, songs, riddles, and proverbs...



Ethnobiobiodiversity



(Heiva i Tahiti, 2013)



(Kiritimati, 2012)



(Alofi, 2008)



(Hiva Oa, 2012)

- ***« The knowledge, uses, beliefs, resource-use systems and conservation practices, taxonomies and language that island societies have for their ecosystems, species, and genetic diversity »***

(Thaman 2008. *Micronesica* 40(1/2): 33-61)



²⁵
(‘Uvea, 2007)

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- LORENCE, D.H. & WAGNER, W.L. **2019 & 2020**. *Flora of the Marquesas Islands*. NTBG, Smithsonian Institution.

➤ Flora of the Marquesas Islands

<http://botany.si.edu/pacificislandbiodiversity/marquesasflora/>

➤ Base de données botaniques « Nadeaud » de l'herbier de la Polynésie française <https://nadeaud.ilm.pf/>

