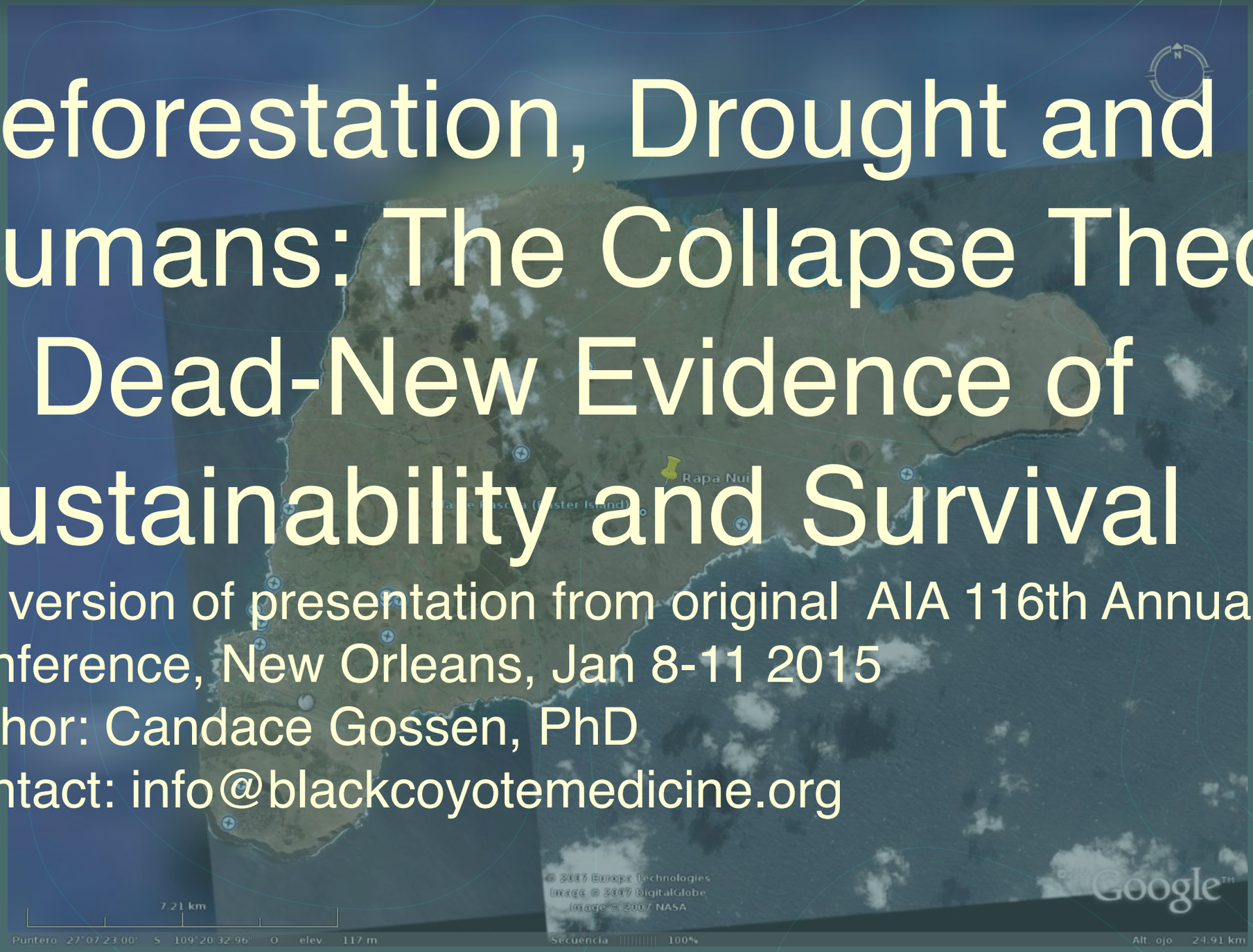
Deforestation, Drought and Humans: The Collapse Theory is Dead-New Evidence of Sustainability and Survival



pdf version of presentation from original AIA 116th Annual Conference, New Orleans, Jan 8-11 2015

Author: Candace Gossen, PhD
Contact: info@blackcoyotemedicine.org


in the navel of the world - Te Pito O' Te Henua

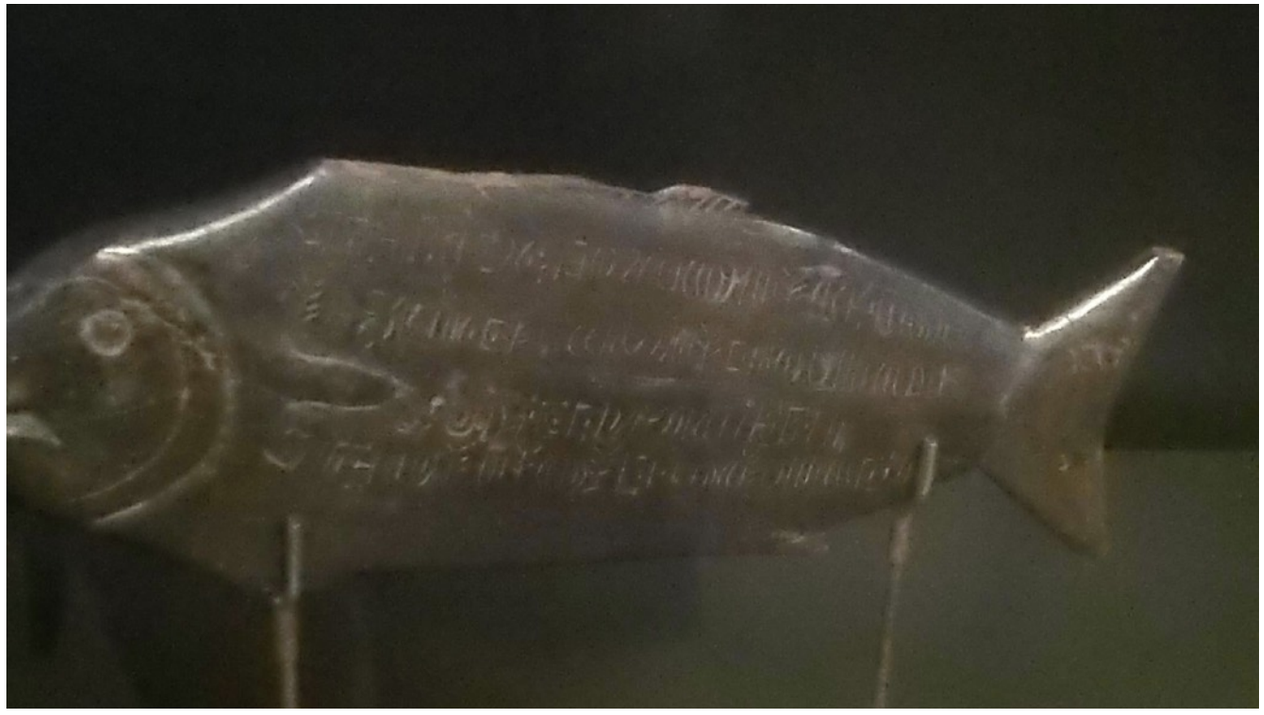
Iorana

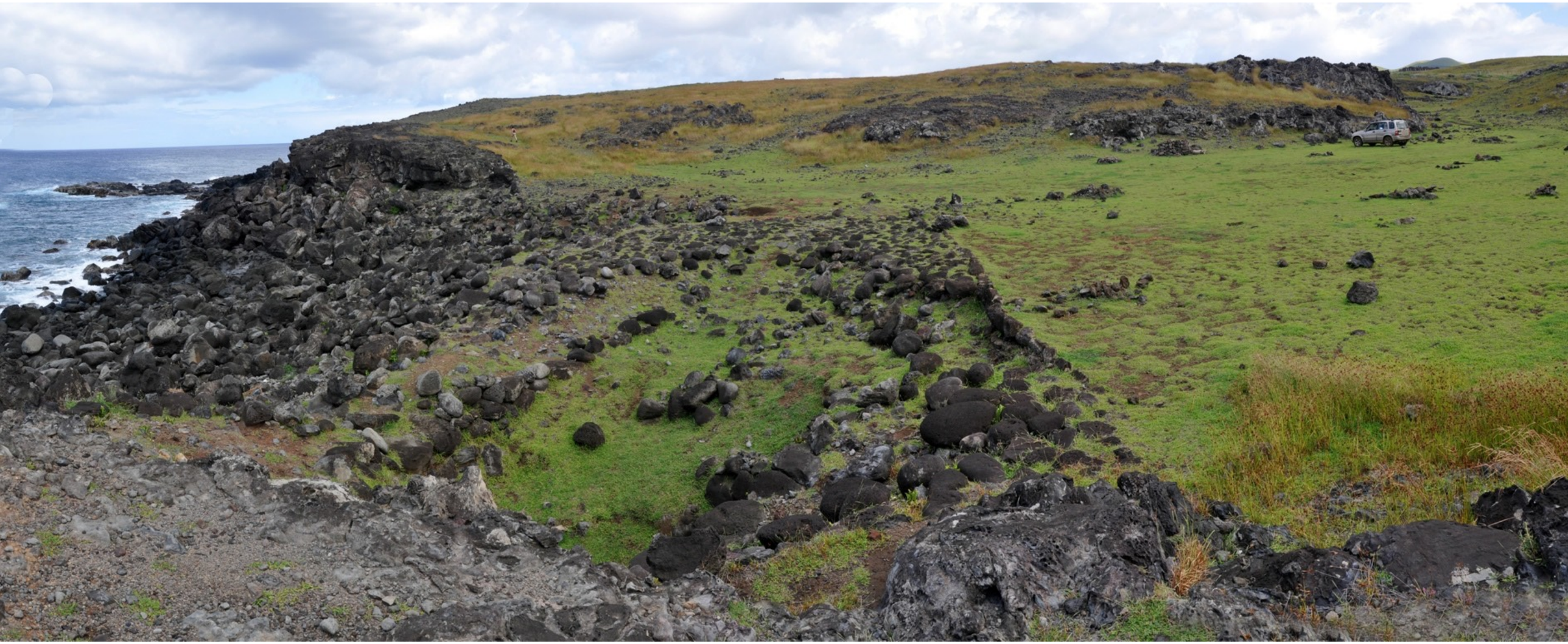
hello and goodbye

Maururu

thank you

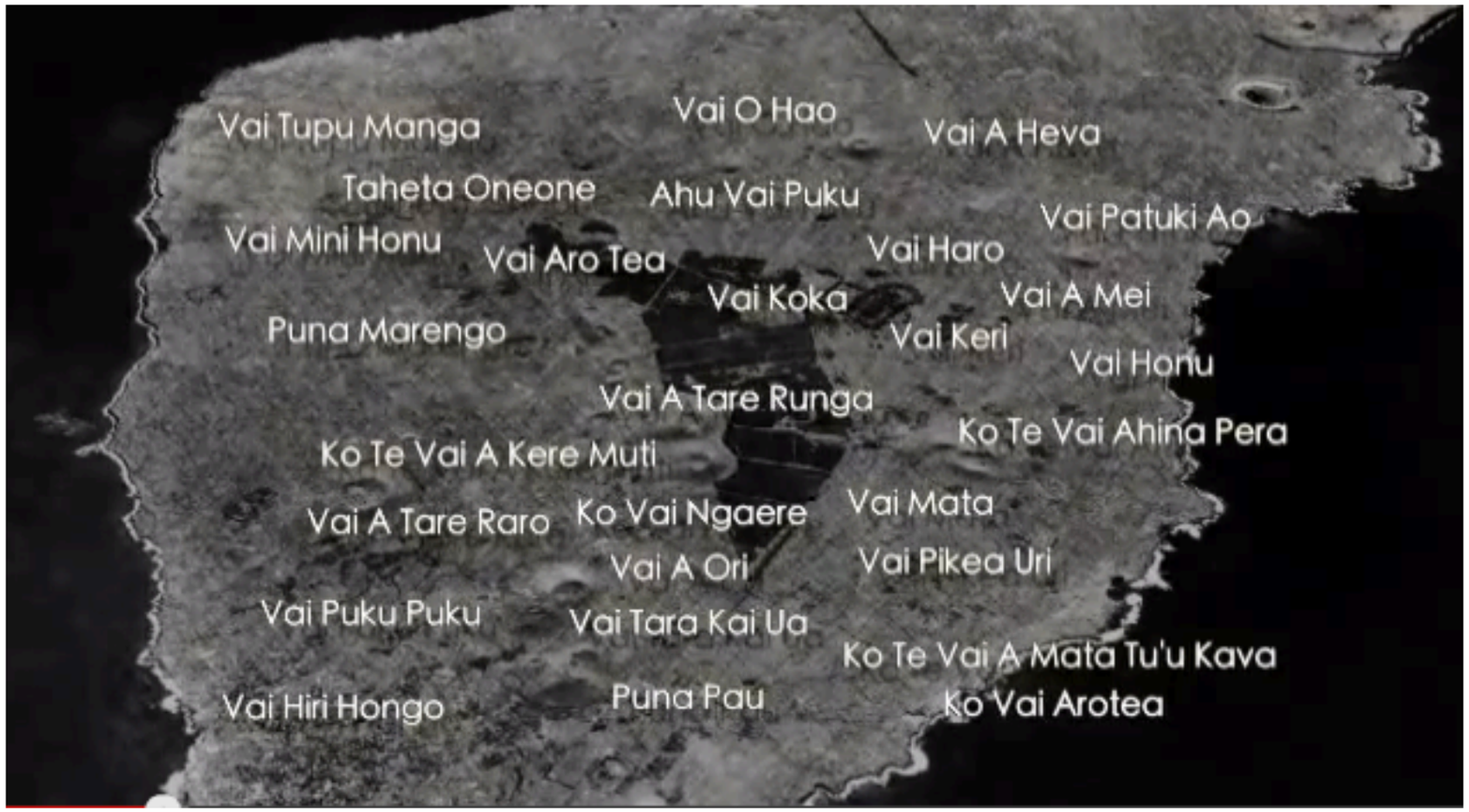
Huri A Urenga - the time keeper





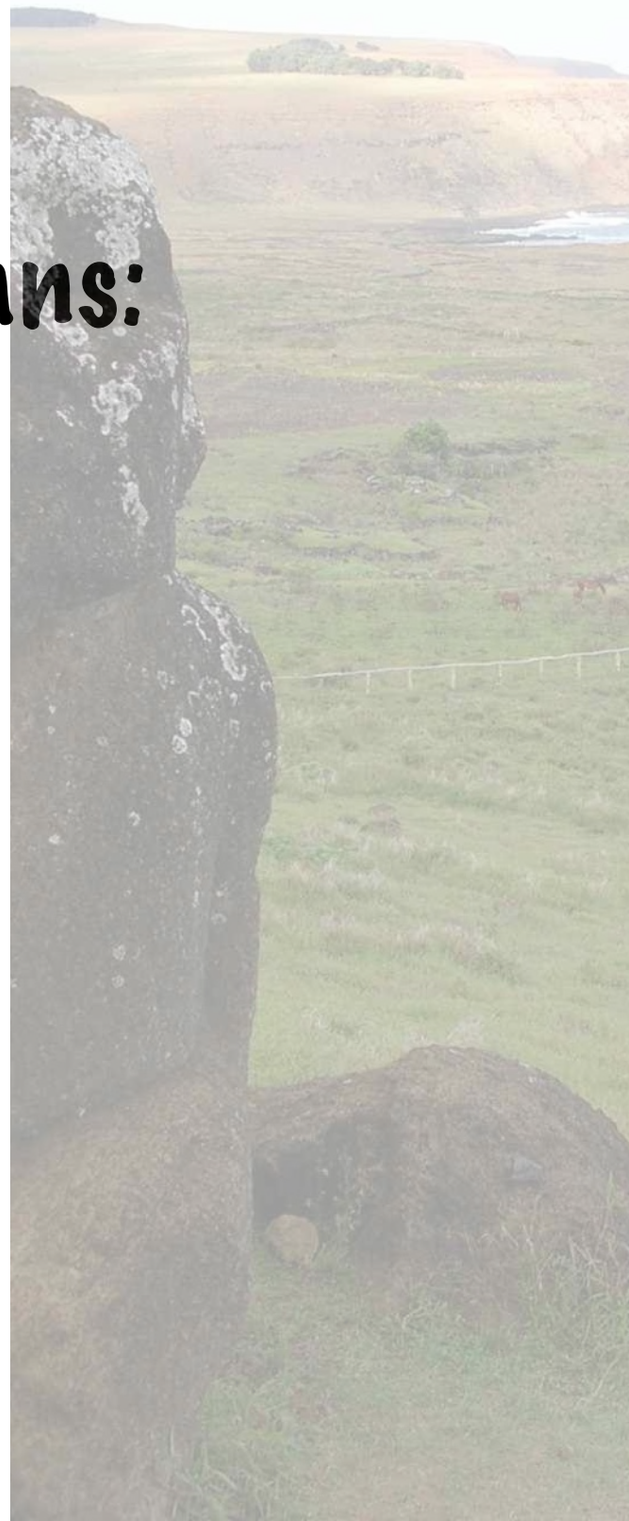
Vaihu

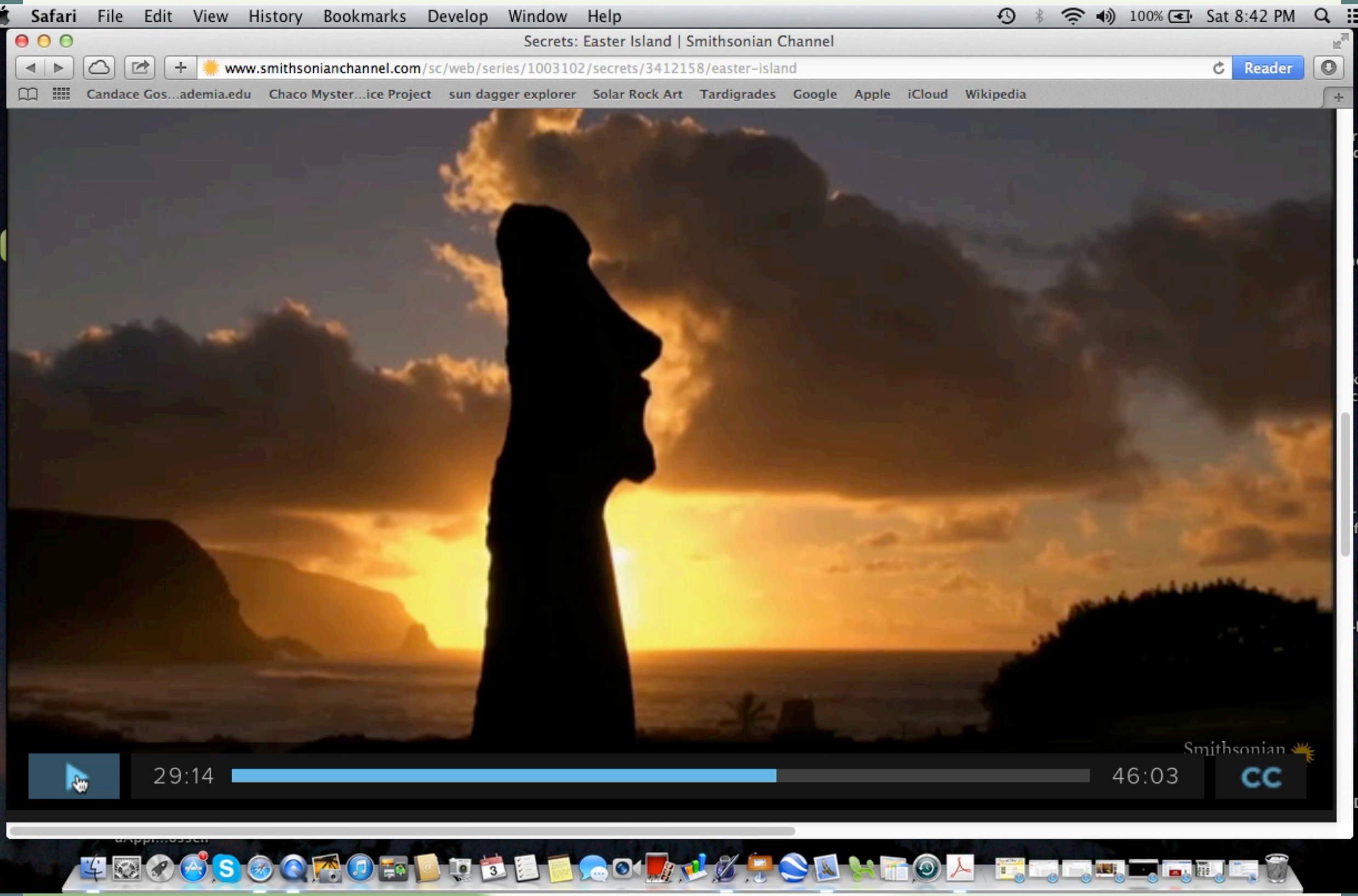
Vai


Vai Tupu Manga
Vai O Hao
Vai A Heva
Taheta Oneone
Ahu Vai Puku
Vai Patuki Ao
Vai Mini Honu
Vai Aro Tea
Vai Haro
Vai Koka
Vai A Mei
Puna Marengo
Vai Keri
Vai Honu
Vai A Tare Runga
Ko Te Vai Ahina Pera
Ko Te Vai A Kere Muti
Vai Mata
Vai A Tare Raro
Ko Vai Ngaere
Vai Pikea Uri
Vai A Ori
Vai Puku Puku
Vai Tara Kai Ua
Ko Te Vai A Mata Tu'u Kava
Vai Hiri Hongo
Puna Pau
Ko Vai Arotea

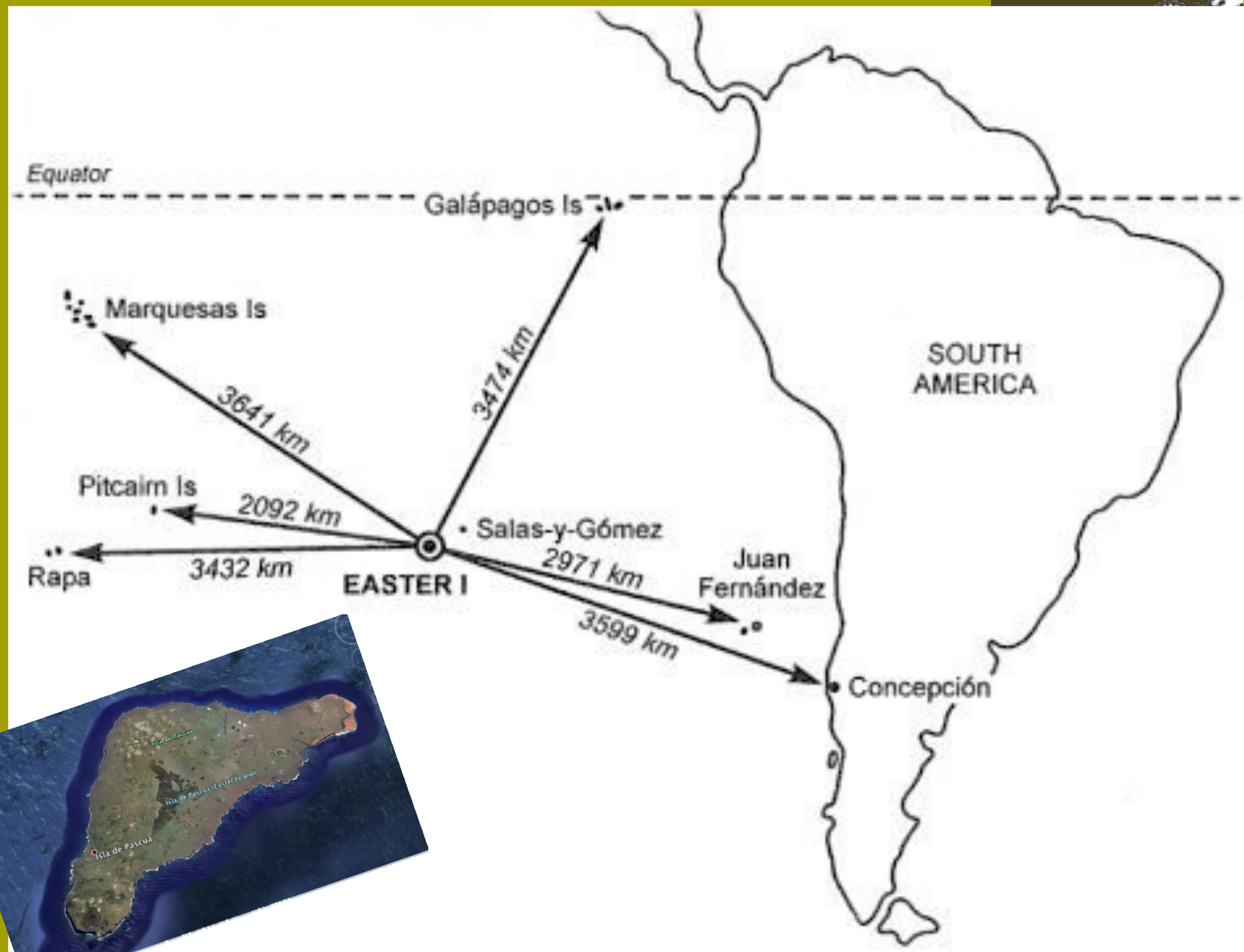

Rano Kao
vai and plantas

Deforestation, Drought and Humans: The Collapse Theory is Dead - New Evidence of Adaptability and Hope




Safari File Edit View History Bookmarks Develop Window Help
100% Sat 8:42 PM
Secrets: Easter Island | Smithsonian Channel
www.smithsonianchannel.com/sc/web/series/1003102/secrets/3412158/easter-island
Reader
Candace Gos...ademia.edu
Chaco Myster...ice Project
sun dagger explorer
Solar Rock Art
Tardigrades
Google
Apple
iCloud
Wikipedia
Smithsonian
29:14
46:03
CC

The most isolated-inhabited land mass on planet Earth



510m

370m

305m

173 sq. km

No surface streams

Over 70 Volcanic cones

Tapilli tuft

27° 10’ S lat 109° 26’ W long

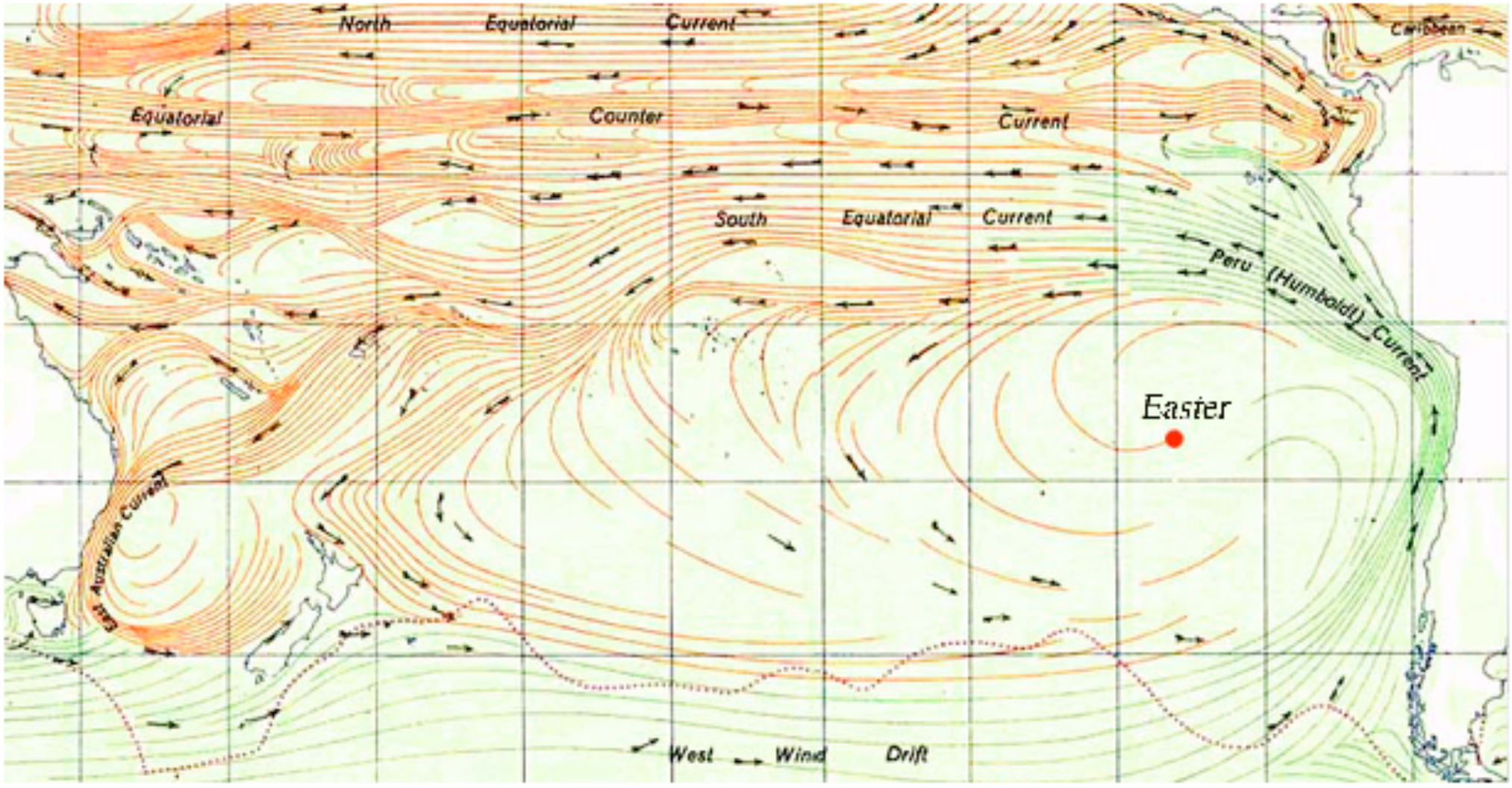
EASTER ISLAND

(TE-PITO-O-TE-HENUA)

North Cape
Vai-mata
Puna-Marengo
Mai-taki-te-moa
Te-pepe-renga
Hanga-o-teo
Vai-tara-kai-ua
Tuu-ko-ihu
E-2
Hanga-o-hiro
Anakena
Tupa Hiramoko
E-4-5-6
Maunga Auhepa
Ovahe
O-hae
Puna-rere-tākatea
La Pérouse Bay
Puapau
Te-pito-te-kura
Hanga-ohonu
Ahu Hekii
Ahu Hanga-o-puna
Mahatua
Teatea
Ana-o-keke
Cape O'Higgins
Ko te Umu o te Henua
Katiki
Poike
Ana-te-ava-nui
Cape Roggeveen
Marotiri
Eepe
Hotu-iti
Rano Raraku
Tongariki
Toatoa
Hanga-tetenga
Hanga-mai-hiku
Tama
Ahu Motuopope
Akahanga
Ahu Ohau
Terevaka
Rano Aroi
Ahu Tepeu
Vaitea
Motu-tautara
Ahu Akapu
Tahai
Cook Bay
Puna Pau
Tuu
Hanga-Roa
Hanga-piko
Ana-Kai-tangata
Mataveri
Orito
Vaihu
Hanga-hemu
Hanga-tee
Hanga-poukura
Hanga-hahave
Vinapu
Rano Kao
Orongo
Ahu Rikiriki
South Cape
Motu-kaokao
Motu-iti
Motu-nui
N
0 1 2 Miles

South Pacific Subtropical Gyre

currents follow a shallow subsurface flow that surfaces along the equator



Ocean current map Easter Island and Southern Pacific

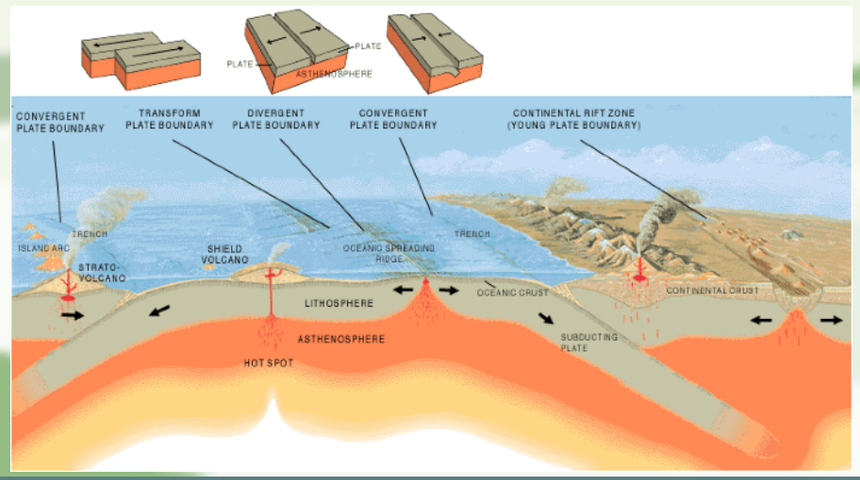
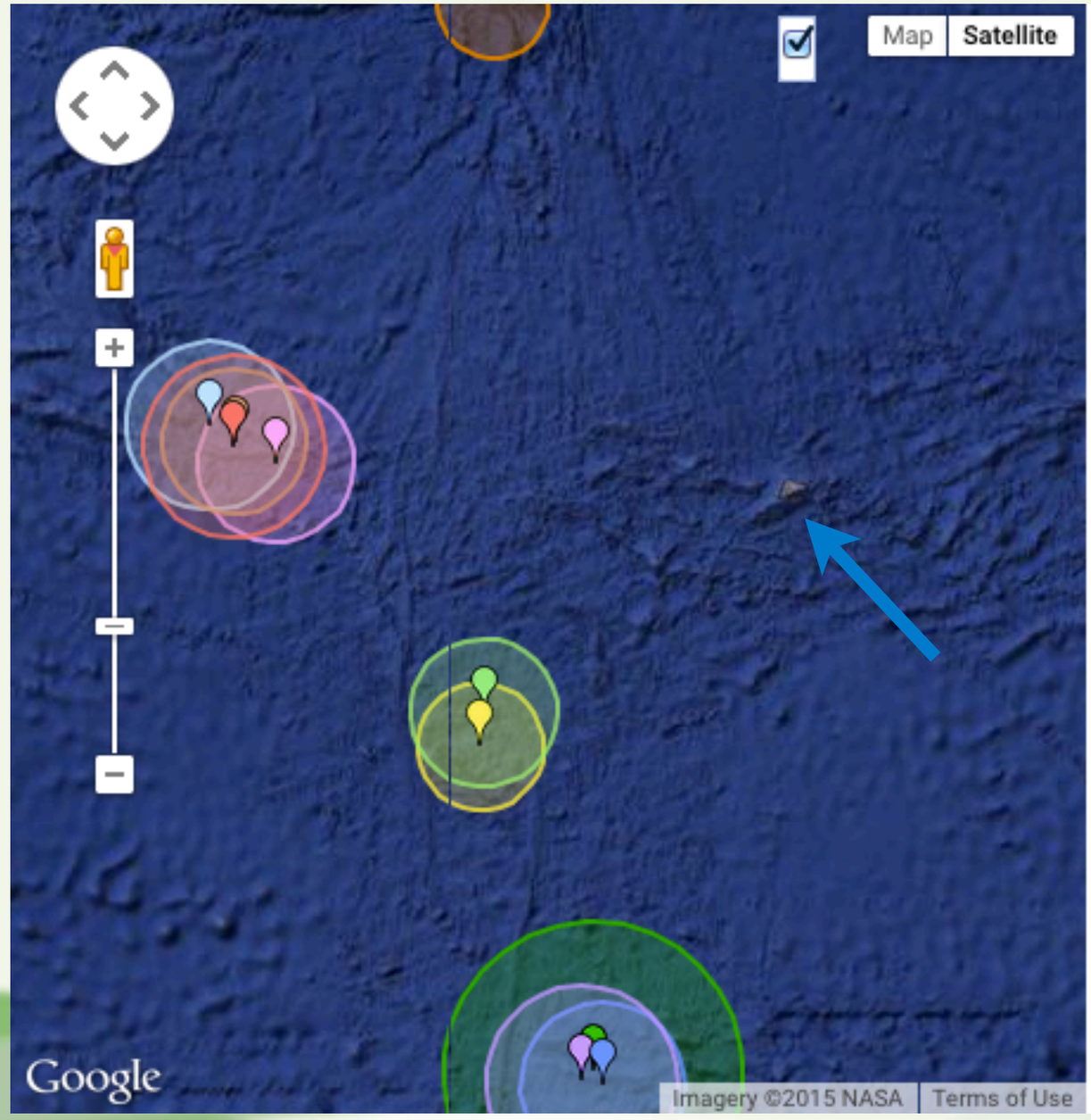
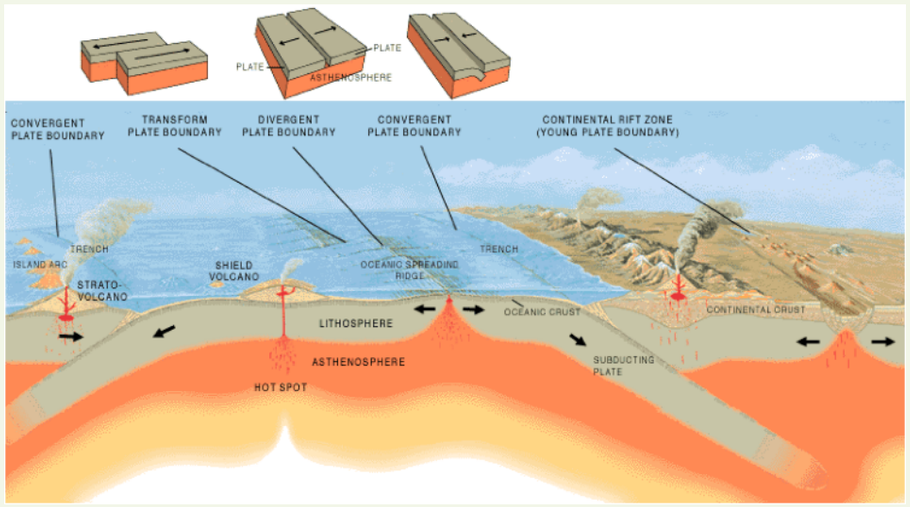
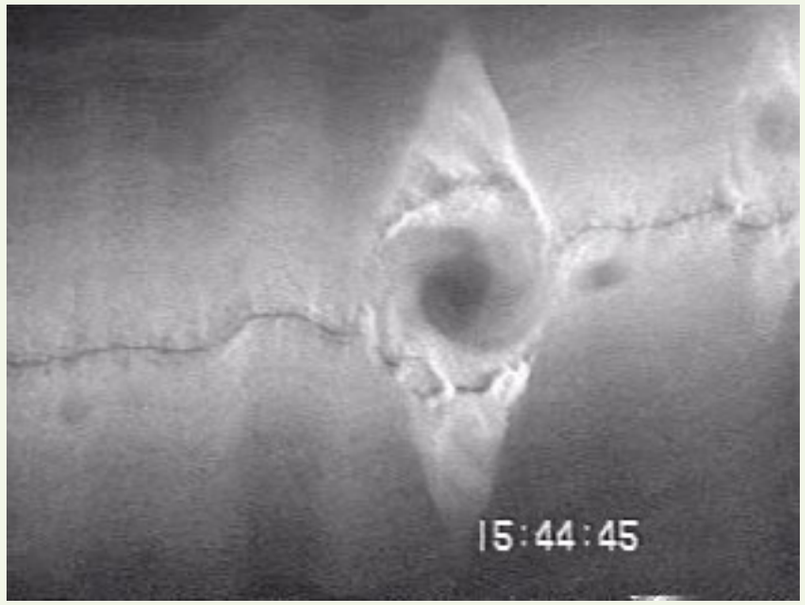


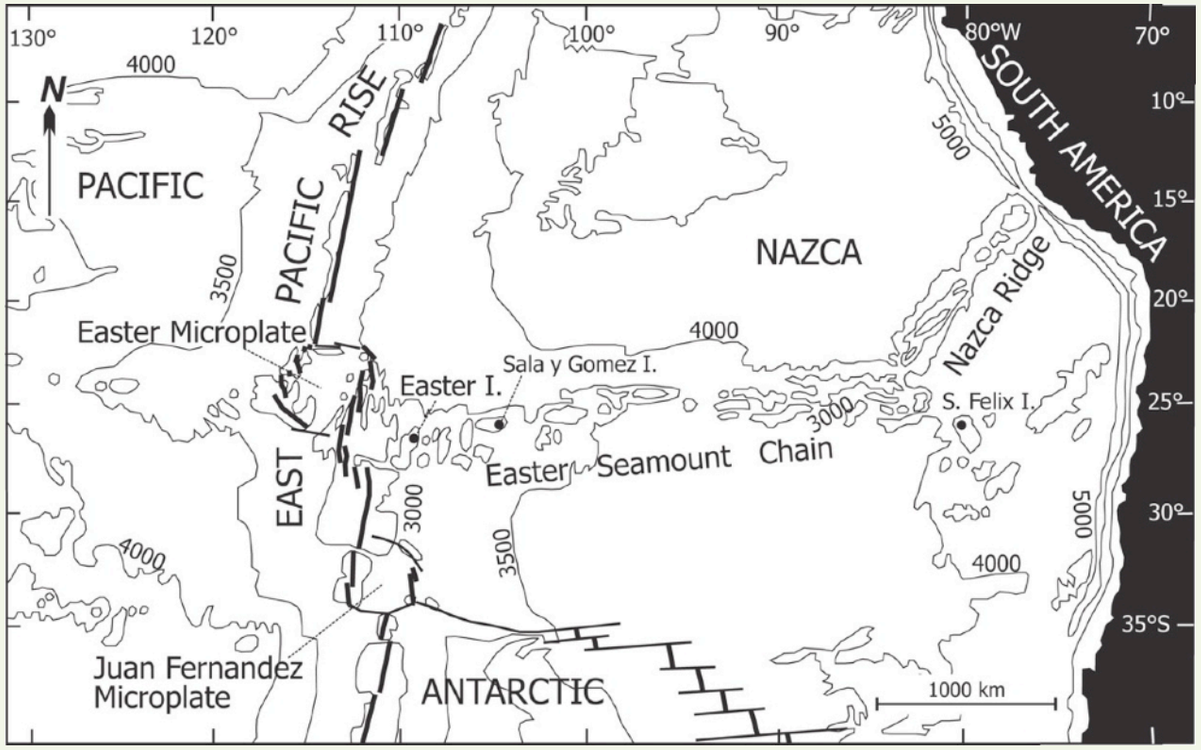
PLATE
ASTHENOSPHERE
PLATE
CONVERGENT PLATE BOUNDARY
TRANSFORM PLATE BOUNDARY
DIVERGENT PLATE BOUNDARY
CONVERGENT PLATE BOUNDARY
CONTINENTAL RIFT ZONE (YOUNG PLATE BOUNDARY)
TRENCH
ISLAND ARC
STRATO-VOLCANO
SHIELD VOLCANO
OCEANIC SPREADING RIDGE
TRENCH
OCEANIC CRUST
CONTINENTAL CRUST
LITHOSPHERE
ASTHENOSPHERE
SUBDUCTING PLATE
HOT SPOT



- 3 months ago 4.8 magnitude, 10 km depth
  Easter Island
- 4 months ago 4.9 magnitude, 10 km depth
  Easter Island
- 4 months ago 5.1 magnitude, 10 km depth
  Easter Island
- 6 months ago 6.0 magnitude, 10 km depth
  Easter Island
- 6 months ago 5.2 magnitude, 10 km depth
  Easter Island
- 7 months ago 5.4 magnitude, 10 km depth
  Easter Island
- 7 months ago 5.2 magnitude, 10 km depth
  Easter Island
- 8 months ago 5.3 magnitude, 10 km depth
  Easter Island
- 8 months ago 5.1 magnitude, 10 km depth
  Easter Island
- 8 months ago 5.4 magnitude, 10 km depth
  Easter Island



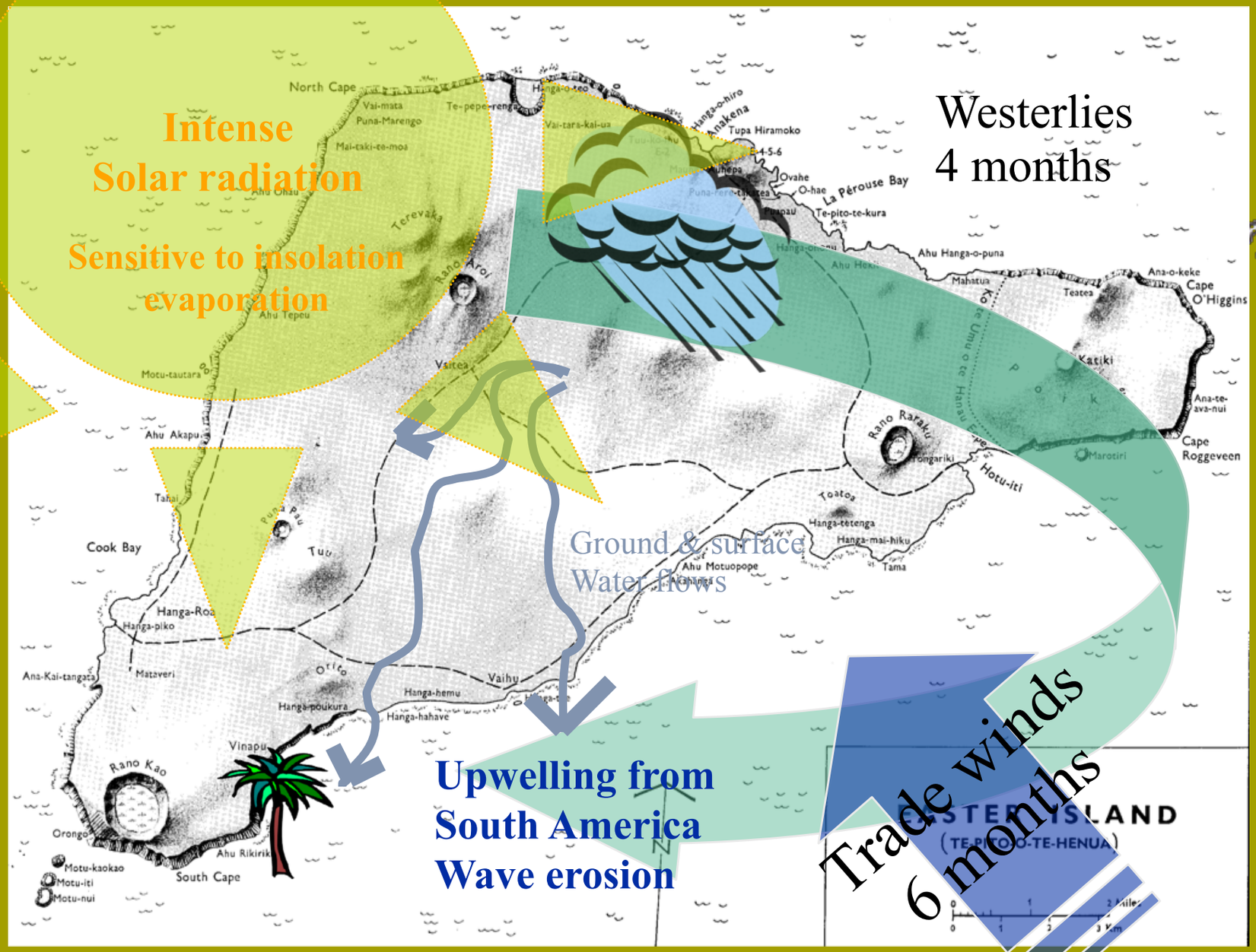




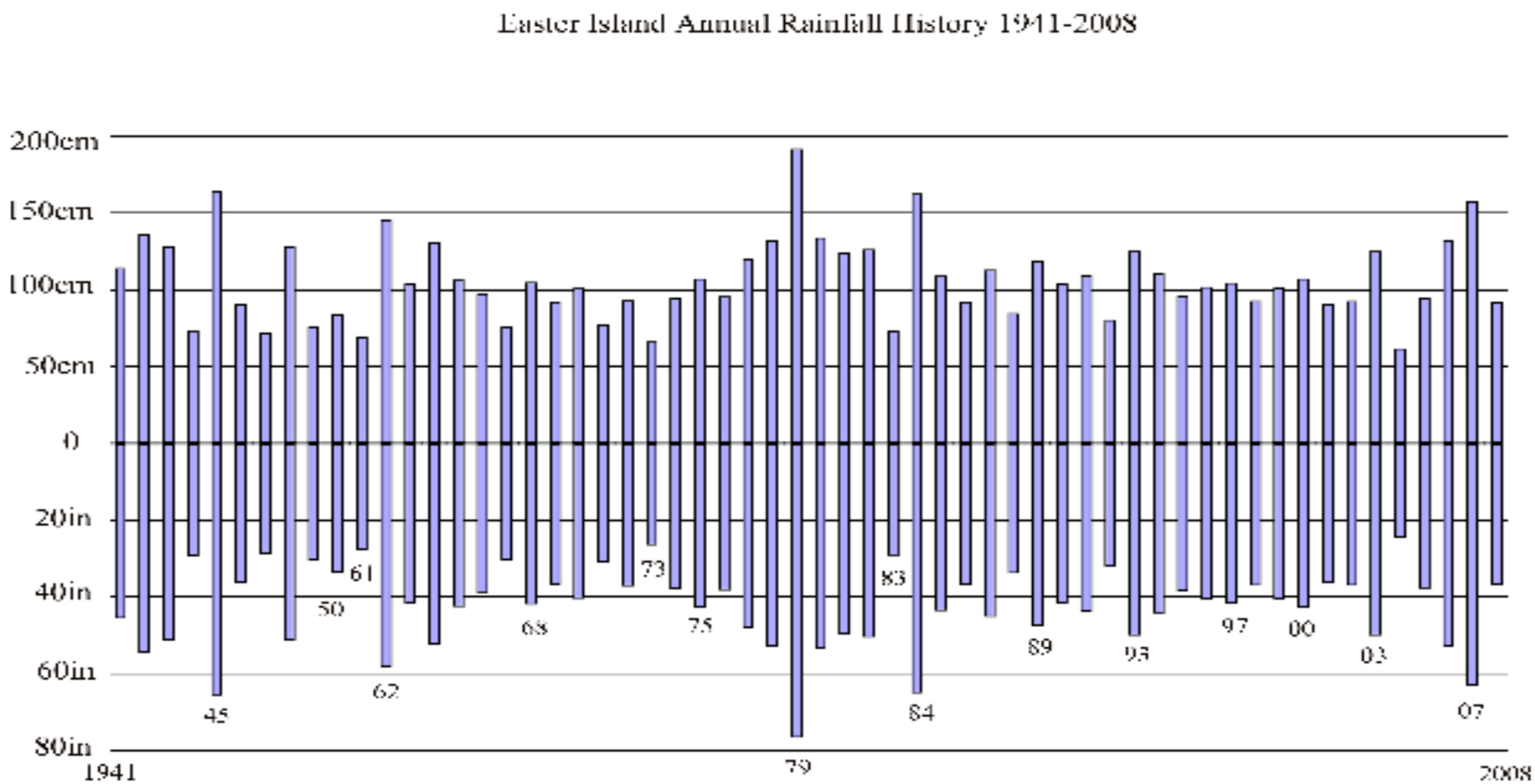
tectonics near Rapa Nui

geophysicists @ Cornell make Wax model to explain the "chimera" of the mid-ocean trench and plates near Rapa Nui .....when the paddles pull the surface apart at a certain rate, a rare spiral feature of mid-ocean ridges called microplates form and evolve, mimicking structures known to exist in the East-Pacific Rise such as the Easter microplate just off Easter Island in the Pacific.

Rainfall 38" annually



wet events(200cm) every 17-22yrs and drought(50cm) every 7-10 years.



Reference: NOAA Global Historical Climate Network V2

The largest palm tree known to exist on the planet

Jubaea chiliensis 20-30m tall/ 2-3m diam. discovered thru pollen analysis
Related to the Chilean wine palm still surviving in Chile

38 palms per 100m = 1400 trees per hectare

70% of island covered

11,600 hectares X 1,400 = 16.24 million Palm trees Before fire clearance

1420

1280

1550

1400

800AD - began (Flenley 1992)
1550AD ended (rc palm nuts)

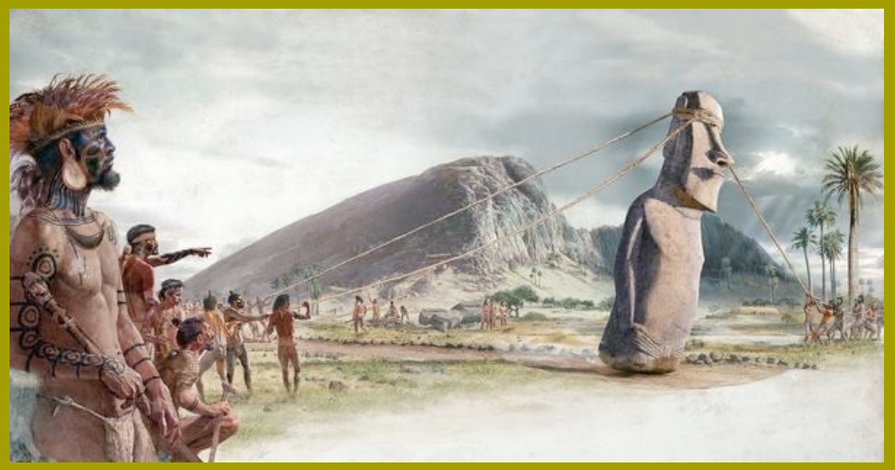
800 years to clear =
20,000 trees annually
55 daily =
32 mil m3 of trunk wood

EASTER ISLAND
(TE-PITO-O-TE-HENUA)

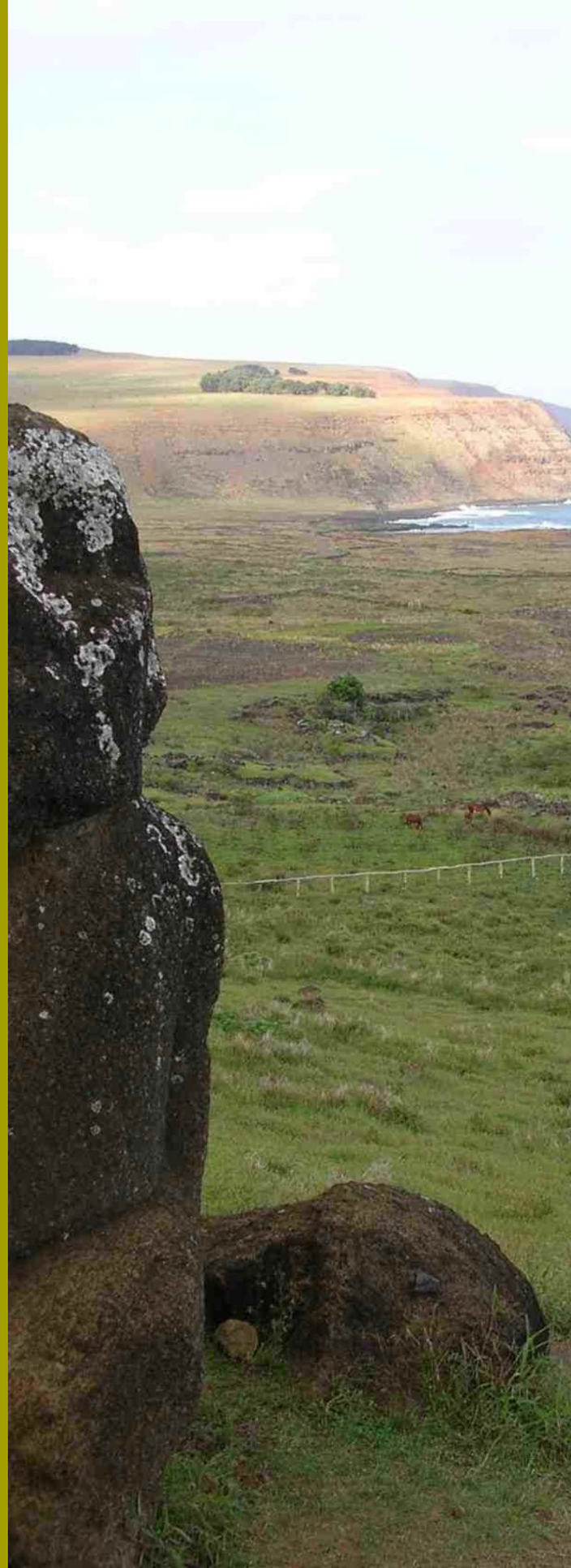
0 1 2 Miles

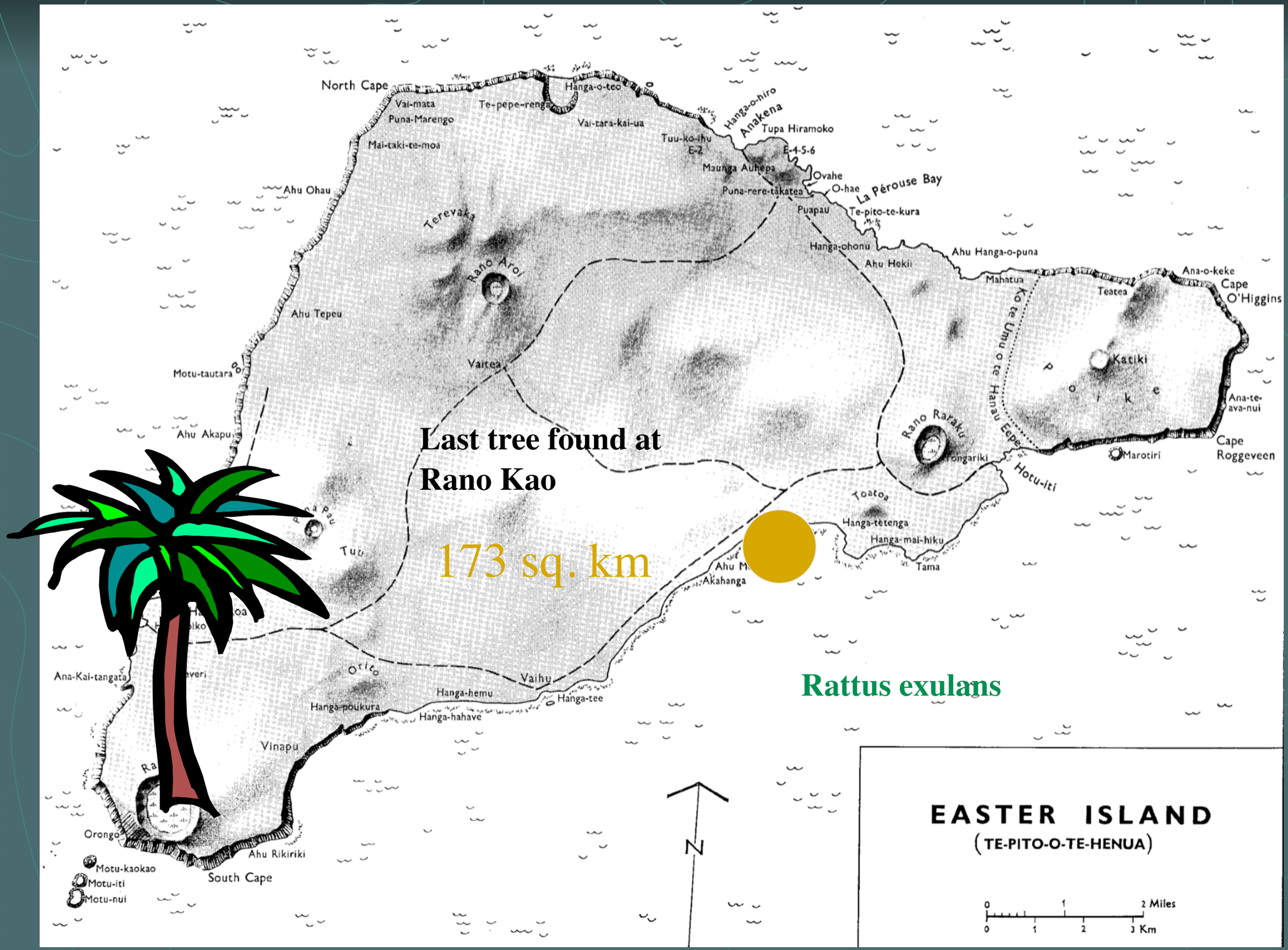
North Cape
Hanga-o-teo
Vai-mata
Te-pepe-renga
Puna-Marengo
Vai-tara-kai-ua
Mai-taki-te-moa
Tuu-ko-ihu
E-2
Hanga-o-hiro
Anakena
Tupa Hiramoko
E-4-5-6
Maunga Auhepa
Ovahe
O-hae
Puna-rere-tākatea
La Pérouse Bay
Puapau
Te-pito-te-kura
Ahu Ohau
Ahu Hekii
Ana-o-keke
Cape O'Higg
Rano Aroi
Ahu Tepeu
Vaitea
Ana-te-ava-nui
Rano Kau
Eepe
Ahu Akapu
Tongariki
Marotiri
Cape Roggeve
Hotu-iti
Tahai
Toatoa
Hanga-tetenga
Hanga-mai-hiku
Cook Bay
Ahu Motuopope
Akahanga
Tama
Hanga-piko
Ana-Kai-tangata
Vaihu
Hanga-hemu
Hanga-tee
Hanga-hahave
Rano Kao
Orongo
Ahu Rikiriki
South Cape
Motu-kaokao
Motu-iti
Motu-nui
N

massive
soil erosion
with
the loss of
trees



What Happened to the Trees?





Last tree found at Rano Kao

173 sq. km

Rattus exulans

Coring Rano Kao

1980 - 10m

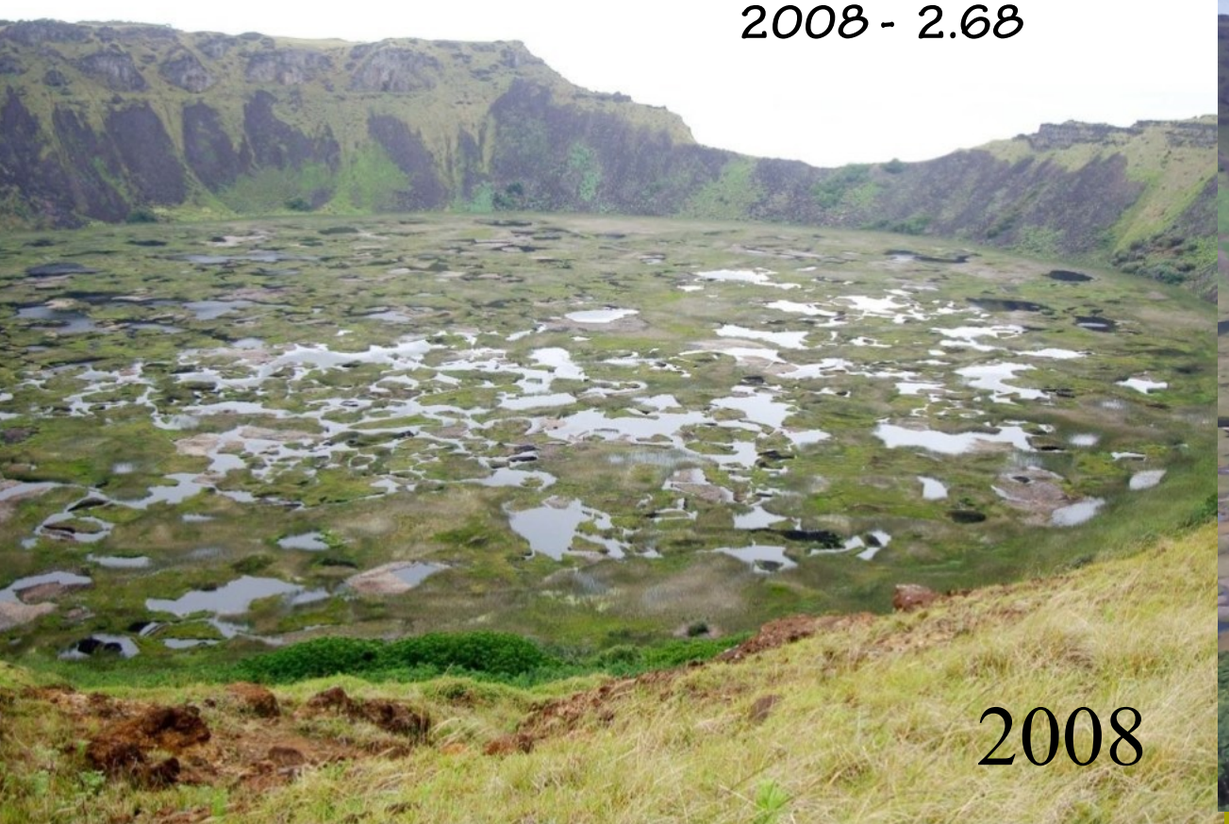
2008 - 12.5m

DOI = 49%

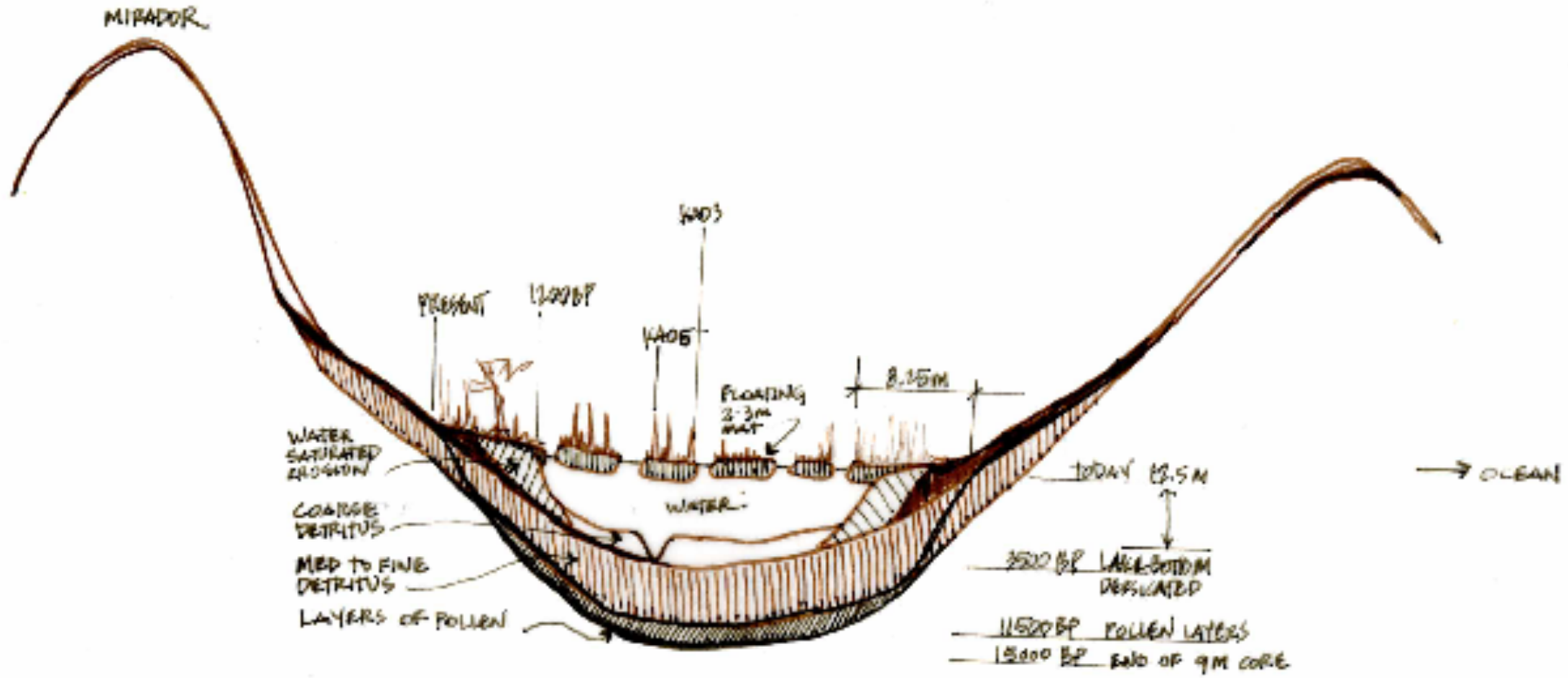
Evaporation Rate:

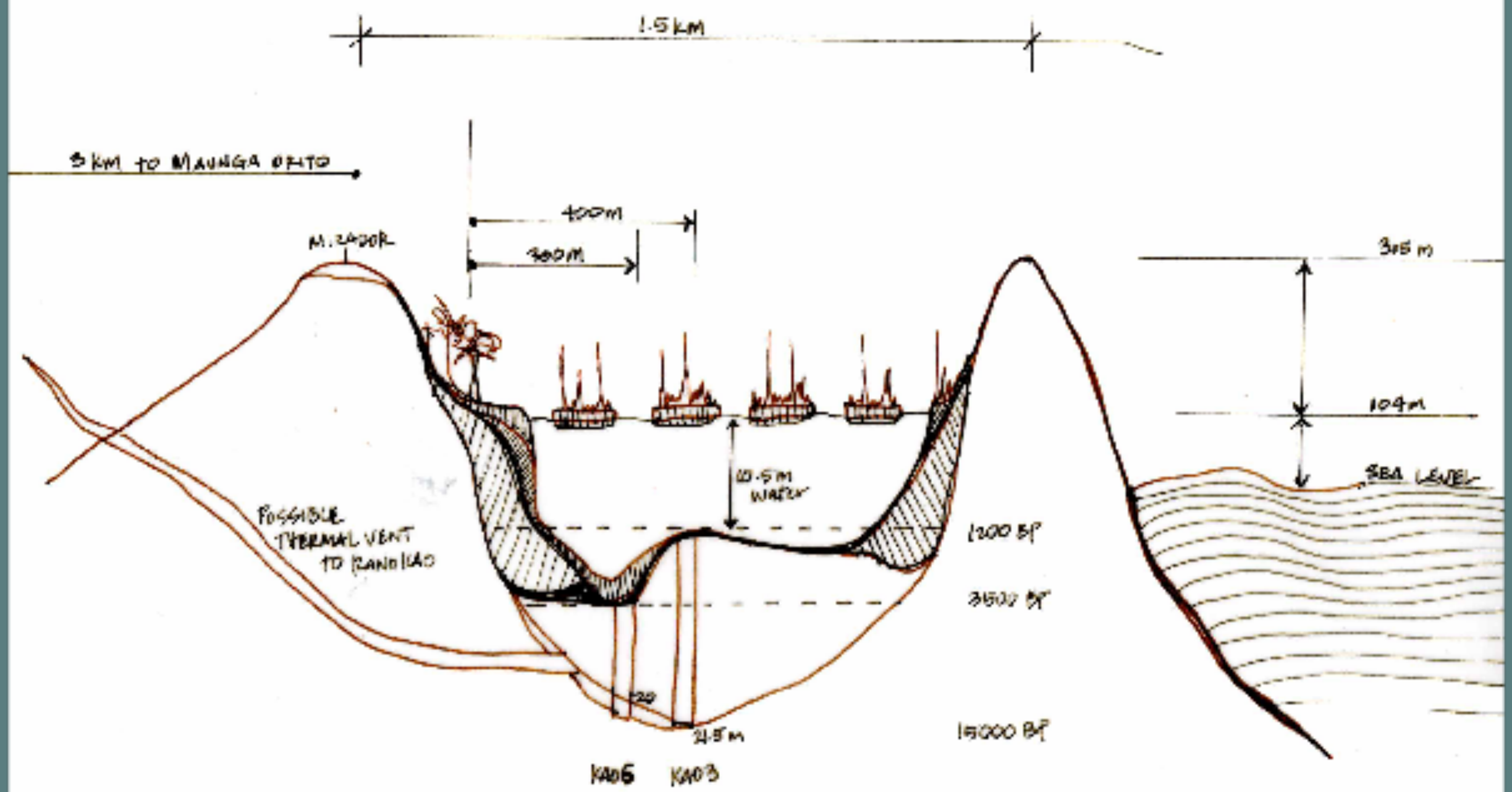
2005 - 2.53

2008 - 2.68



Learning more about the structure of Rano Kao..... How deep is the water?

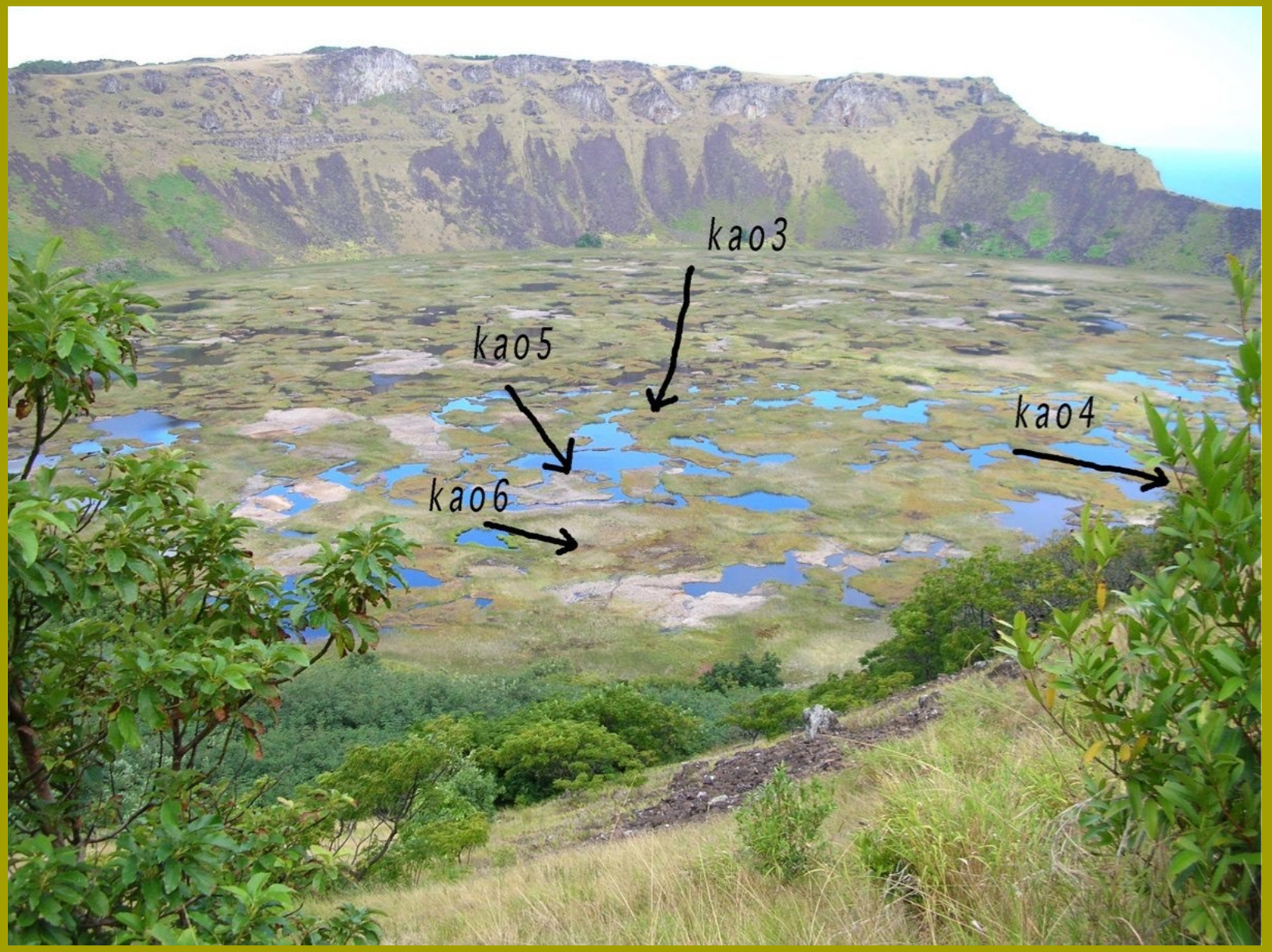




In one's mind's eye, can you imagine what this looks like……

Coring of Rano Kao

attempt a core between Flenleys Kao1 & kao2 sites from 1980



19 meters total

9 meters KAO3 (9meters of water below 3 meter totora mat)

None @ KAO5 beyond 19 meters of rods

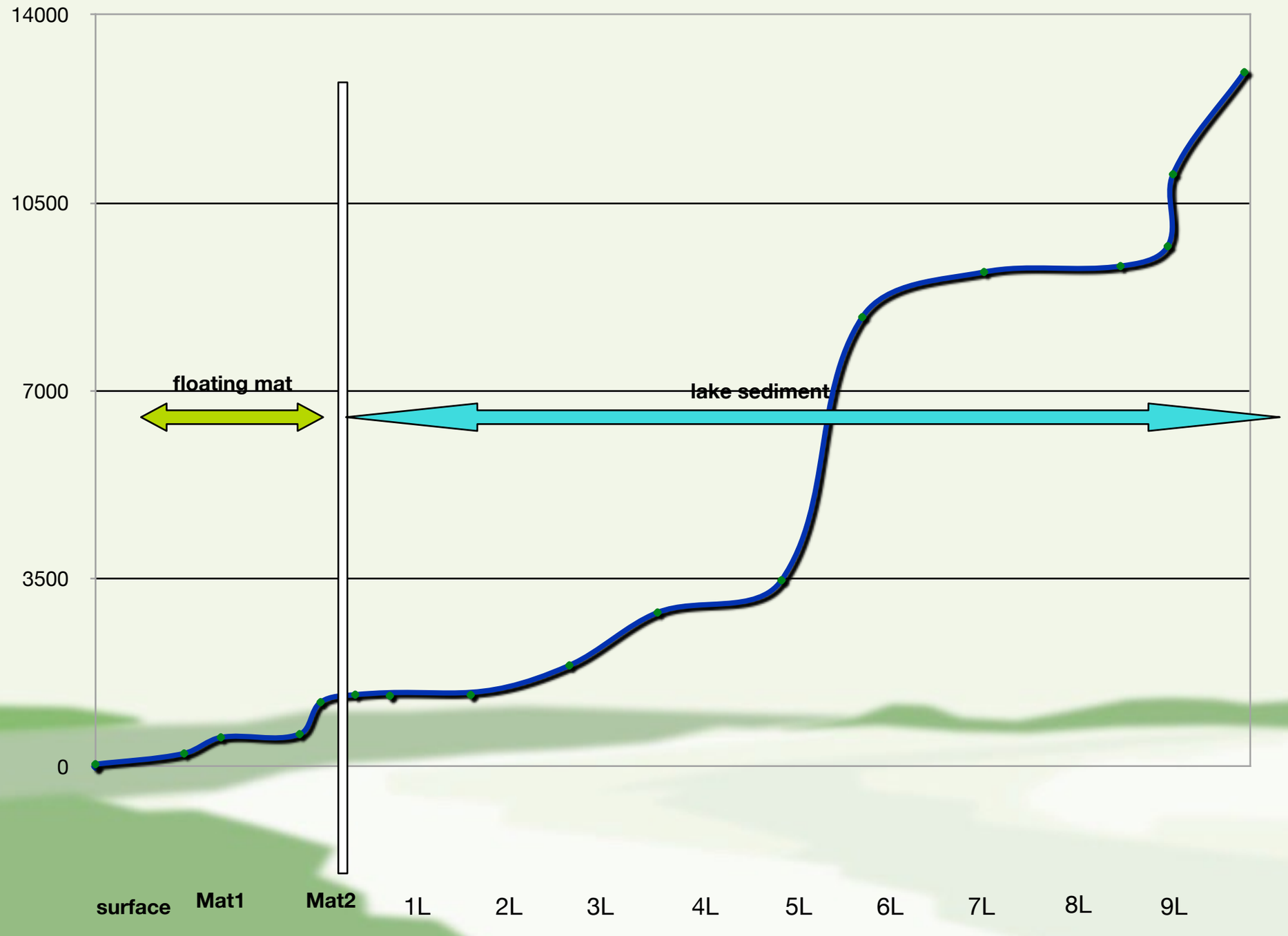
KAO6 3 meters

KAO4 2 meters

RKU1 5 meters

Kao3 - 9metres
15,000 years

Radiocarbon dates of KAO3



Climate affects a fragile island

Finding indicators of moisture change

Using oxygen isotopes

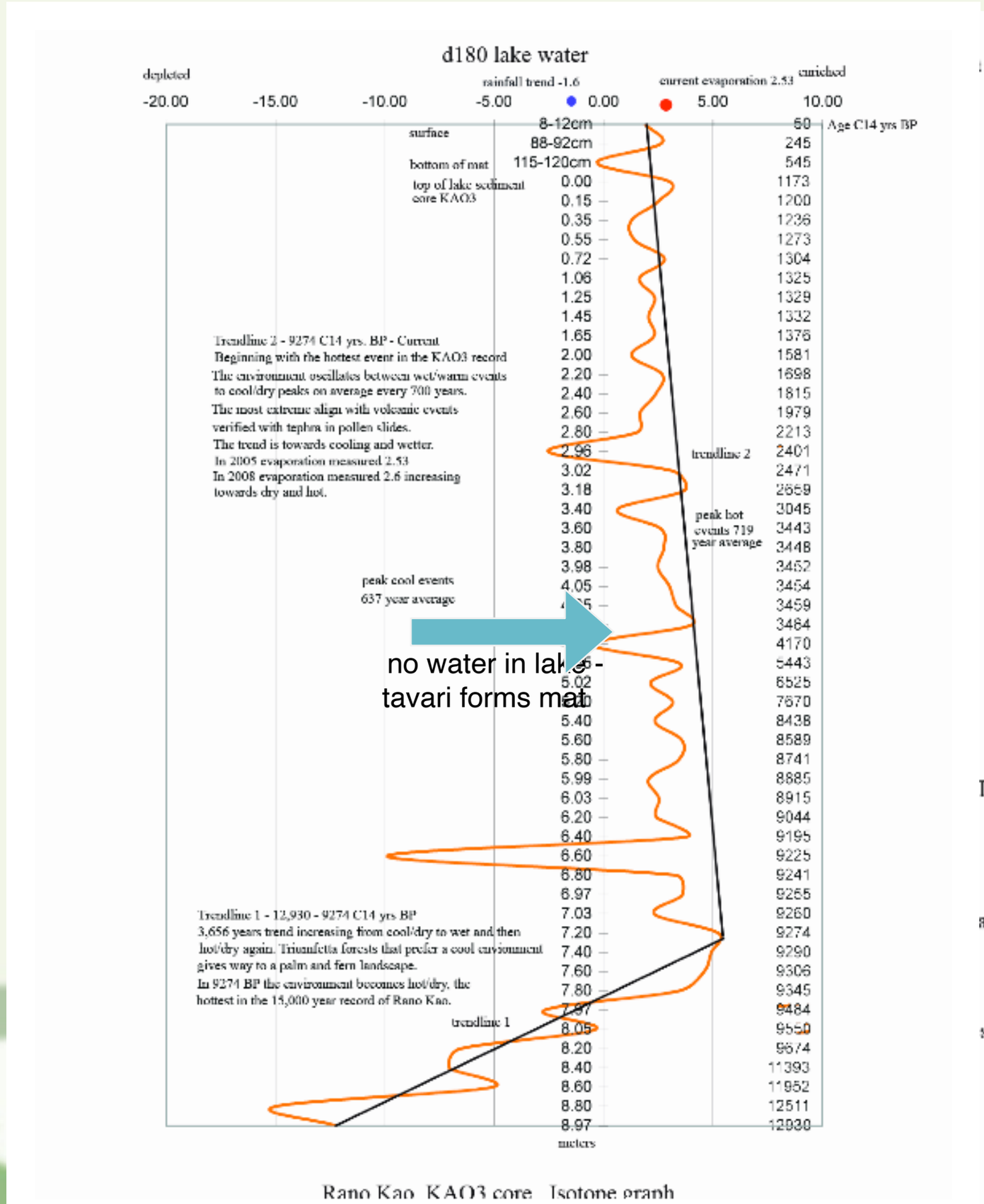
Results

d018lw....

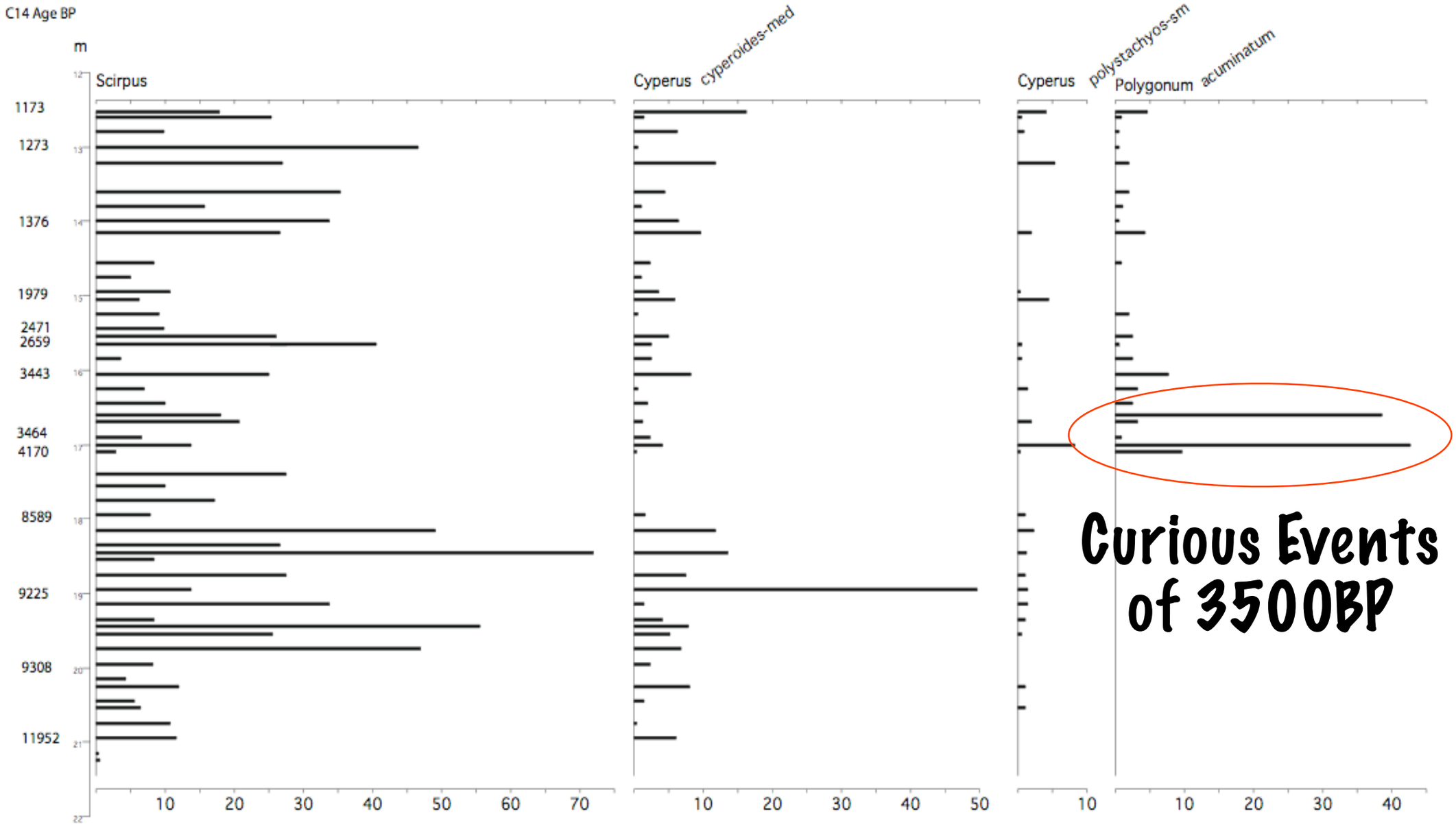
Trendlines & Cycles

637 year Cold/Dry

719 year Hot/Dry



RANO KAO KAO3 CORE EASTER ISLAND 2008



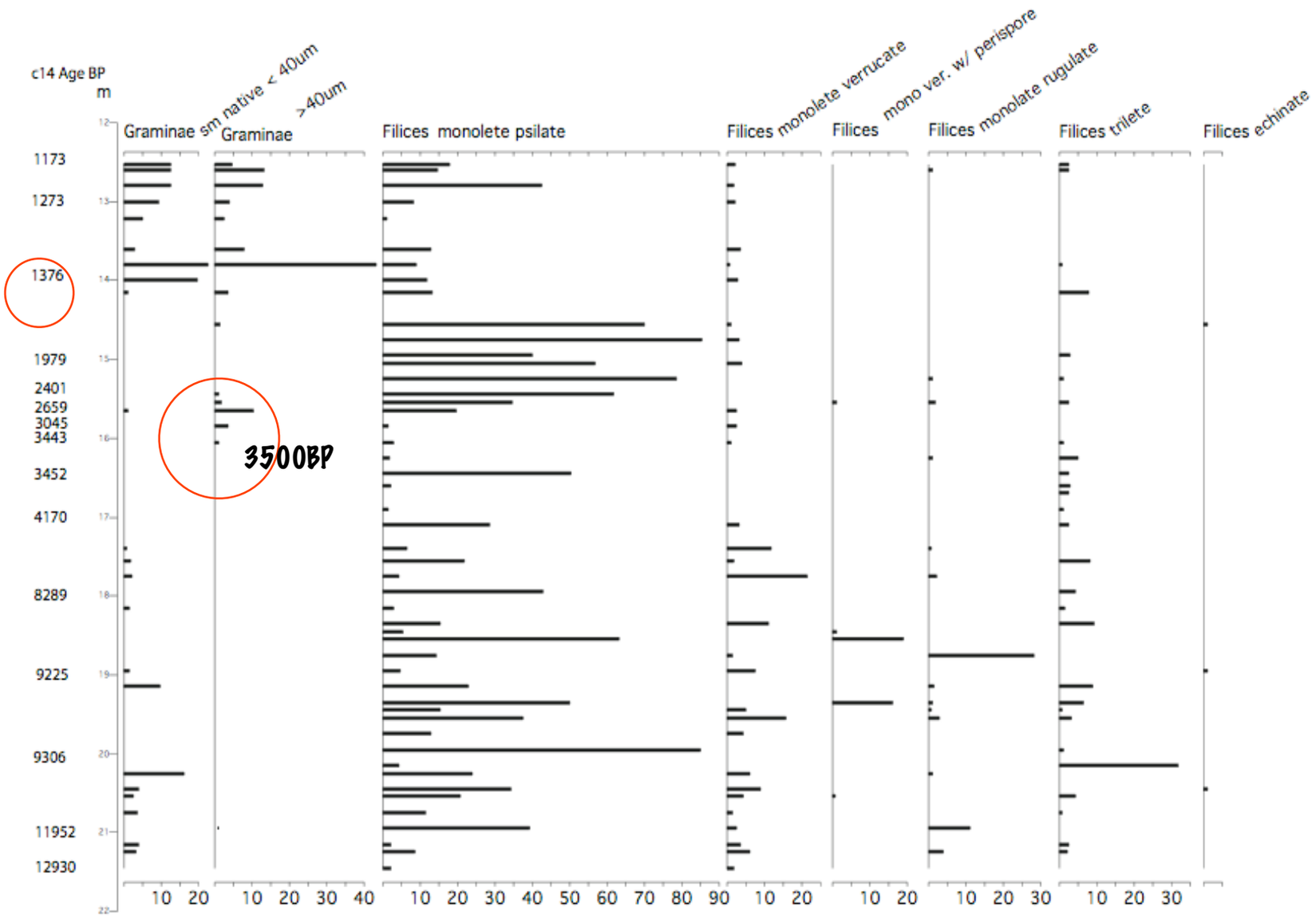
AQUATICS

Polygonum acuminatum

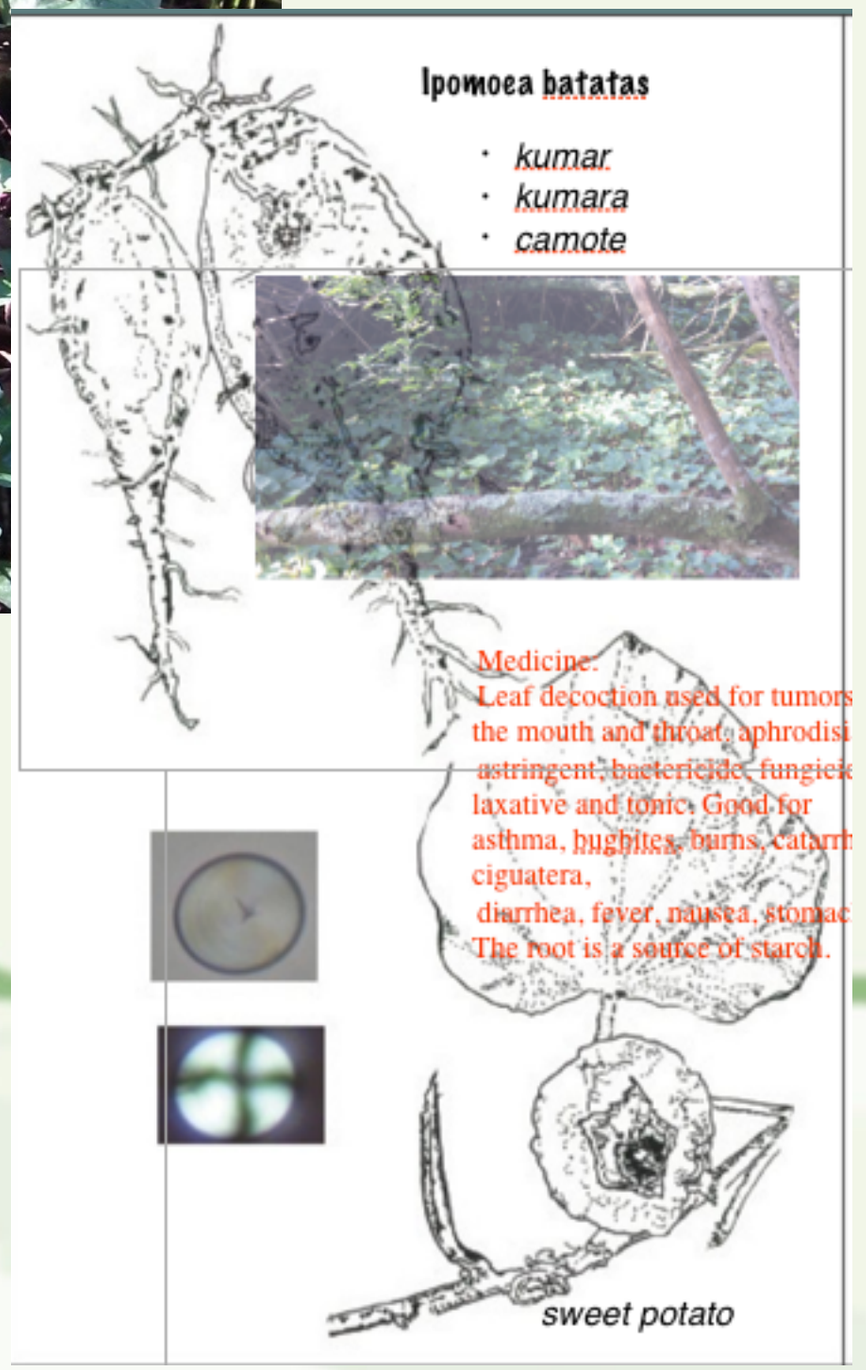
· *Tavari*

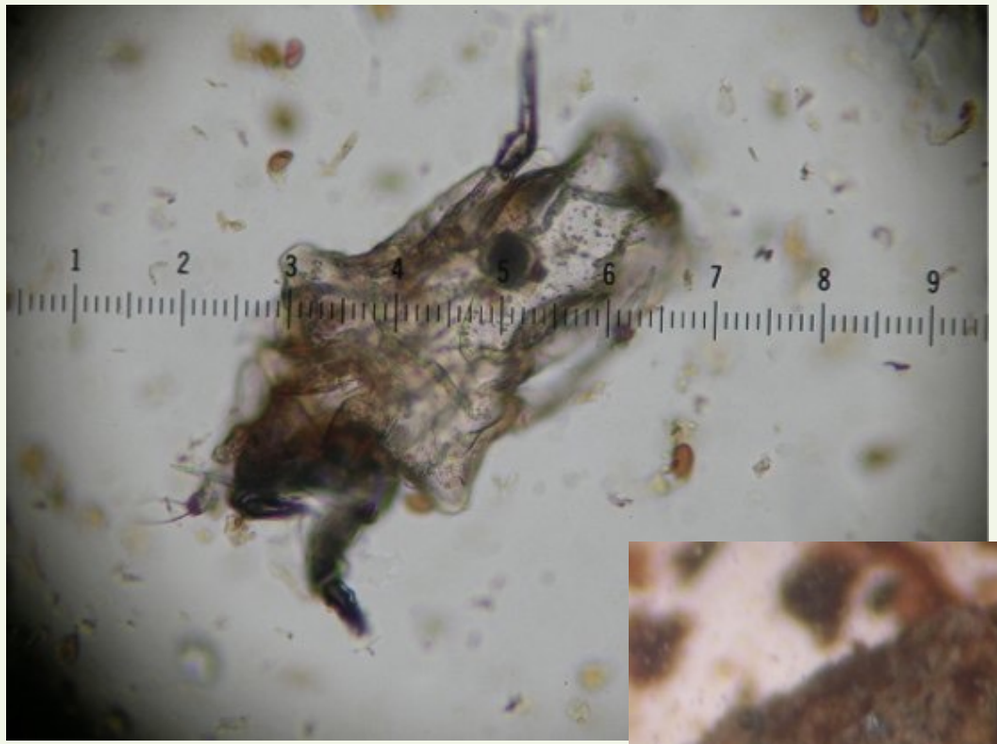
Medicine:
Food plants for butterflies
Eaten in times of famine and leaves smoked as tobacco.
Tea as treatment for asthma, and infected wounds. Internally for astringent, antiheumatic.
Topical as antiseptic.

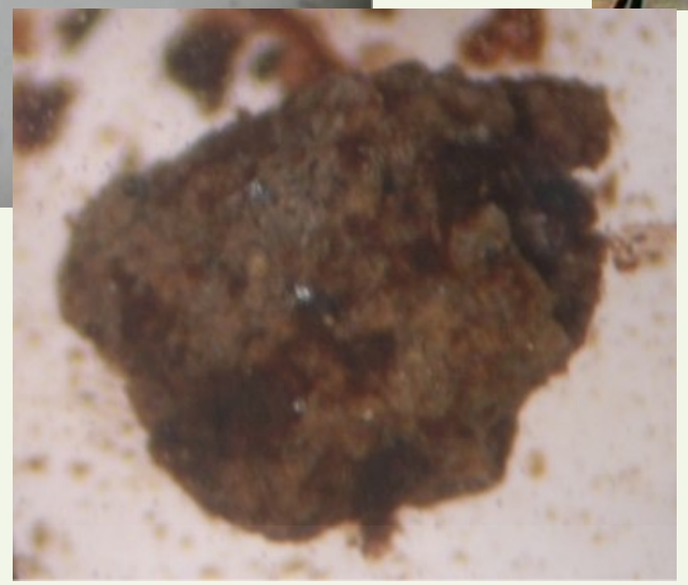
RANO KAO KAO3 CORE EASTER ISLAND 2008

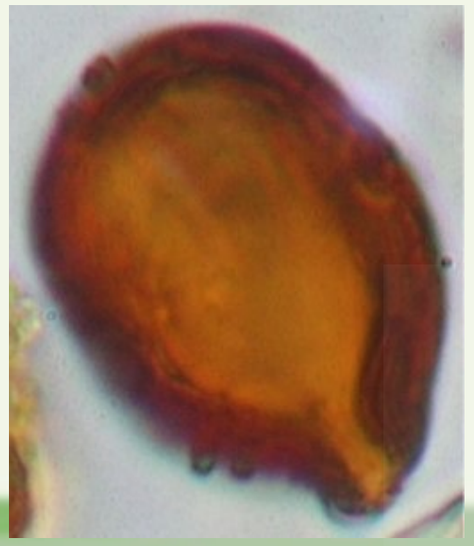


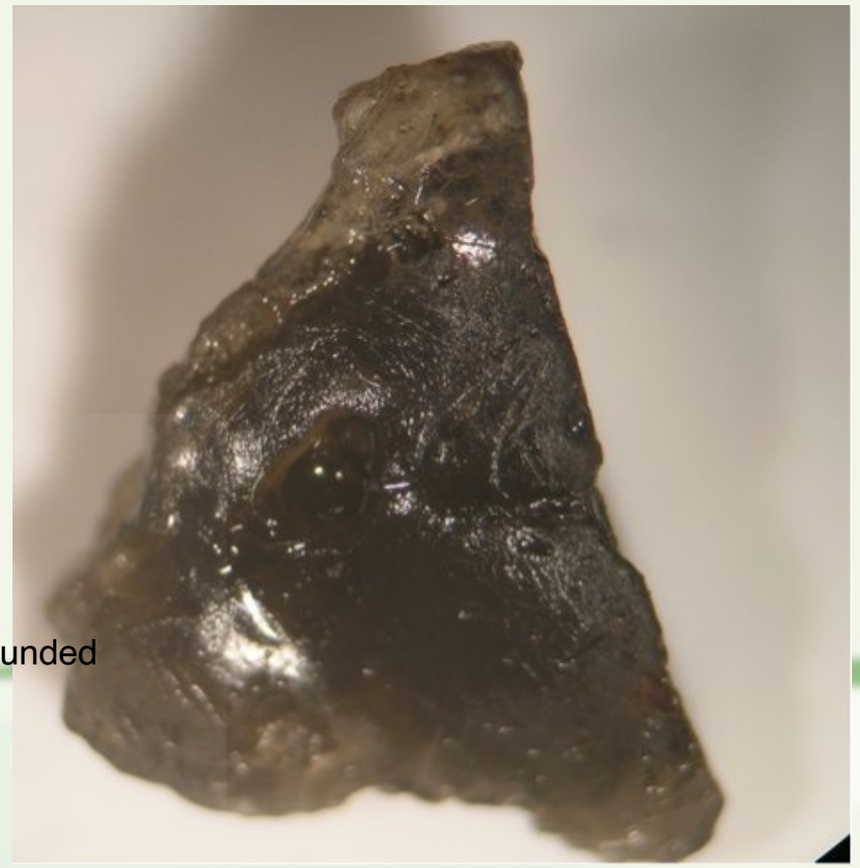
GRASS AND FERNS


Ipomoea batatas
· kumar
· kumara
· camote
Medicine:
Leaf decoction used for tumors
the mouth and throat; aphrodisi
astringent, bactericide, fungicid
laxative and tonic. Good for
asthma, bugbites, burns, catarrh
ciguatera,
diarrhea, fever, nausea, stomac
The root is a source of starch.
sweet potato









Lake dessicated (soil balls 5L 50cm)
4L95cm only bug found in slide (mite)
Charcoal large more than 25 pieces >100um
Only obsidian flakes found in lake angular not rounded
Exotic pollen found (sapindus, myrsine, ….)
Polygonum introduced to island
High deposition for 100cm over 20 years
Trenching between kao3 and kao6
1877 starch count highest in core
2659BP first introduction of round grass pollen (sugarcane)

Curious Events of 3500BP

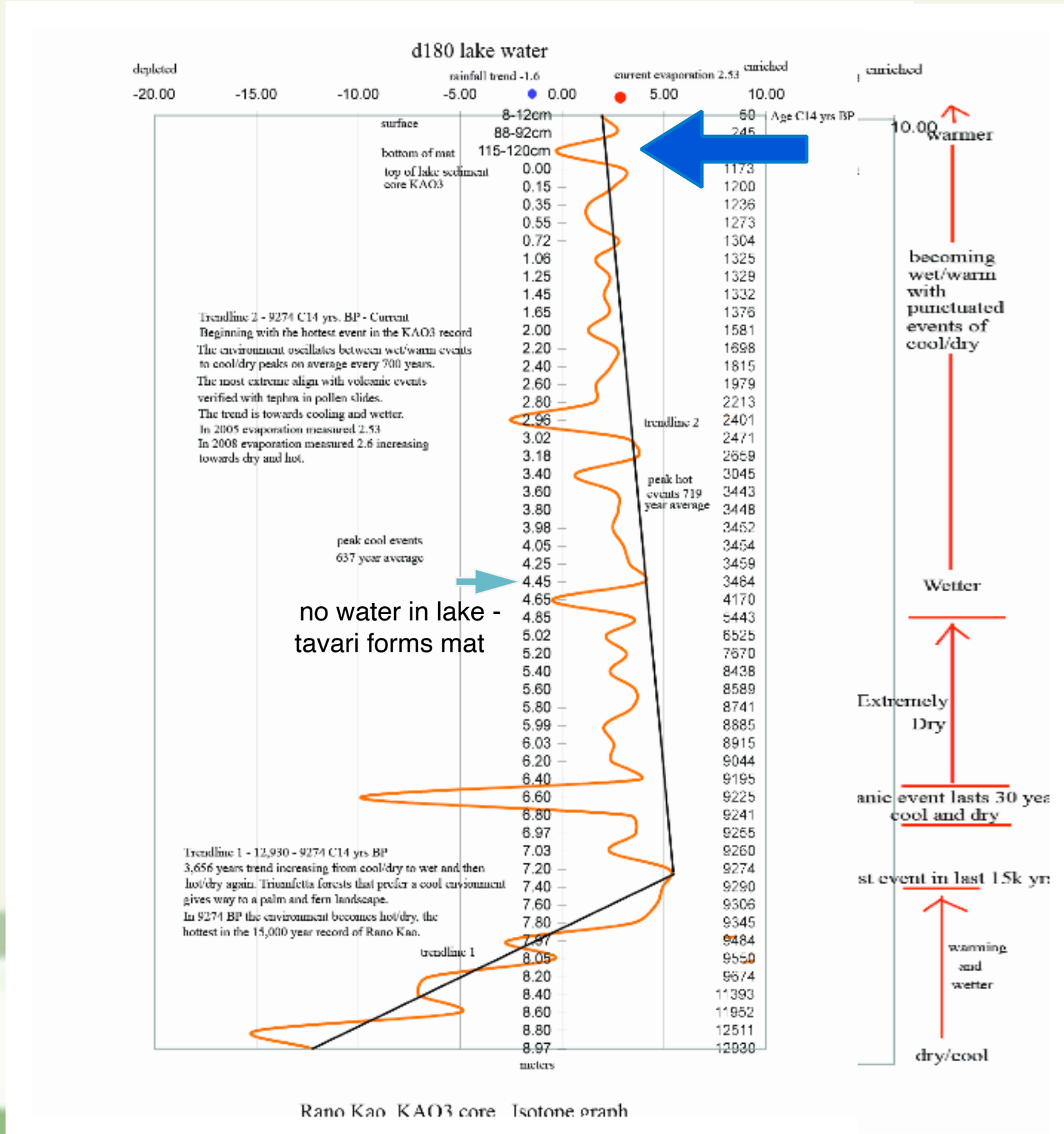
Results

d018lw....

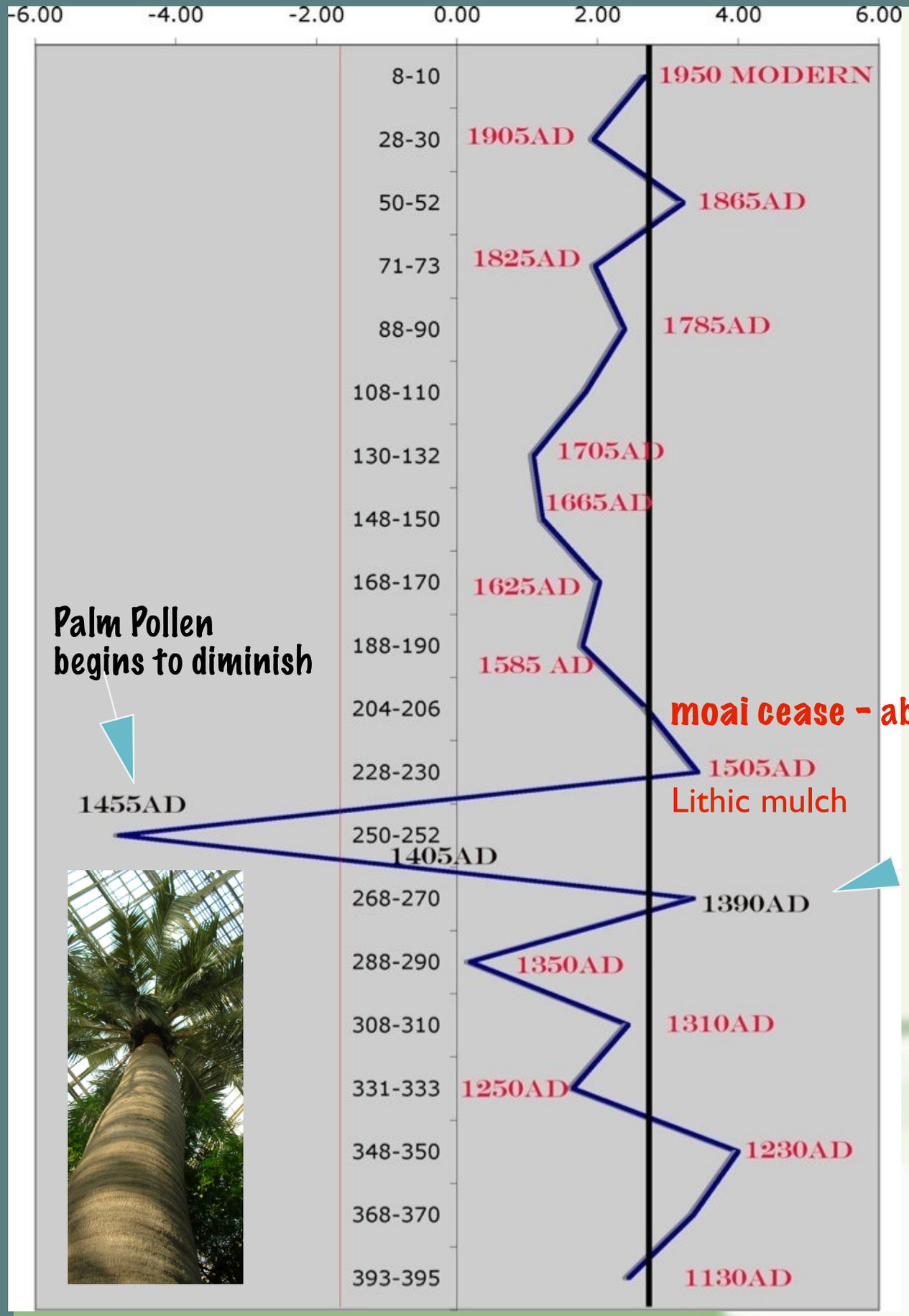
Trendlines & Cycles

637 year Cold/Dry

719 year Hot/Dry



Rano Kao KAO3 core Isotope graph



2008

Mat Results of the last 1000 years

Major cold/dry event peak 1456AD

began 1390 and lasted 115 years

Cold Cycle 637 Years:

Next Projected Event -
2027 +/-

moai cease - abandonment is a choice to survive

Lithic mulch

Jubaea

Paschalococos

Inside contains 100 gal (400L) of
sweet 18% sugar = to sugarcane
tolerant of everything except cold
The tree cannot go dormant, or else it will die
one part cannot be injured or else it will die

The palm, each is a unique organism, each different from the other, with an animal-like vascular system

The essence “mana” of the island (antigua)


CAFETERIA

Palm trees, **monocotyledons**, are different from any other tree on the planet. They are the "world's longest lived trees because stem cells of several kinds remain active in differentiated tissues throughout the life of the palm."

"The palm behaves, in a sense, more like an organism with unitary (animal-like) construction rather than a plant-like modular construction." **a "self-regulated organism"**

16 million ancient giant Palms
Breathing such as a human organism
The essence of which produced life
on Rapa Nui

"From an evolutionary perspective, all groups of organisms are genetically unique as independent lineages."

Each palm can survive in its unique way, adapting to habitats in all ranges of hydroseres, with only one limiting factor: it cannot tolerate dormant periods caused by freezing temperatures

Results:

17 Trees Species,
4 New Palms

The giant palms did not disappear entirely

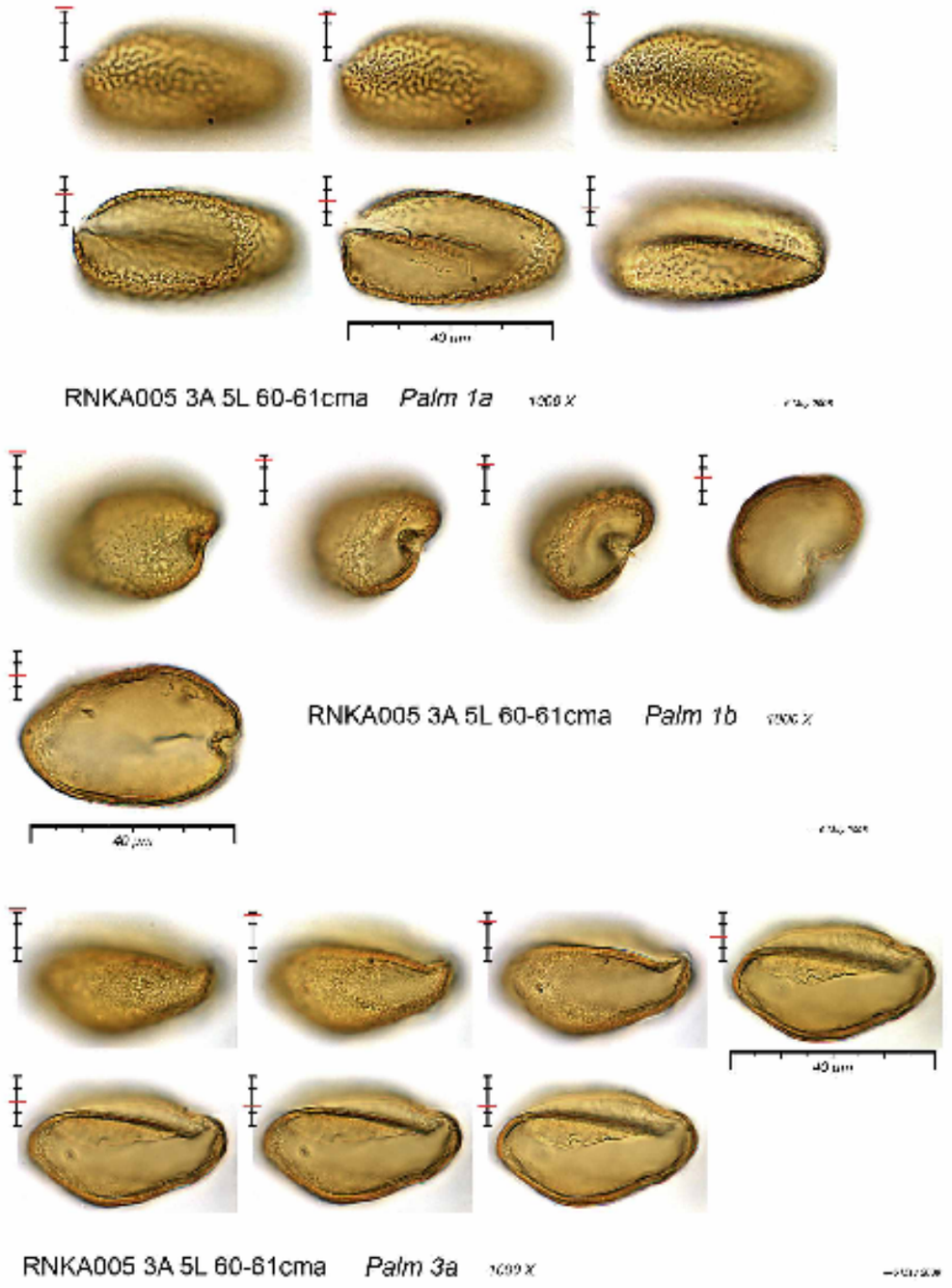
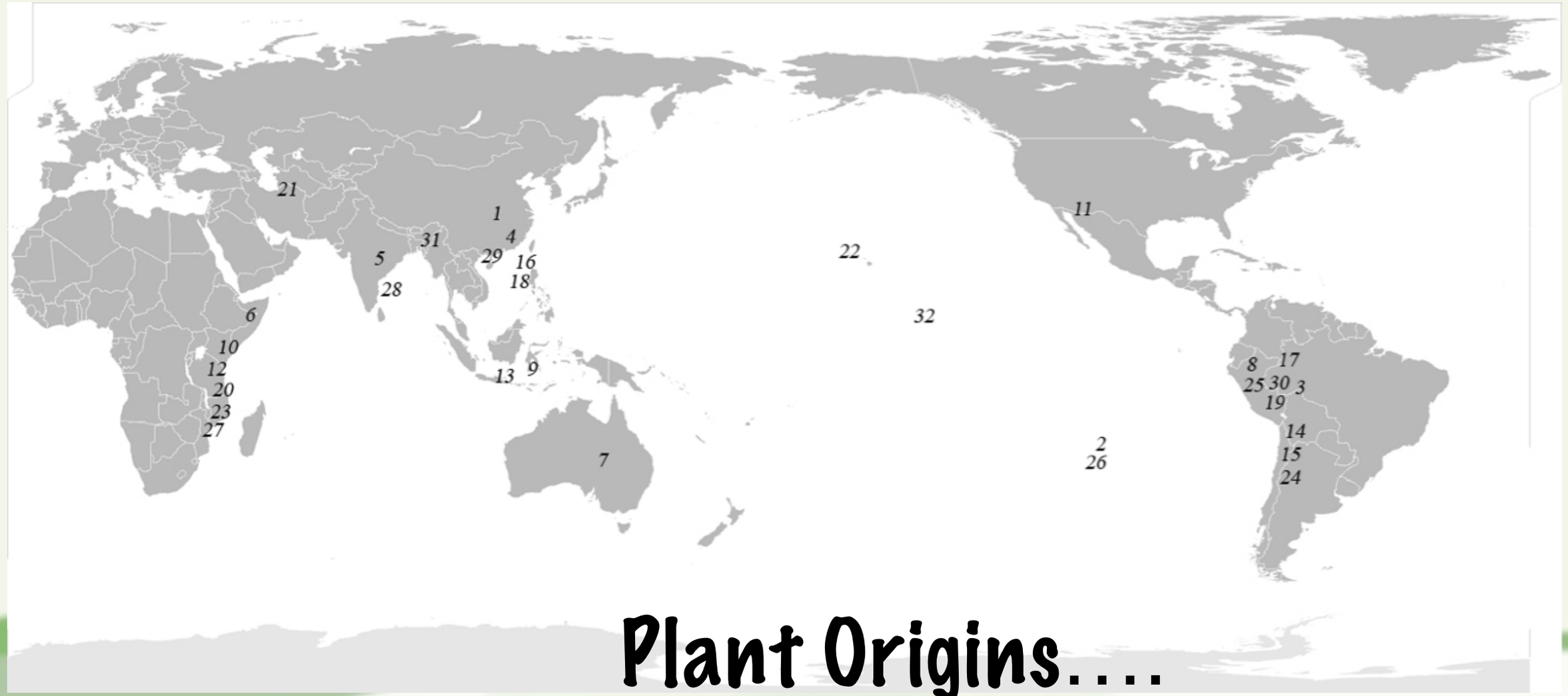


Figure 9 - New Palm Types 1a, 1b and 3a identified in KAO3

the mission, the planting began 2013, the youth are planting....

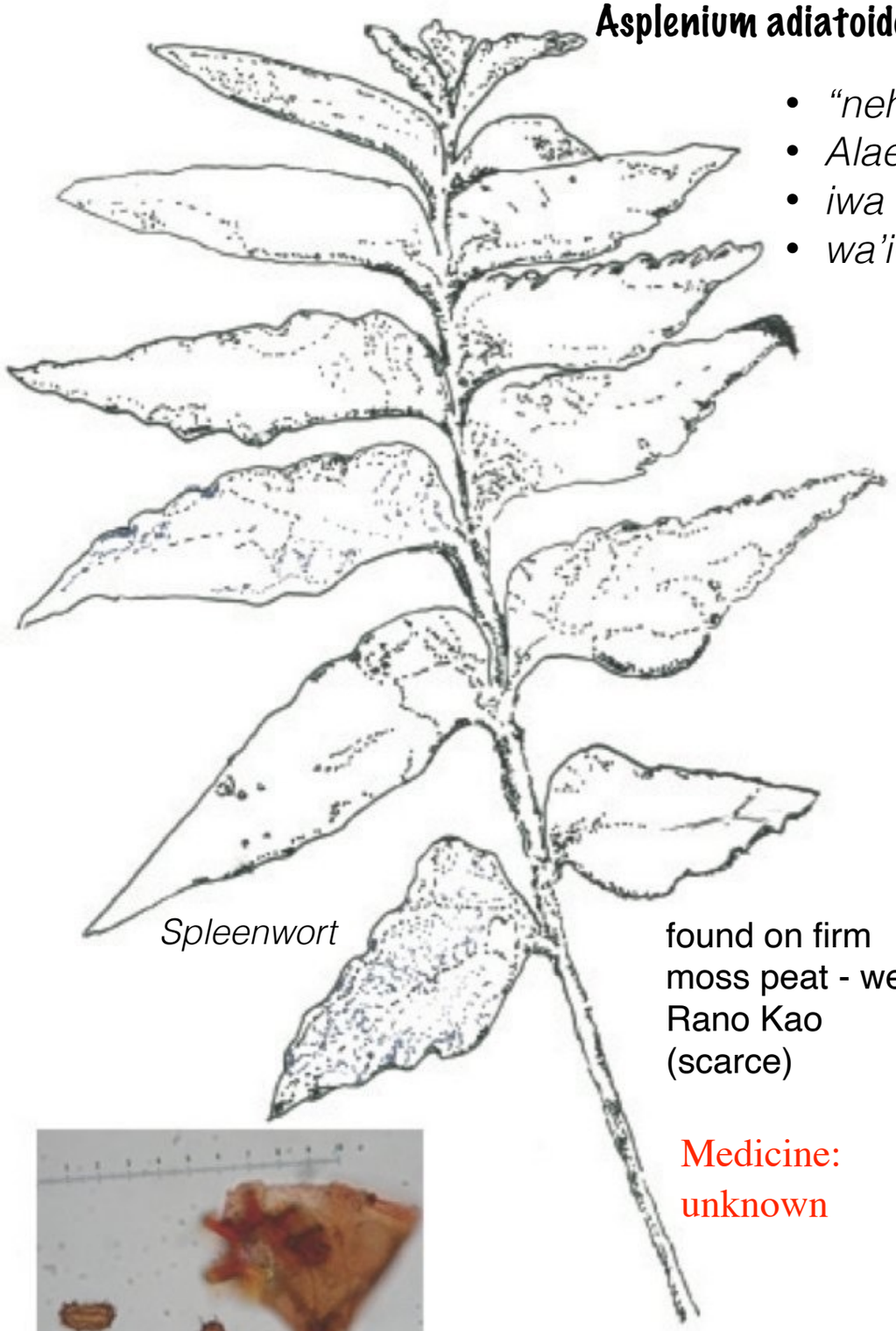


Plant Origins....

everything comes from somewhere else until all that follow you come from here

Asplenium adiatoides

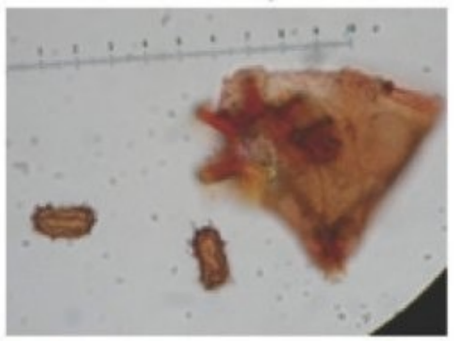
- *"nehe nehe"*
- *Alae*
- *iwa*
- *wa'iwa*



Spleenwort

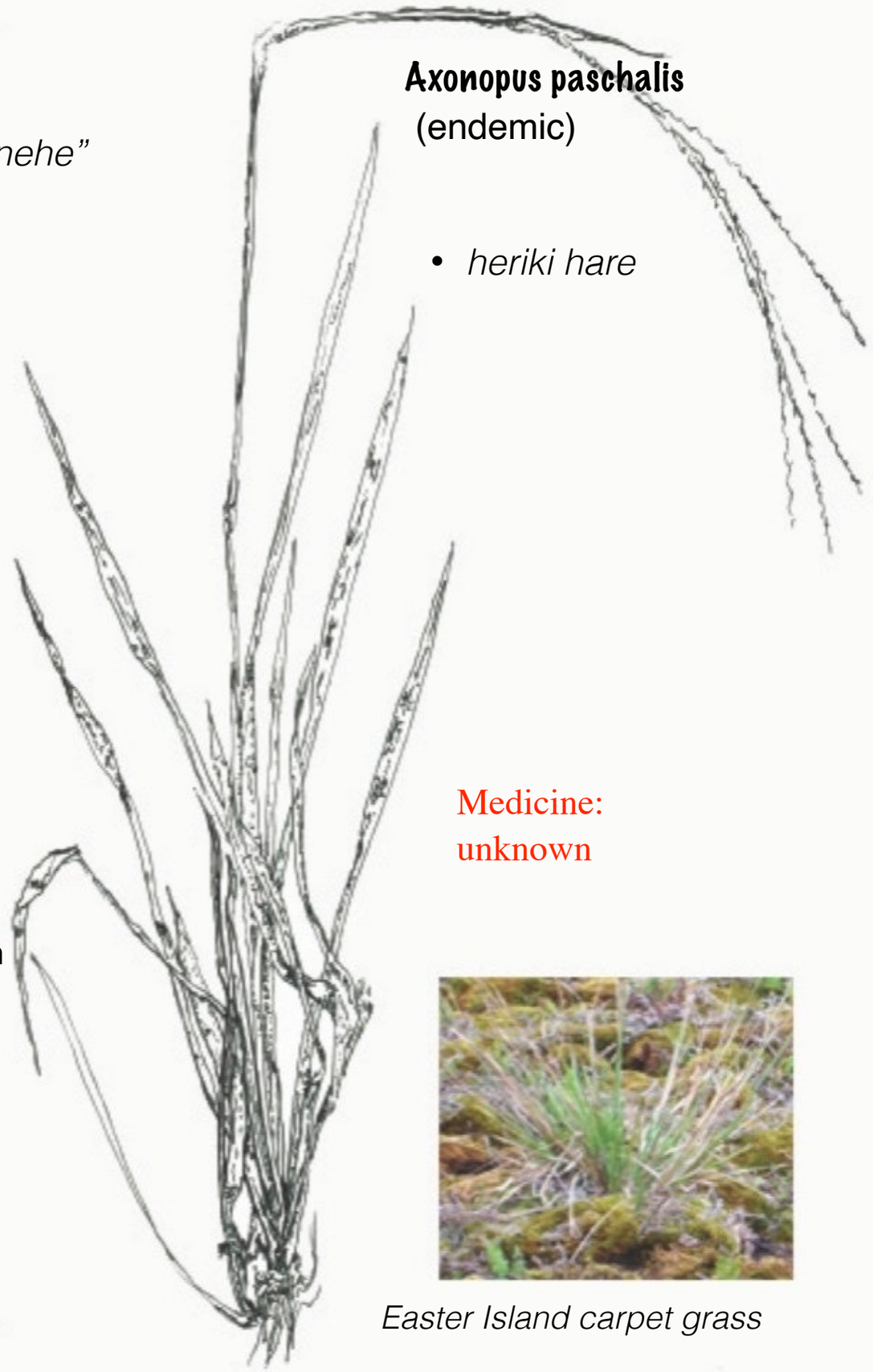
found on firm moss peat - wet in Rano Kao (scarce)

Medicine: unknown



Axonopus paschalis (endemic)

- *heriki hare*



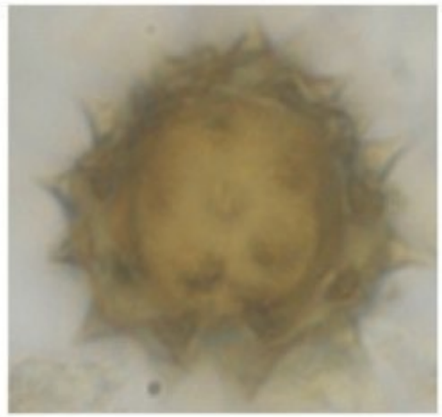
Medicine: unknown

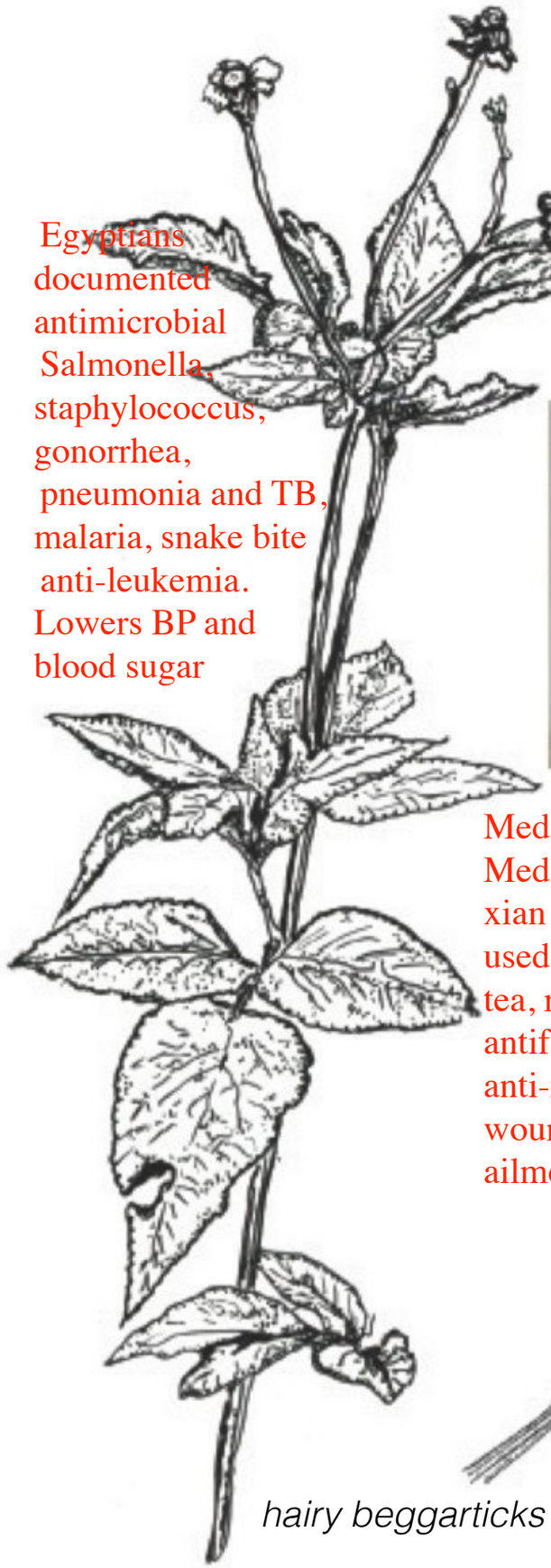
Easter Island carpet grass

Bidens pilosa

- *te*
- *matua kamate*

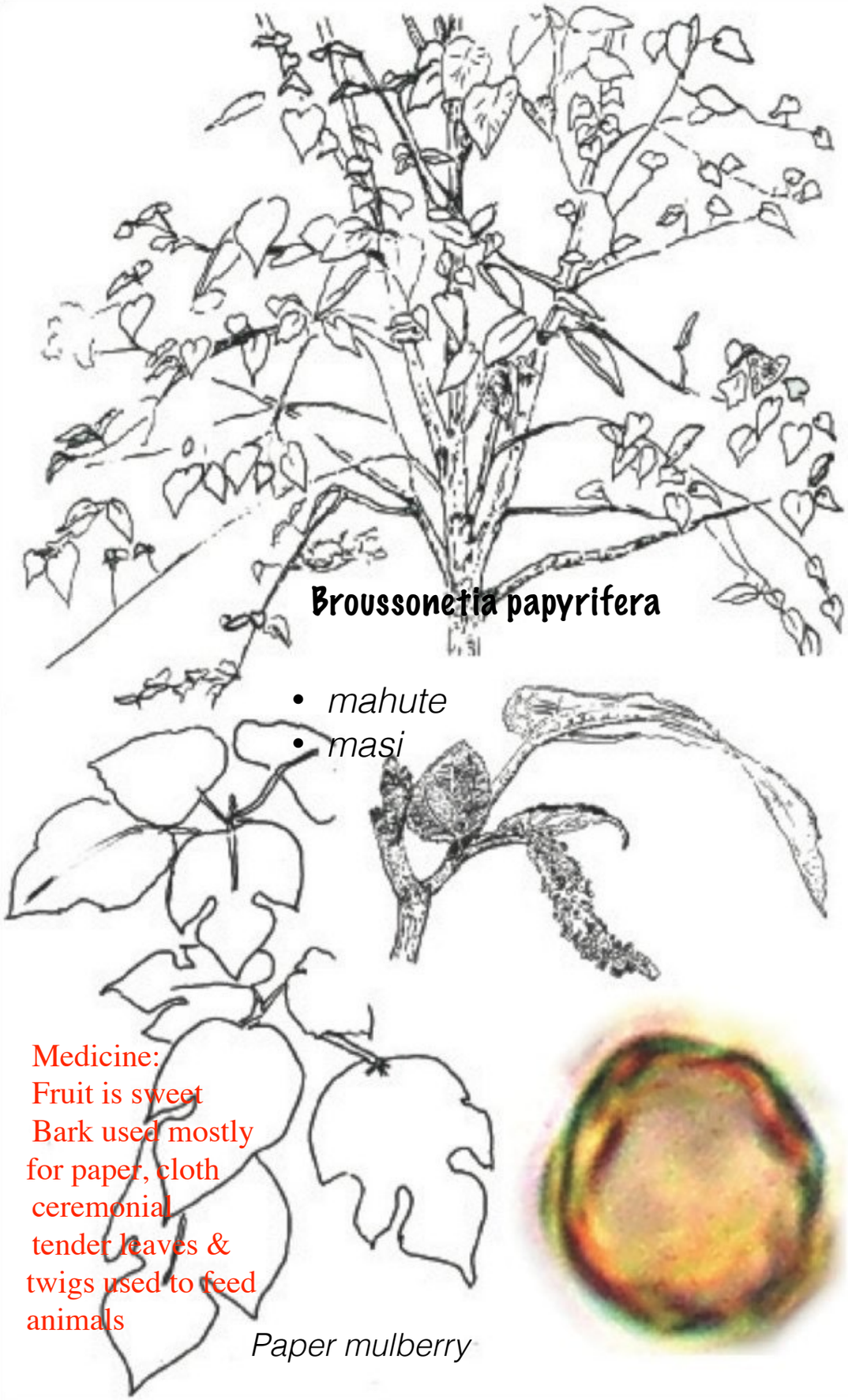
Egyptians documented antimicrobial Salmonella, staphylococcus, gonorrhea, pneumonia and TB, malaria, snake bite anti-leukemia. Lowers BP and blood sugar





Medicine:
Medicinal herb in China
xian feng cao
used against diarrhea
tea, raw or cooked as food
antifungal, anti-inflammatory
anti-rheumatic. Leaves for wounds and ulcers. Intestinal ailments.

hairy beggarticks



Broussonetia papyrifera

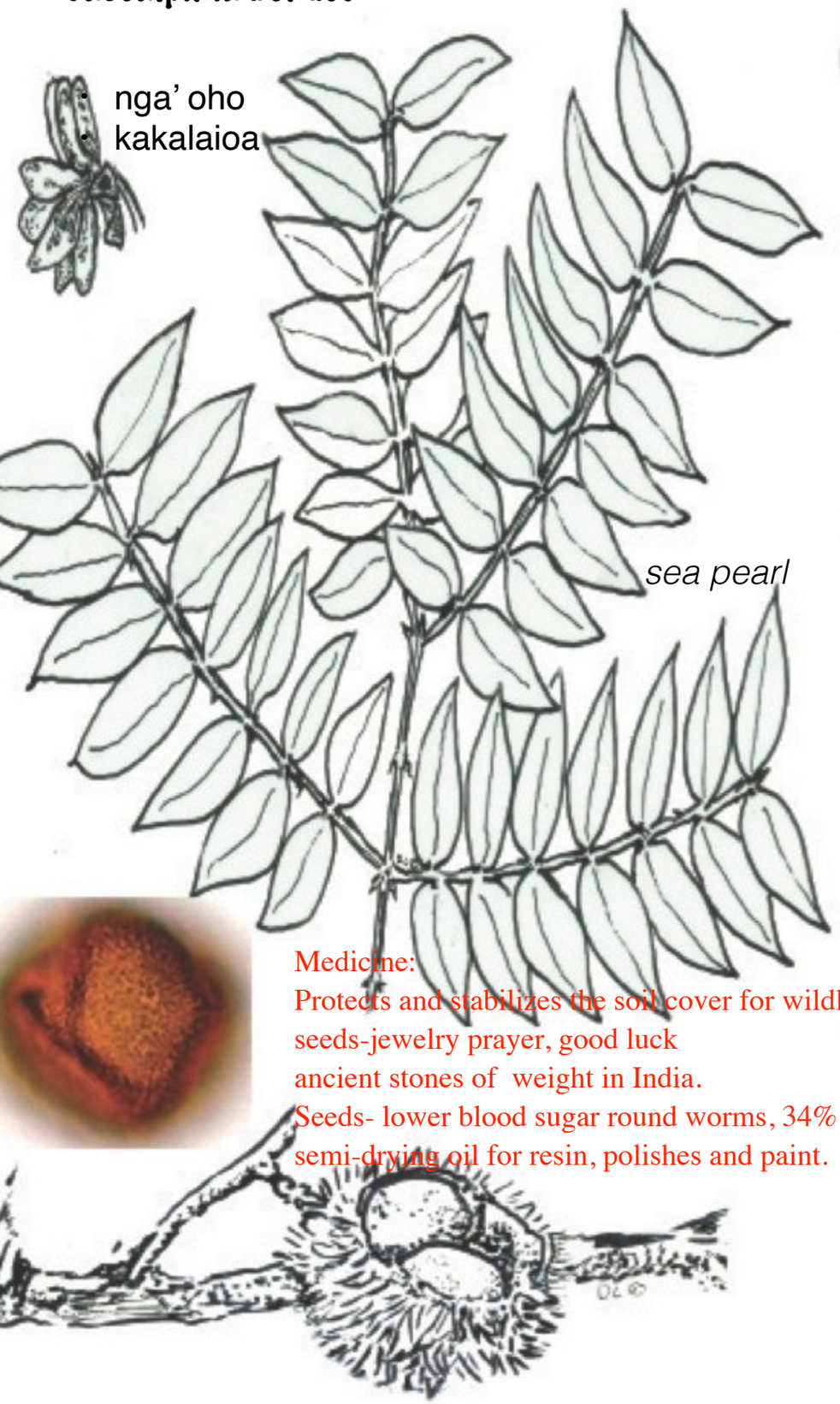
- *mahute*
- *masi*

Medicine:
Fruit is sweet
Bark used mostly for paper, cloth
ceremonial
tender leaves & twigs used to feed animals

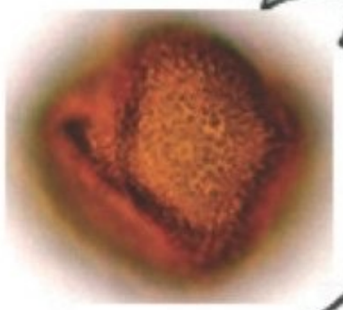
Paper mulberry

Caesalpinia bonduc

nga' oho
kakalaioa

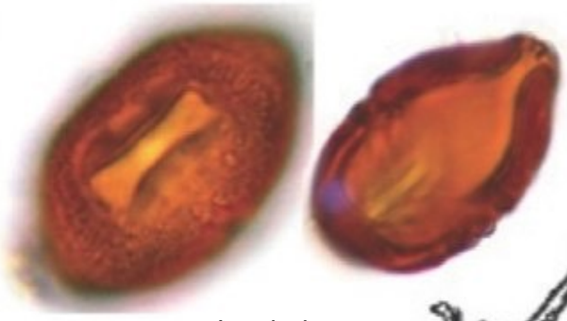


sea pearl

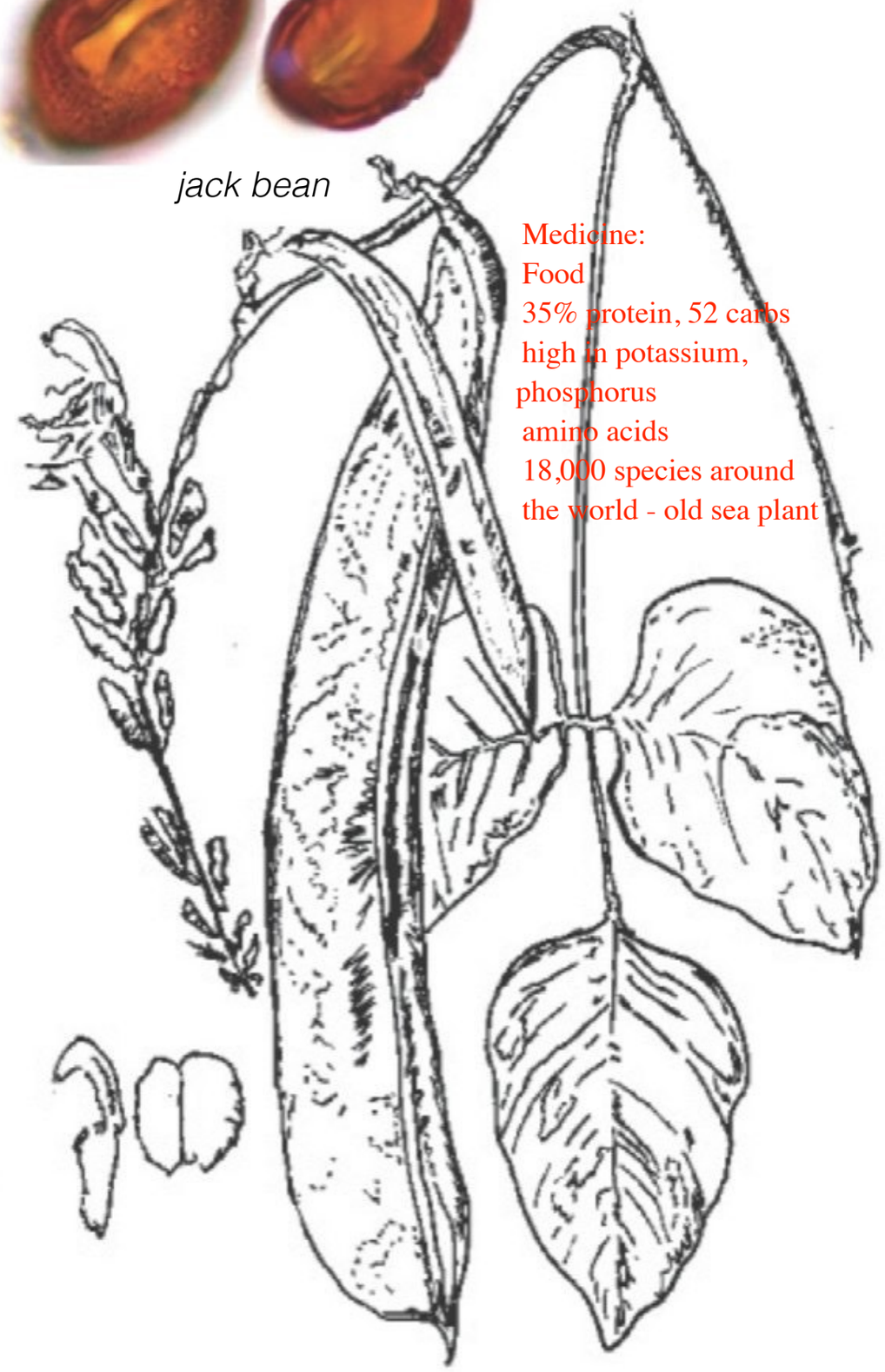


Medicine:
Protects and stabilizes the soil cover for wildlife
seeds-jewelry prayer, good luck
ancient stones of weight in India.
Seeds- lower blood sugar round worms, 34% fat
semi-drying oil for resin, polishes and paint.

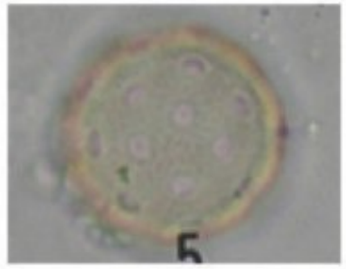
Canavalia spp
(extincto)



jack bean



Medicine:
Food
35% protein, 52 carbs
high in potassium,
phosphorus
amino acids
18,000 species around
the world - old sea plant



Chenopodium glaucum

(common to sea shores)

- *huataru*
- *alaweo*

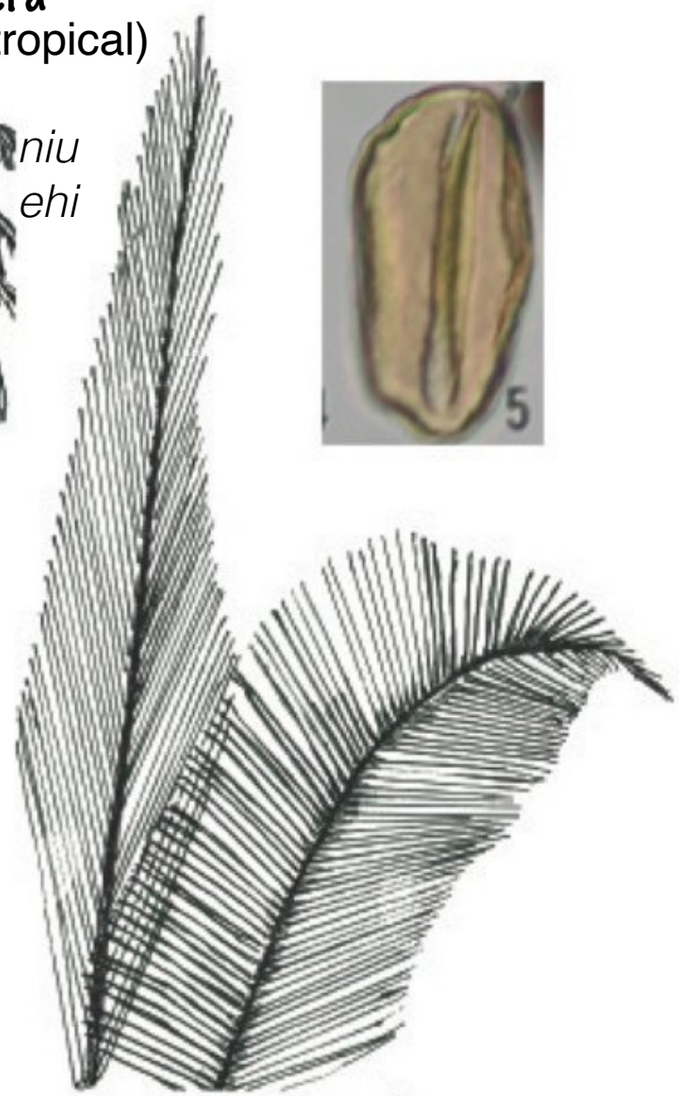
Medicine:
Edible. Nutritious. However contains saponins, but broken down when cooked. Fisherman use them in streams to stun fish. Nutritious. People with rheumatism, arthritis, gout, kidney stones, may aggravate condition.

oak-leaved goosefoot

Cocos nucifera

(pantropical)

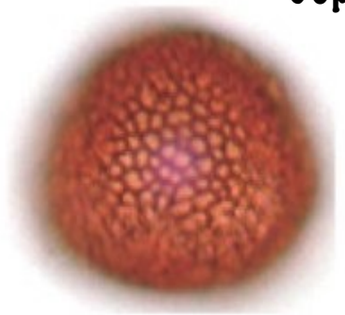
- *niu*
- *ehi*

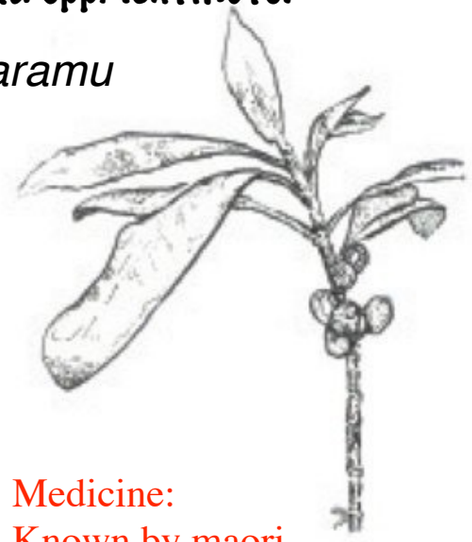


Medicine:
Edible. One of the 10 most useful trees in the world. At any one time the tree has 12 crops of nuts on it.
Top of tree- if damaged, whole tree dies. All parts used for charcoal, shoes, caps, clothing, roofing, medicine and food. Good for tumors and more.

Coprosma spp. (extincto)

- *karamu*



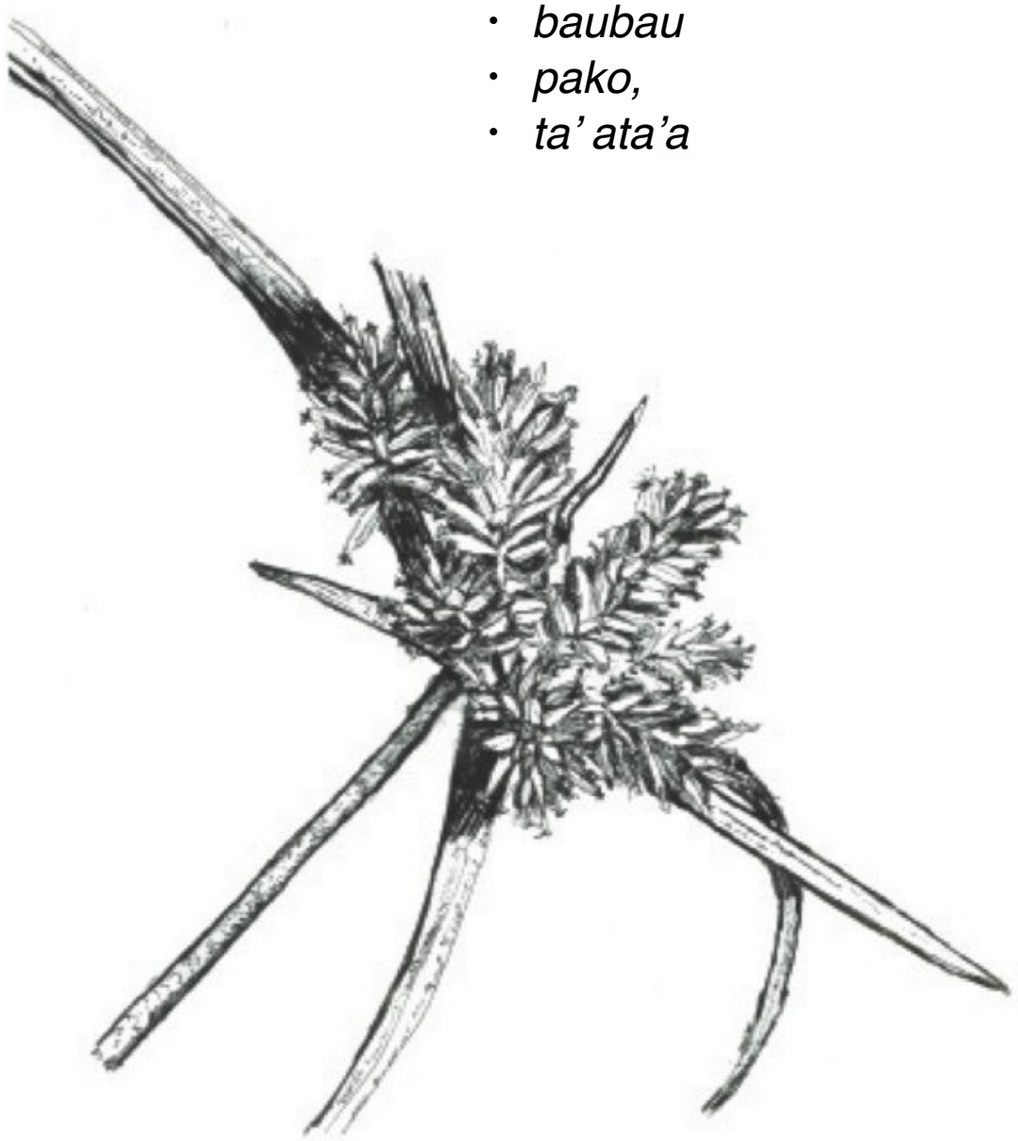


Medicine:
Known by maori, fruit eaten by children and birds. Pounded vines and roots used for skin ulcers and diseases. TB remedy. Used for dyes, fiber, food and medicine.

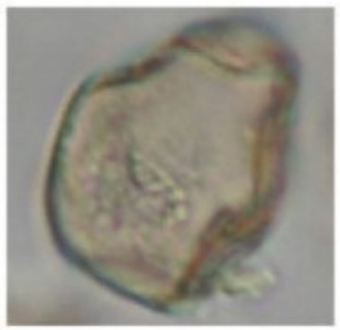
forest mirrorplant

Cyperus cyperoides

- *baubau*
- *pako,*
- *ta' ata'a*



Medicine:
Root/tubers most important for nausea, as a sedative, stomach and intestines. Antibacterial and antifungal used in Chinese Medicine



Pacific Island flatsedge

Cyperus vegetus

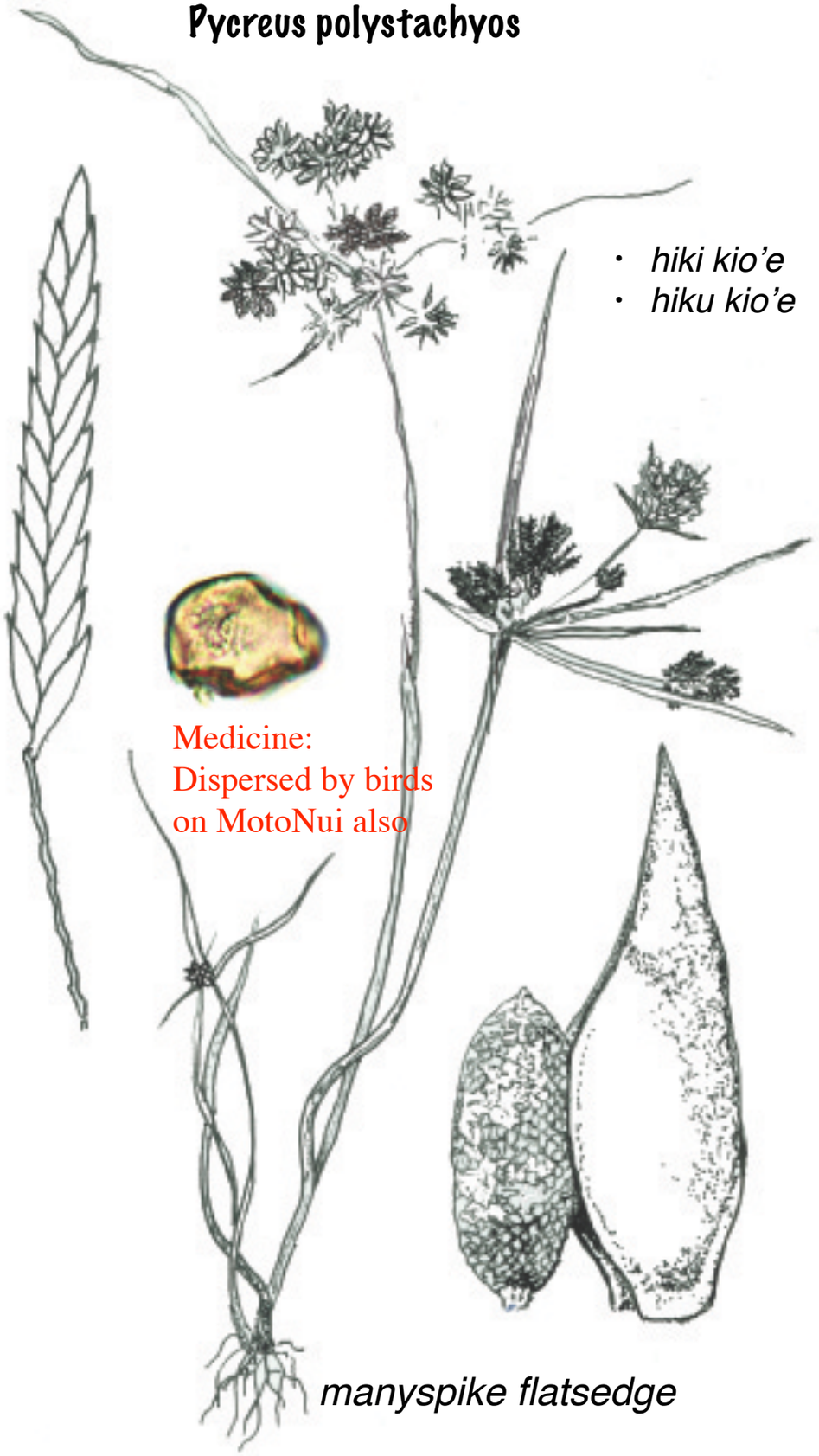
- *hiki kio'e*
- *hiku kio'e*

Medicine:
Rhizome used for various diseases, and as a sedative.

umbrella sedge

Pycreus polystachyos

- *hiki kio'e*
- *hiku kio'e*



Medicine:
Dispersed by birds on MotoNui also

manyspike flatsedge

Thelypteris interrupta

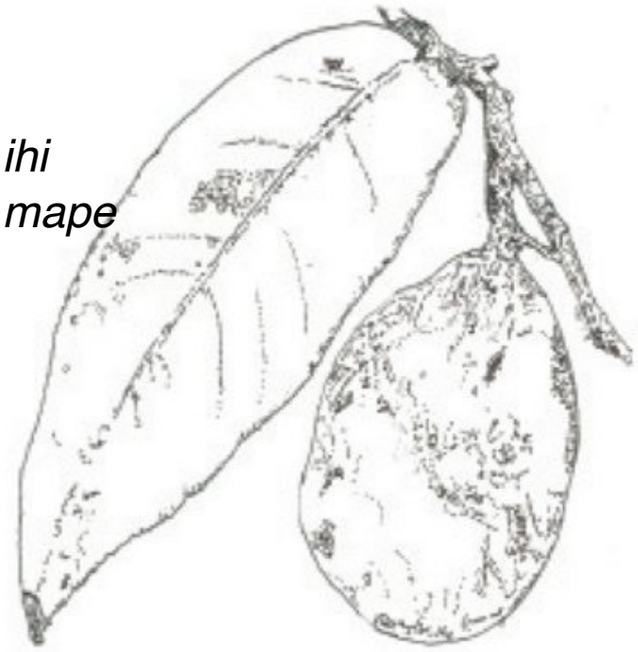
- *Nehe nehe*
- *Neke*

  (scarce)

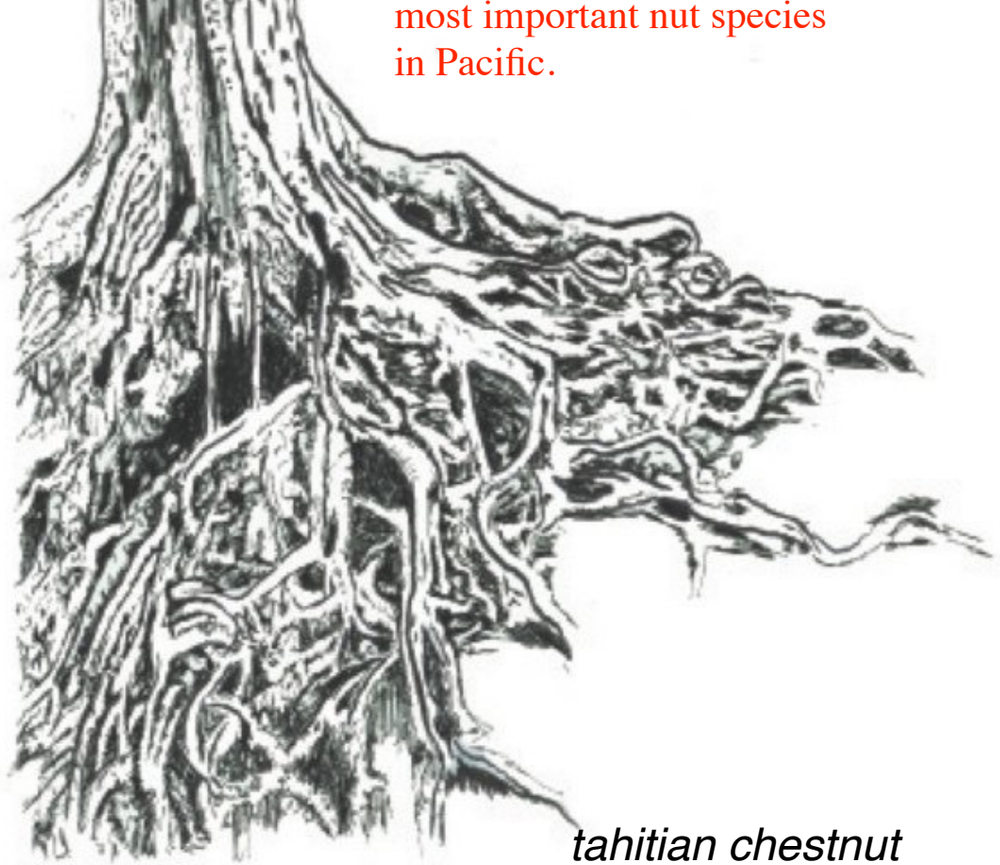
maiden fern

Inocarpus fagifer

- *ihi*
- *mape*



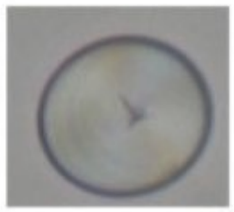
Medicine:
Edible nut, and used for wood
most important nut species
in Pacific.



tahitian chestnut

Ipomoea batatas

- *kumar*
- *kumara*
- *camote*

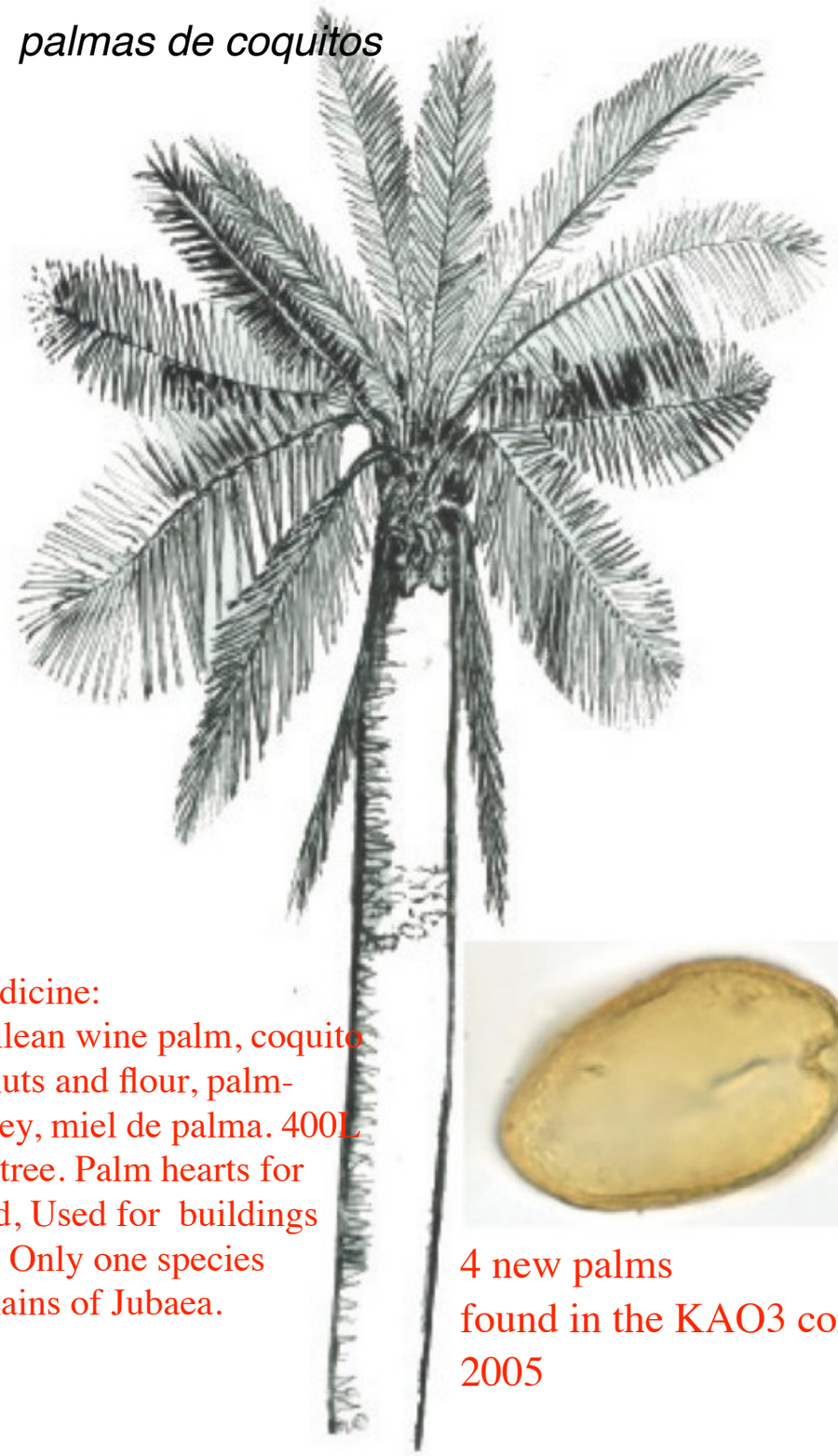


Medicine:
Leaf decoction used for tumors of the mouth and throat: aphrodisiac, astringent, bactericide, fungicide, laxative and tonic. Good for asthma, bugbites, burns, catarrh, ciguatera, diarrhea, fever, nausea, stomach, The root is a source of starch.

sweet potato

Jubaea chilensis

- *palmas de coquitos*

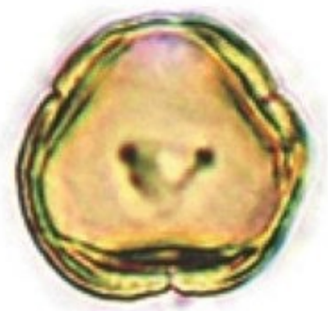


Medicine:
Chilean wine palm, coquito as nuts and flour, palm-honey, miel de palma. 400L per tree. Palm hearts for food, Used for buildings too. Only one species remains of Jubaea.

4 new palms
found in the KAO3 cores
2005

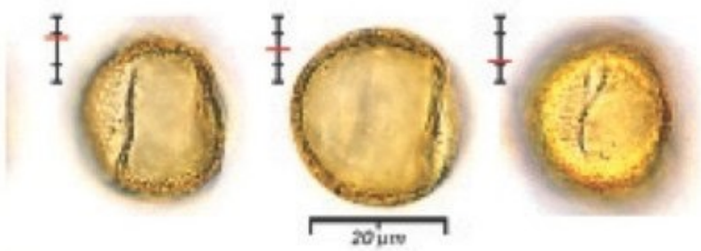
We located only one at Rano Kao at the location S27.10.885 W109.26.376. It may be 30 years old now, being it was planted as a small tree and I have calculated the Jubaea grows 1cm/yr over its 300 year lifetime it could achieve 3m in diameter and 30 meters tall. This tree at Rano Kao is 1 meter tall at the top of stem and 25 cm wide approx.

Macaranga spp. *(extincto)*



Noted in pollen record @
1L30cm - 1280BP

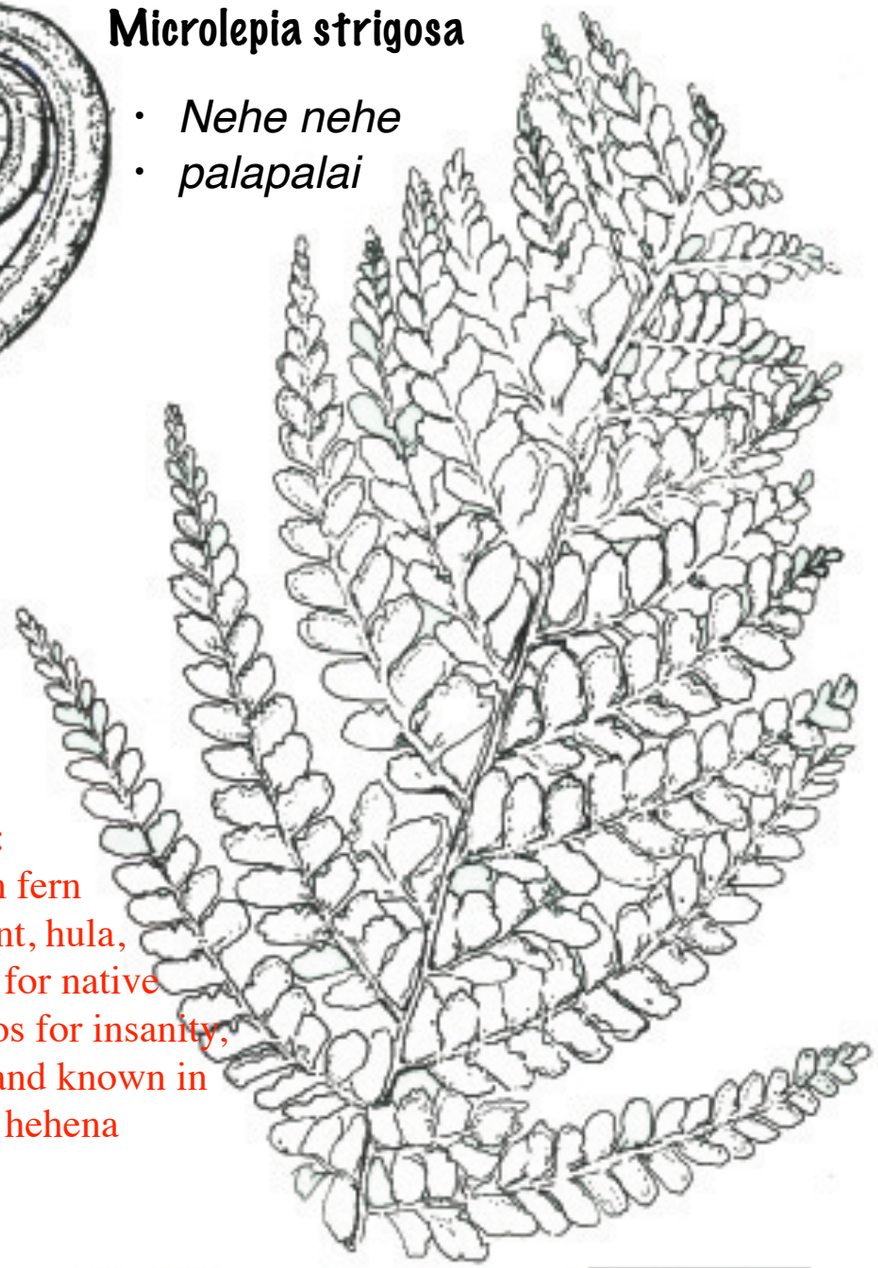
Quercus *(extincto)*



Noted in pollen record @
1L3cm - 1174BP

Microlepia strigosa

- *Nehe nehe*
- *palapalai*



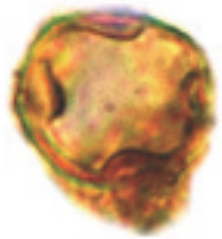
Medicine:
Evergreen fern
Adornment, hula,
Medicine for native
americanos for insanity,
delirium and known in
Hawaii as hehena
(insanity
illness).

lace fern

Myrsine spp.

- *mapou (NZ)*
- *white seasoning tree (n. am.)*

Medicine:
Native Am. in Florida
mixed the leaves with
tobacco. Fruit edible.
Songbird food. Bark
used for leather tanning,
fuel, tannin and other
medicines.



colicwood

Paspalum scrobiculatum

- *mati*
- *mijo koda*

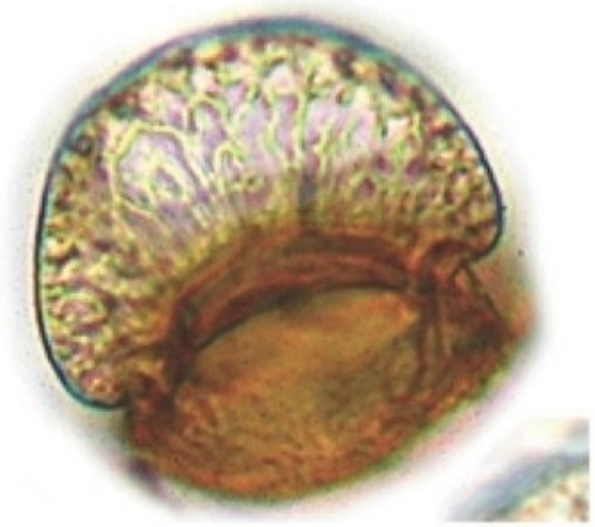
Medicine:
Root and rhizome
decoctions used after childbirth. Herb for minor njuries as crushed leaves.
Stypik to stop bleeding. Plant is bitter, sharp hot taste, good odor, laxative, brain and heart tonic, aphrodisiac, expectorant, for pains and inflammation and toothache. Virus-affected discolored leaves are used for treatment of liver complaints. For bleeding and skin troubles.

Polygonum acuminatum

- *Tavari*

Medicine:
Food plants for butterflies
Eaten in times of famine and leaves smoked as tobacco.
Tea as treatment for asthma, and infected wounds. Internally for astringent, antiheumatic. Topical as antiseptic.

Podocarpus *(extincto)*



Noted in pollen record @
3L25cm, 3L55cm, 7L20cm
1698BP, 1885 and 9044BP

Ephedra & Elaeocarpus (extincto)

Noted in pollen record @ 4L95cm 3452BP, and
5L50cm 3500BP

Polypodium phymatodes

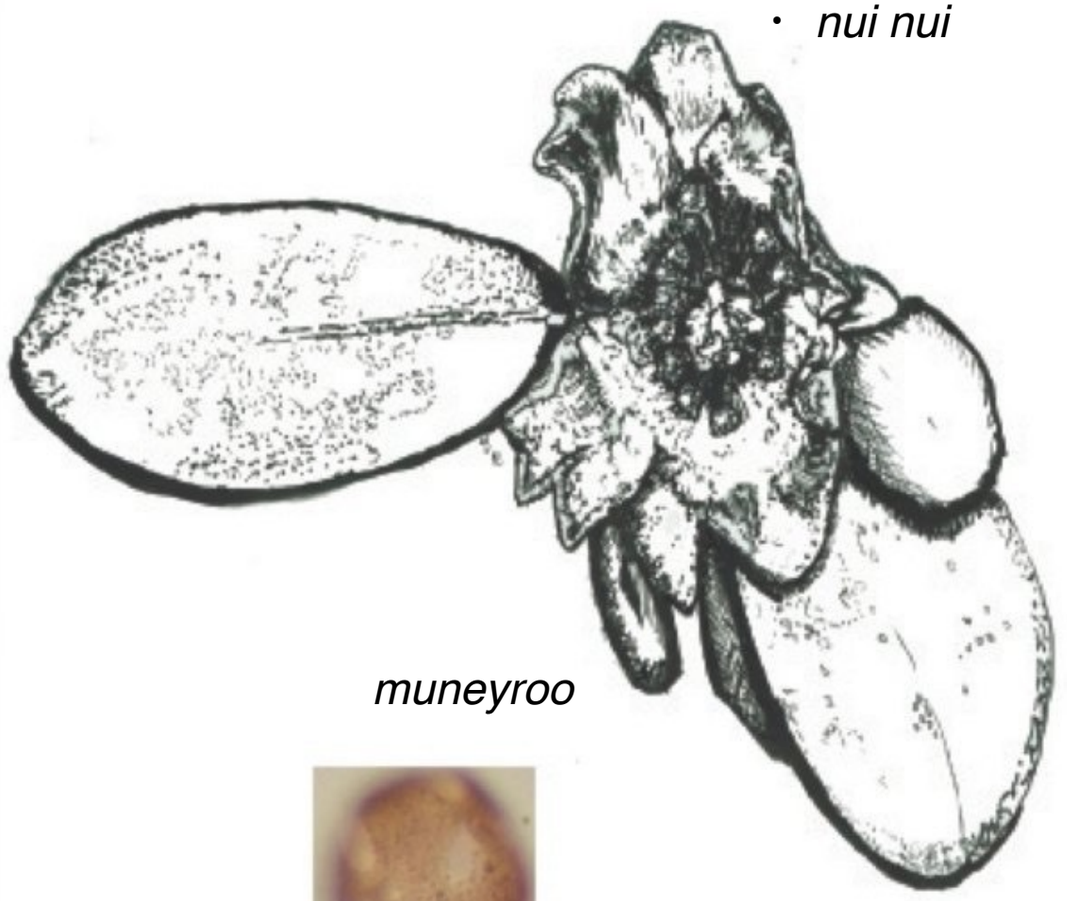
- *matua'a pua'a*

Medicine:
Curing disease and numerous symptoms and pain.
The rhizome gives great hope to mental conditions.
Contains a volatile oil which is used in food.

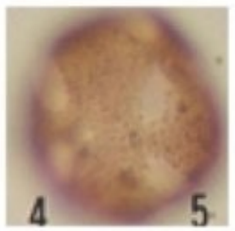
licorice fern

Portulaca oleracea

- *nui nui*



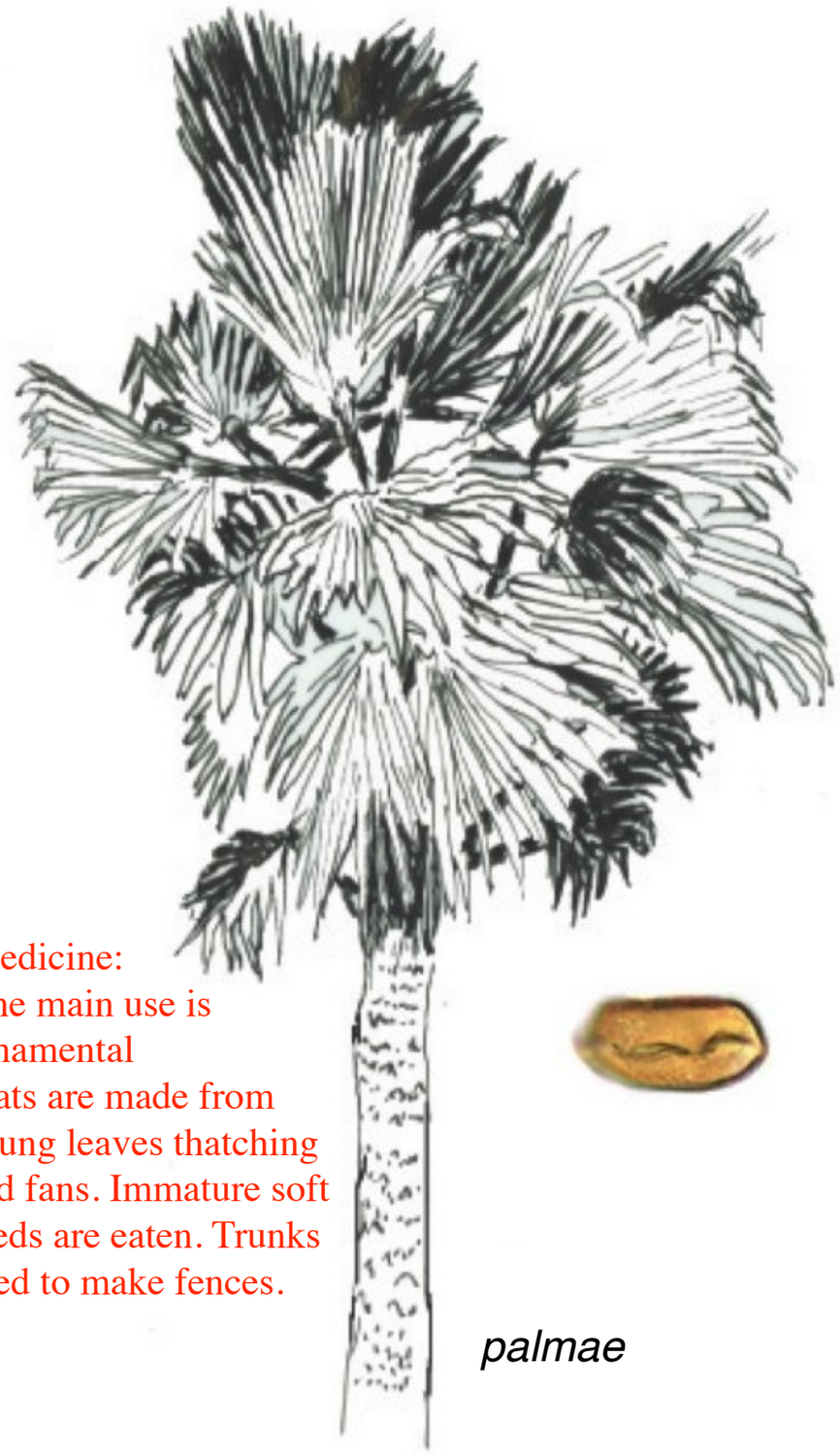
muneyroo



Medicine:
Male and female organs on same plant, pollinated by insects. Vegetable.
The juice is used against dry cough. Topical for inflammation and sores, and hemorrhage.
Beneficial for urinary and digestive, also used in treatment of candida, lupus, fibromyalgia.
Treats bipolar, depression, hyperactivity, congenital heart disease and migraines.

Pritchardia spp.

- loulu



Medicine:
The main use is ornamental
Hats are made from young leaves thatching and fans. Immature soft seeds are eaten. Trunks used to make fences.

palmae

Pteris spp.

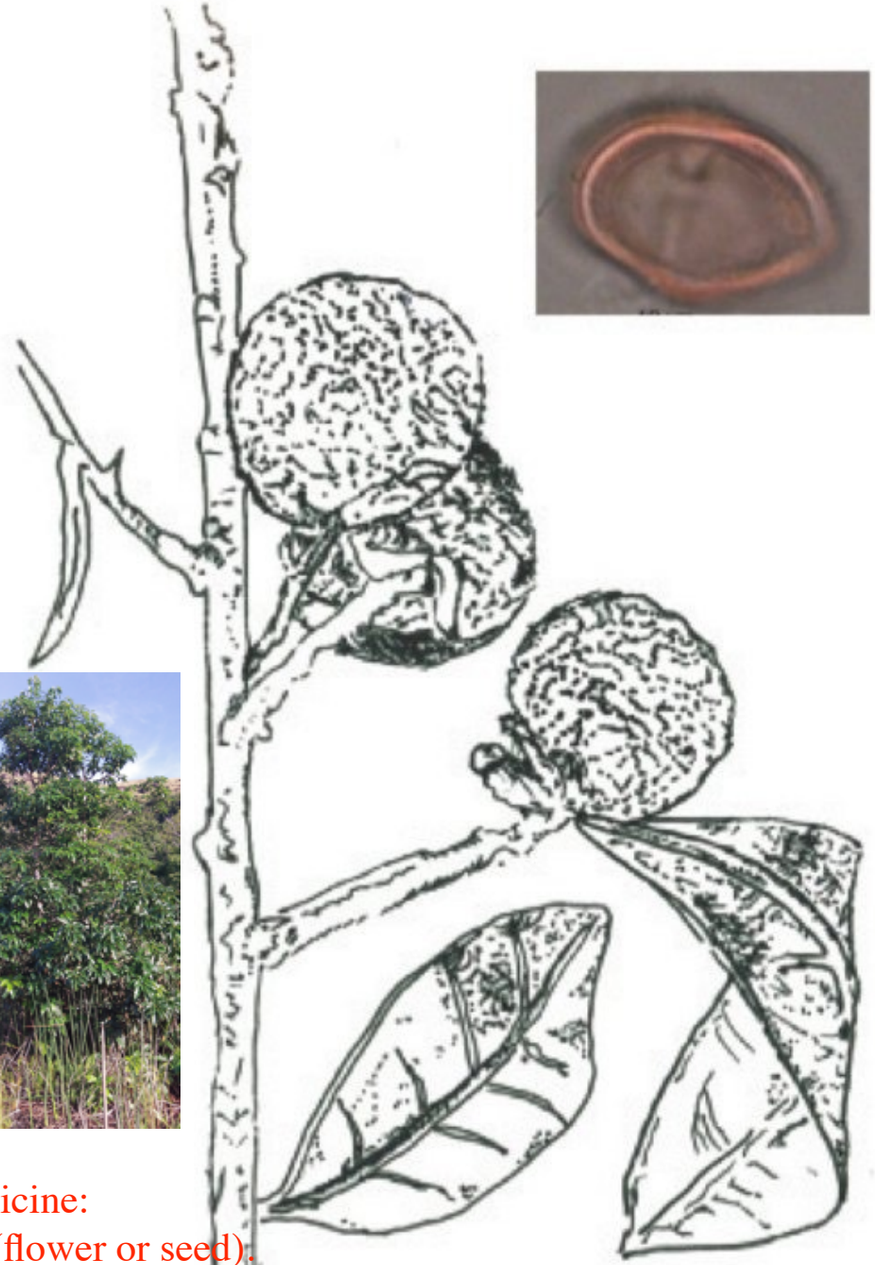
Medicine:
Many ferns are used for medicine. Pteris is a spleenwort used to heal the spleen. Also for dysentery, fever, malaria, swelling and painful throat.
Urinary tract infection, mumps, measles, eczema also.

wing/feather

Sapindus saponaria

- *marikuru*

Noted in pollen record with Elaeocarpus 4L15cm-2659BP and 9L40cm-11393BP



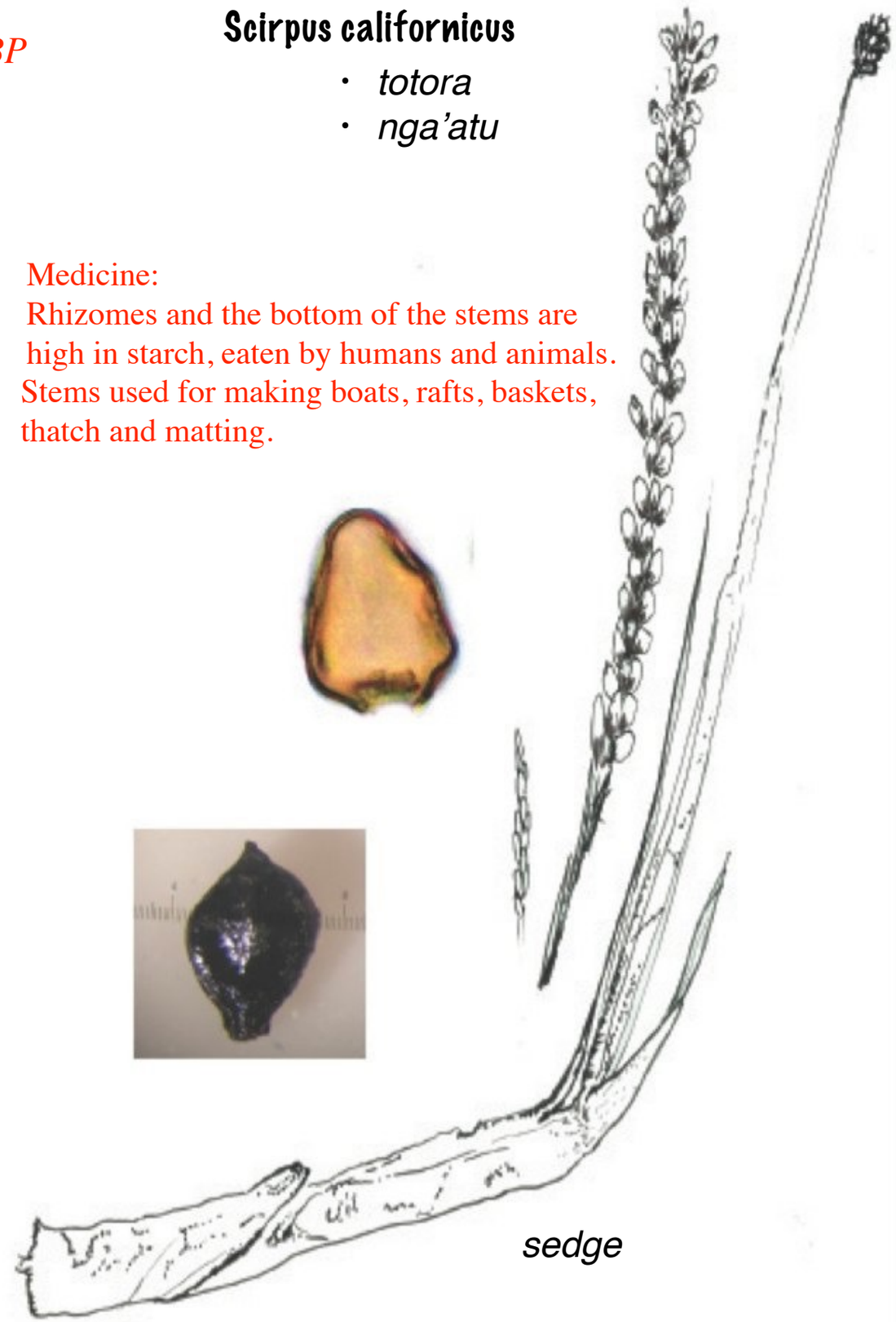
soapberry

Medicine:
Lei (flower or seed).
Indian soap also used as beads.
The fruit is poisonous but used as a soap substitute for washing clothes. Baskets are made from the wood.

Scirpus californicus

- *totora*
- *nga'atu*

Medicine:
Rhizomes and the bottom of the stems are high in starch, eaten by humans and animals.
Stems used for making boats, rafts, baskets, thatch and matting.



sedge

Sophora toromiro

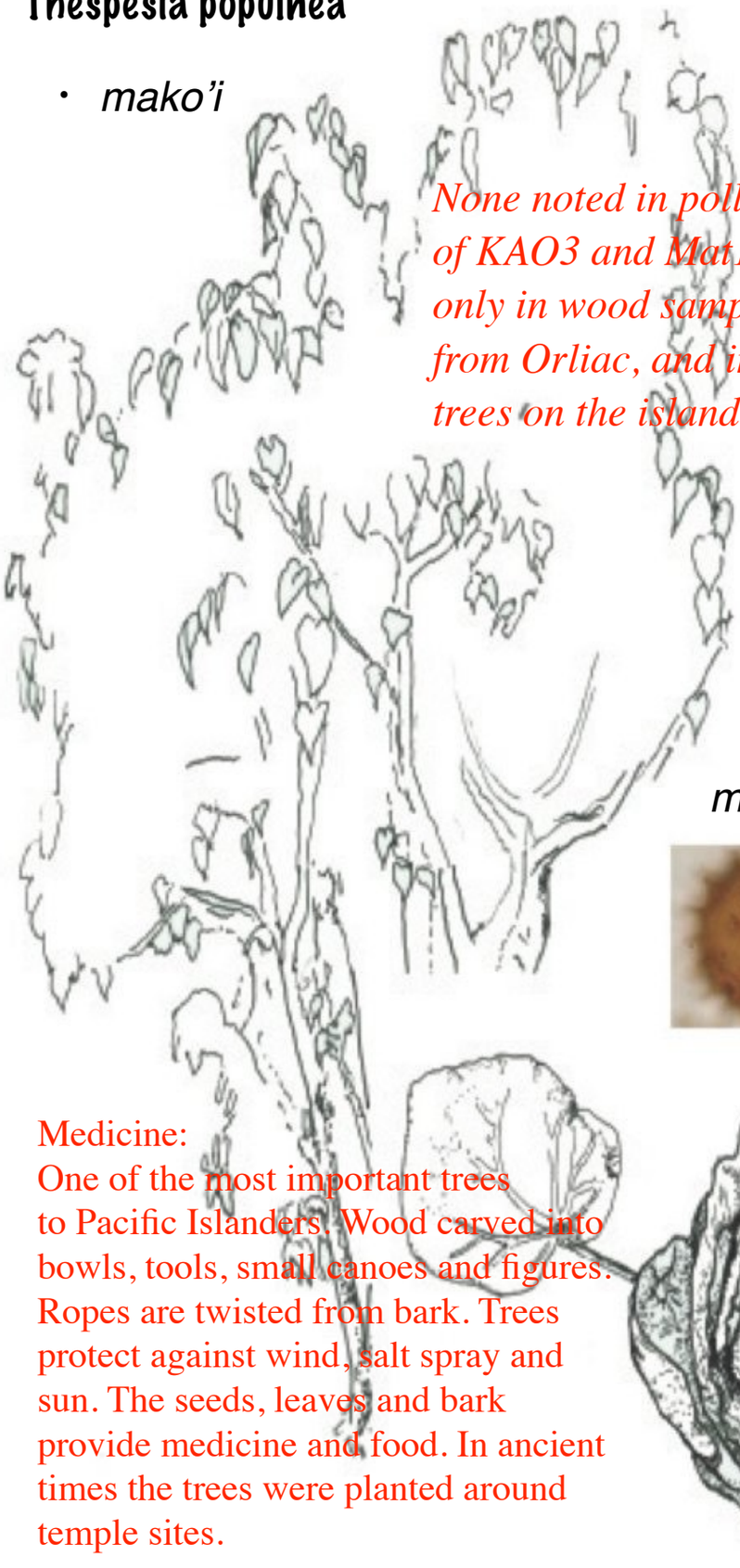
- *miro*

Medicine:
Wood used as carvings for islanders.

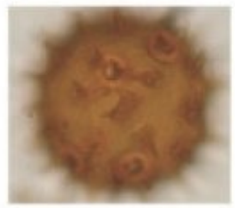
Thespesia populnea

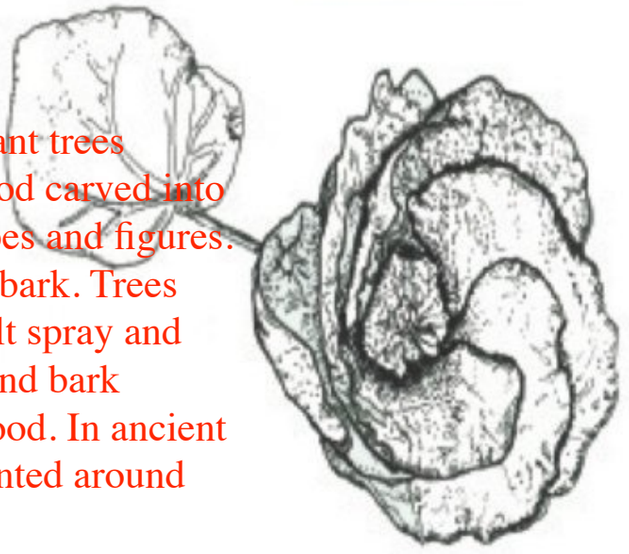
- *mako'i*

None noted in pollen record of KAO3 and Mat1RKE08 only in wood samples from Orliac, and in modern trees on the island



milo





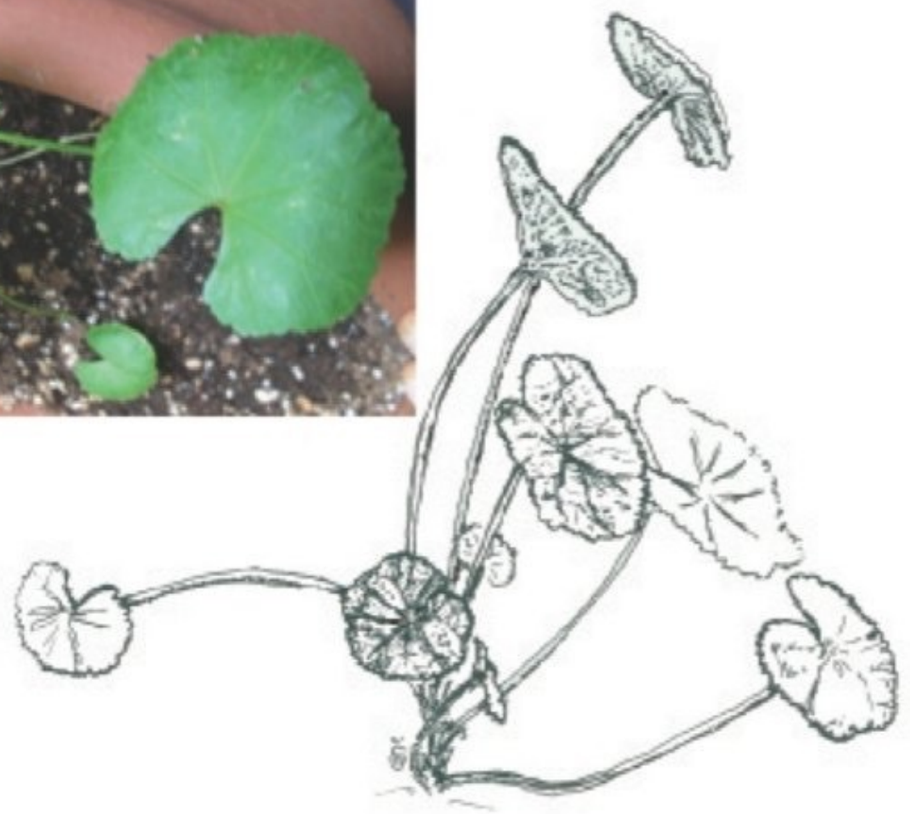
Medicine:
One of the most important trees to Pacific Islanders. Wood carved into bowls, tools, small canoes and figures. Ropes are twisted from bark. Trees protect against wind, salt spray and sun. The seeds, leaves and bark provide medicine and food. In ancient times the trees were planted around temple sites.

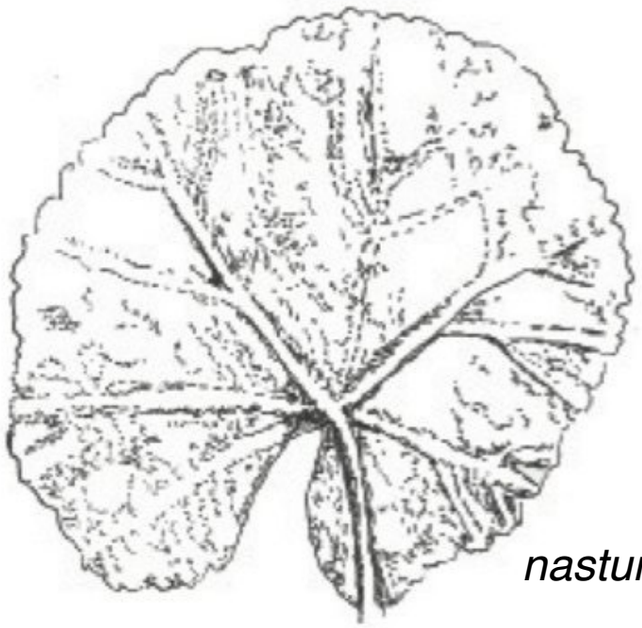
Triumfetta semitriloba

- *hau hau*

Medicine:
Rope and fibers.

Tropaeolum majus L.





Medicine:
food

nasturtium

Unidentified fern

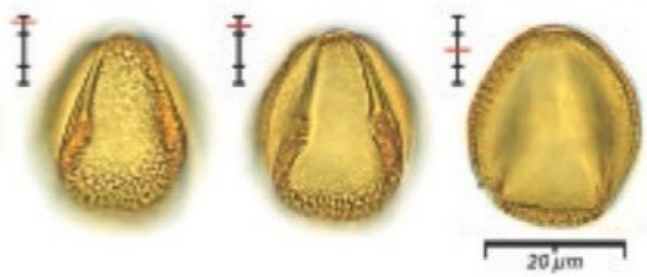
Medicine:
similar to most
ferns

Vitis

Noted in pollen record @ 1L3cm-1174BP

Medicine:
food and wine

grape



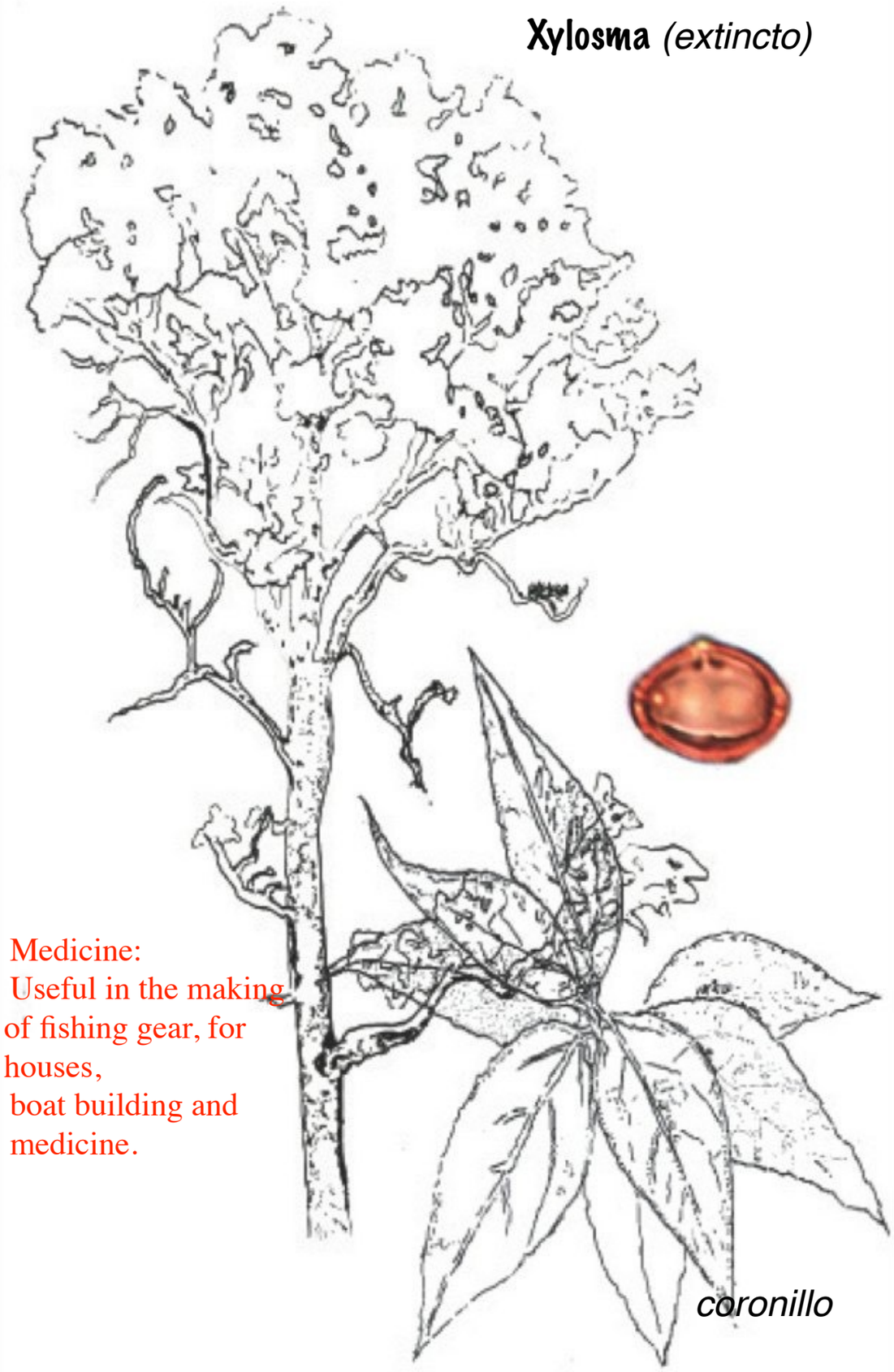
Vittaria elongata

- *kava kava atua*

Medicine:
In Native Am. medicine,
a complex infusion of leaves
was taken for chronic conditions.

shoestring fern

Xylosma *(extincto)*



Medicine:
Useful in the making of fishing gear, for houses,
boat building and medicine.

coronillo

Saccharum offinarum L.

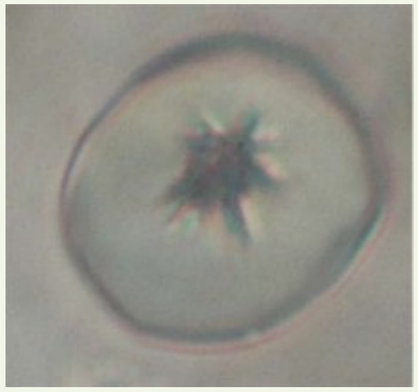
- *Toa*

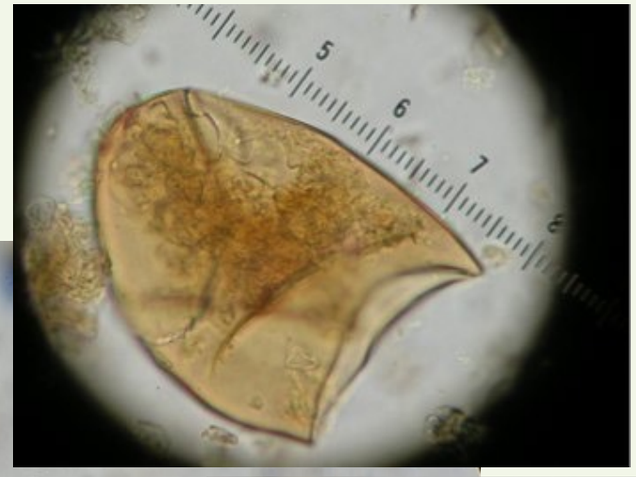
Noted in pollen record as cynadon 1L10cm-1200BP, 1L50cm-1260BP, 3L75cm-2213BP, and introduced at 4L15cm-2659BP

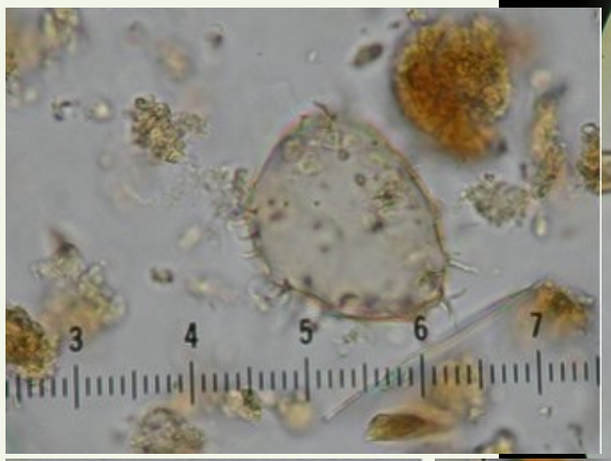
sugar cane

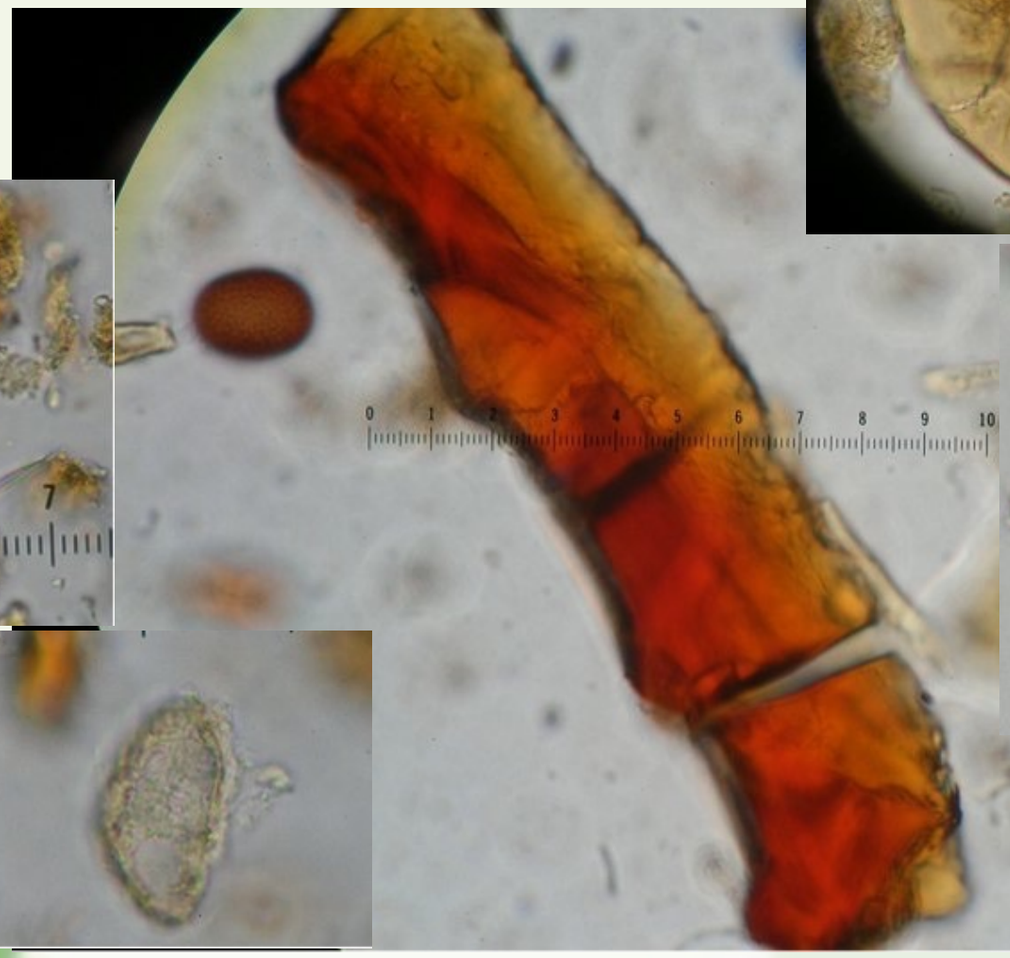
Medicine:
Food
Sap 18% sugar

Starch, resting sacs, minerals, phytoliths, fungi, bacteria

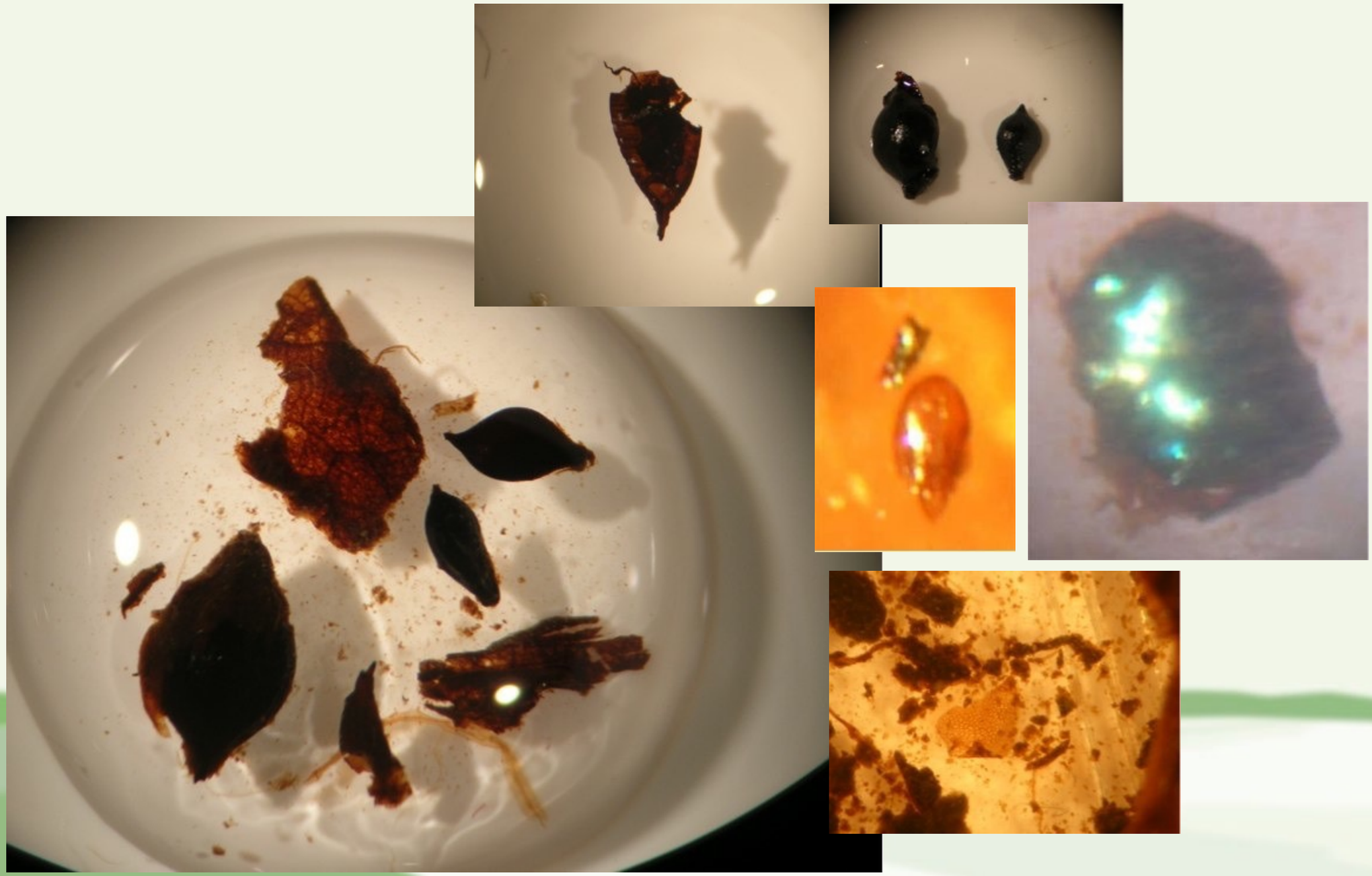




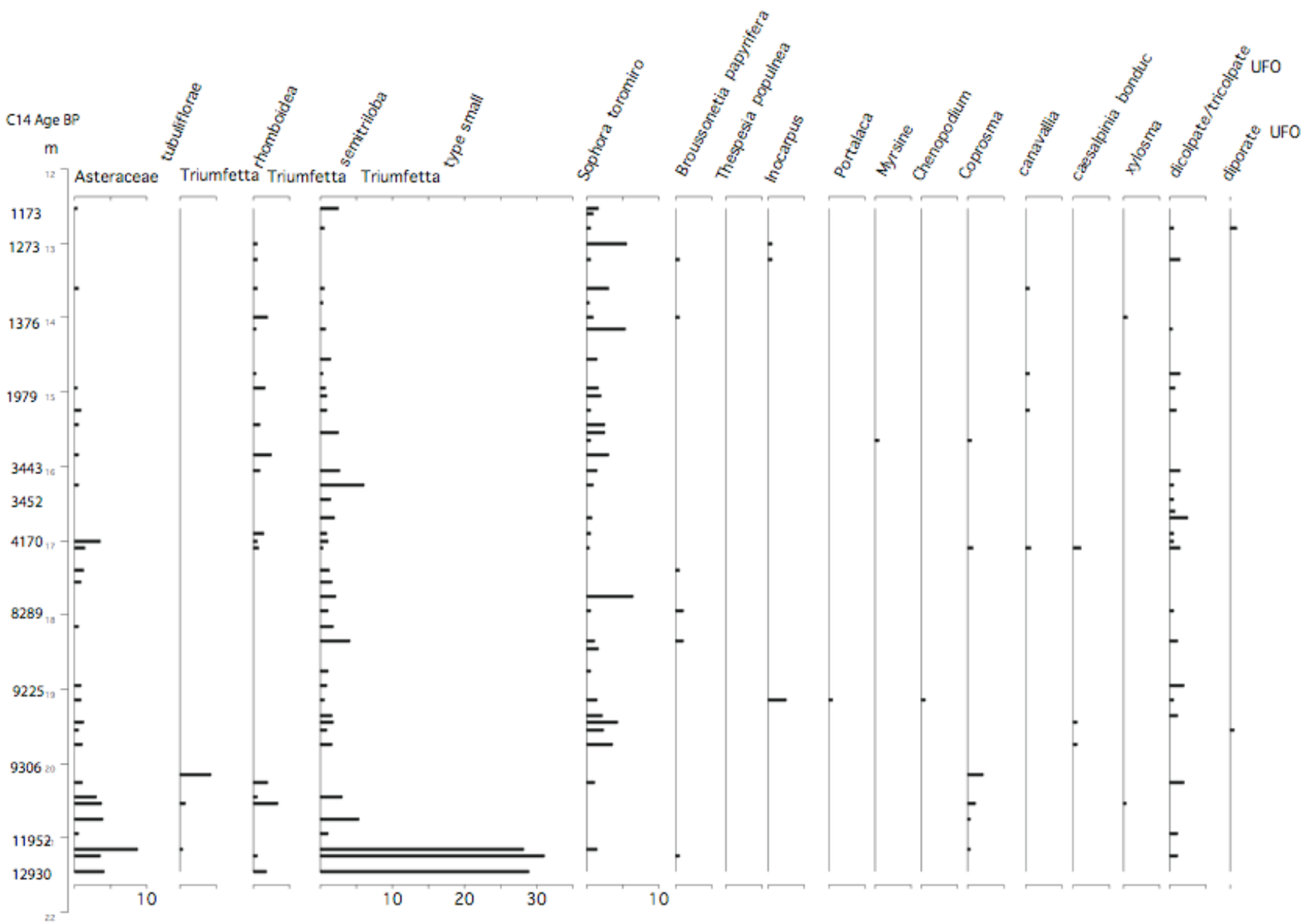




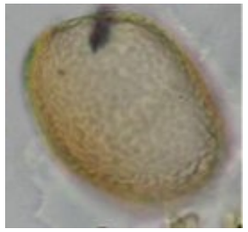
Macrofossils - seeds, plant parts, insects.....



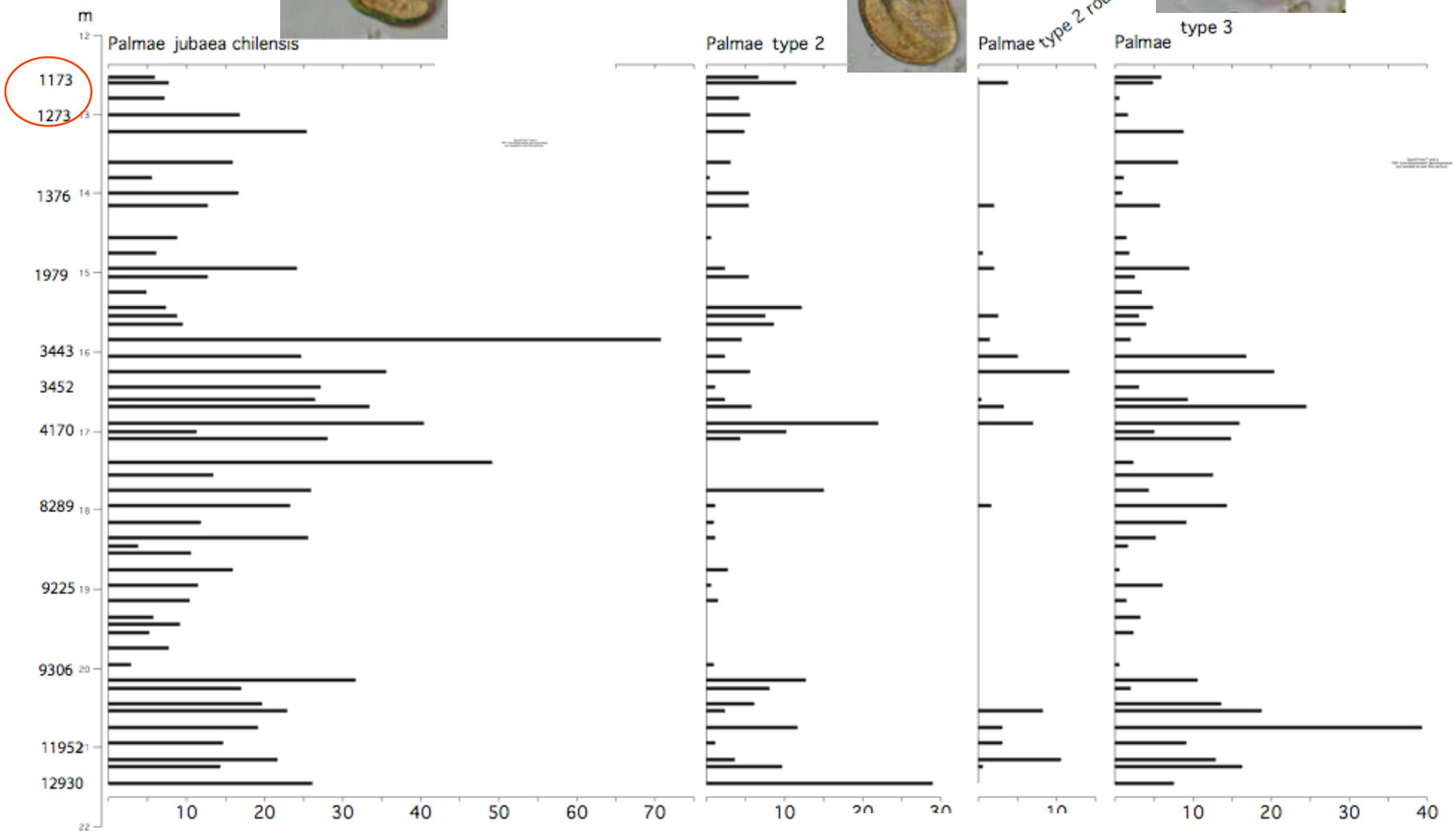
RANO KAO KAO3 CORE EASTER ISLAND 2008



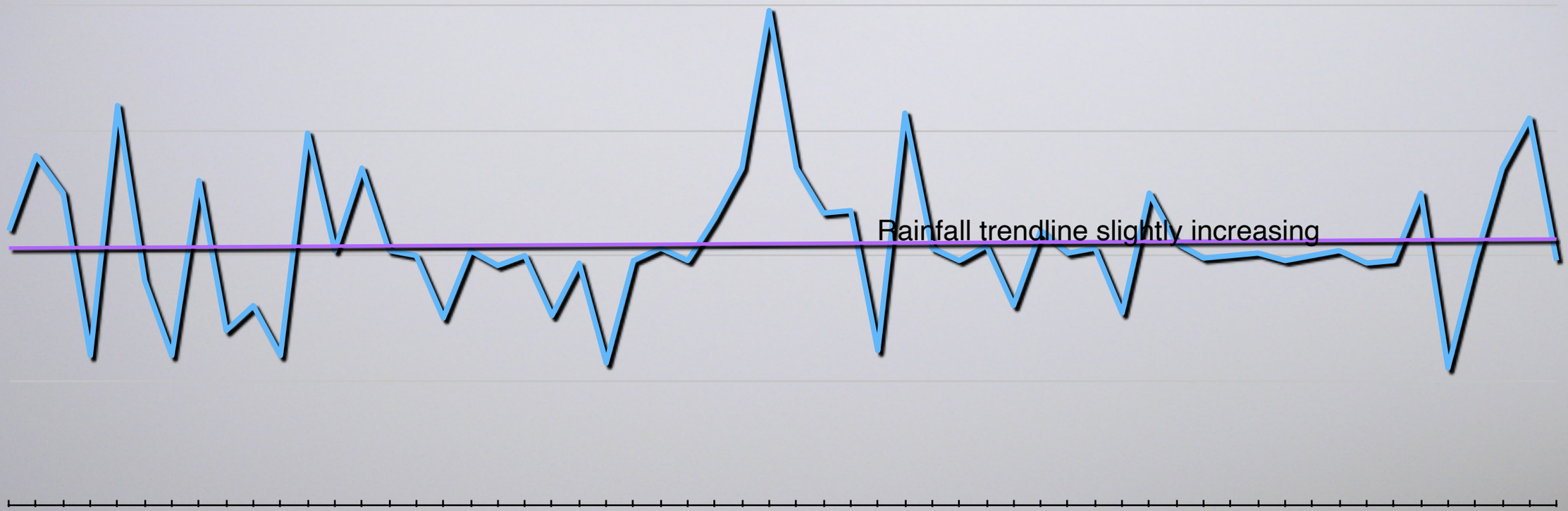
TREES



RANO KAO KAO3 CORE EASTER ISLAND 2008

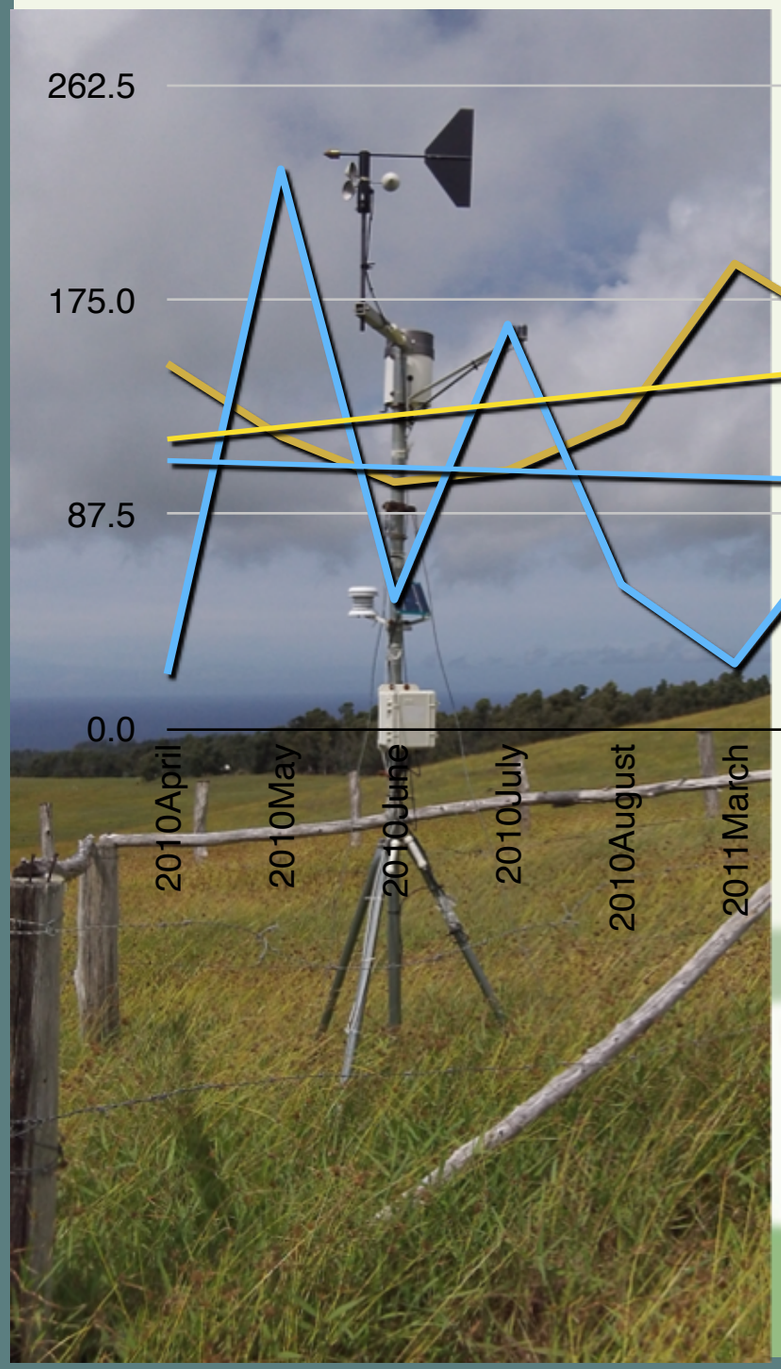


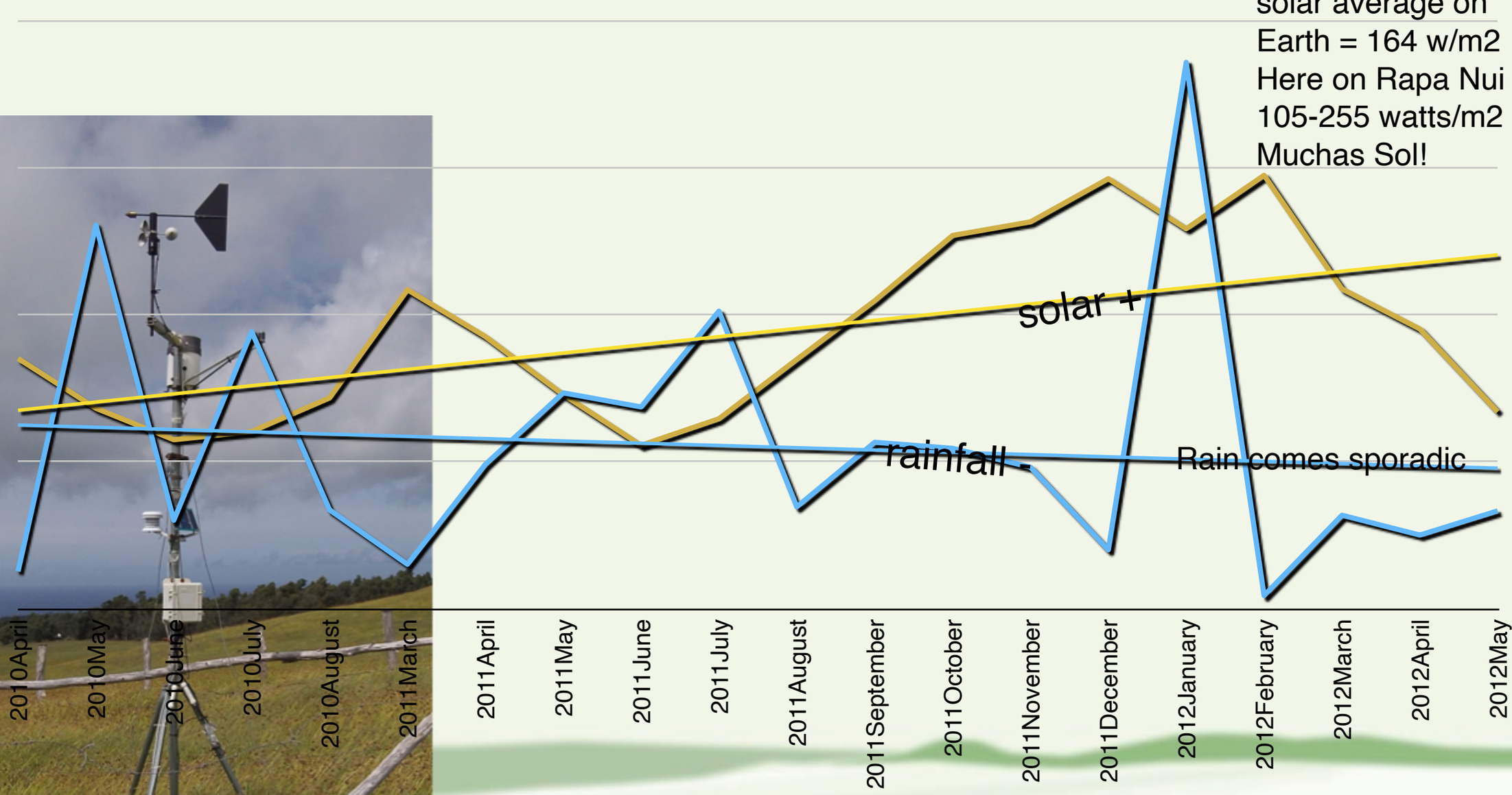
PALMS



2014

Ava Ranga Uka Weather Station Rainfall and Solar 2010-2012





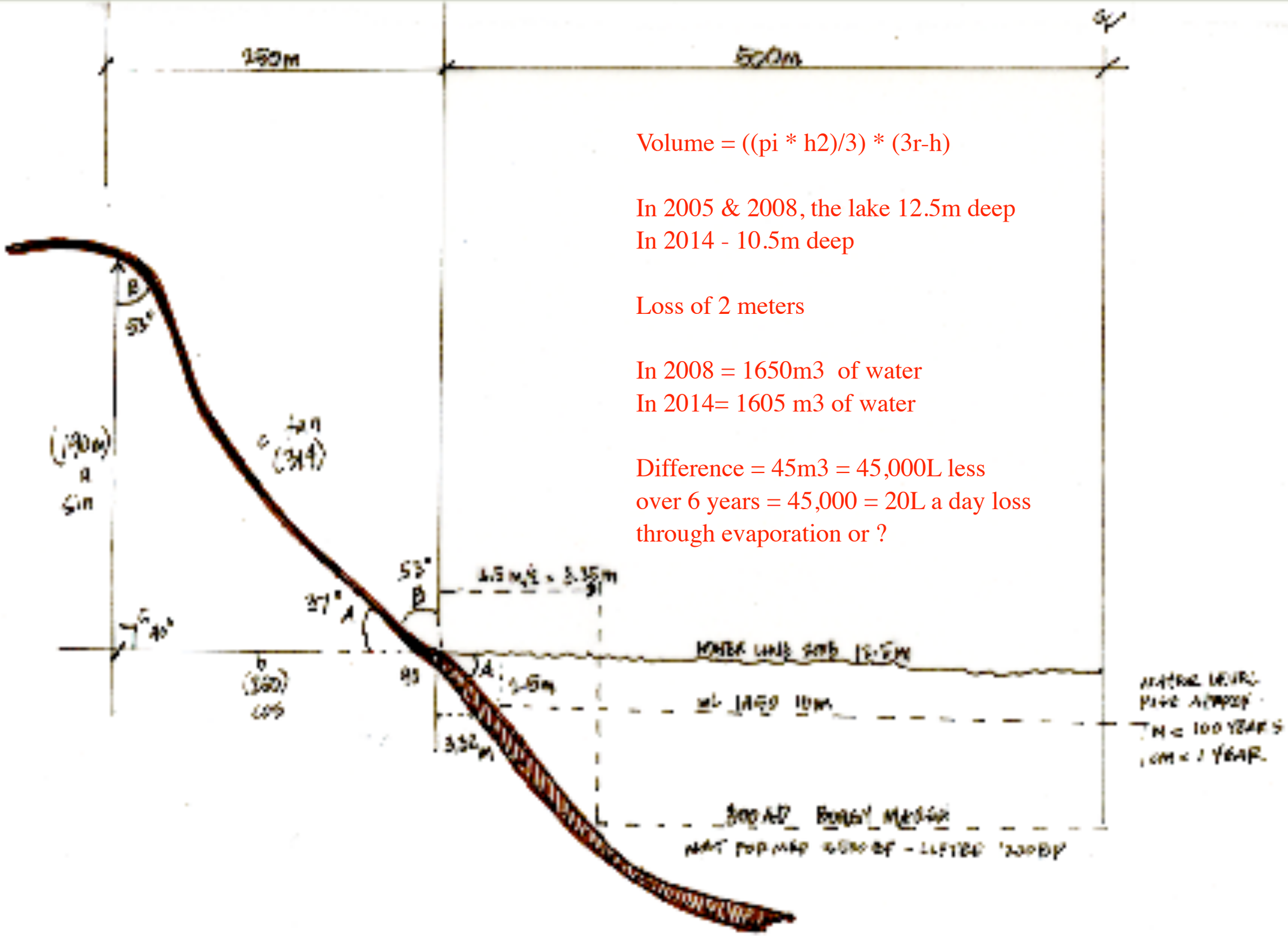
Rano Kao -Lake Water depth 29 March 2014

Candace, Max, Francisco, Christian (CONAF)
Cloudy-Wet day
Water - Temperado
In center cold plumes felt on legs 1meter below

Water depth 1980 - 10m (Flenley)
2005 - 12.5m (Gossen)
2008 - 12.5m (Gossen)

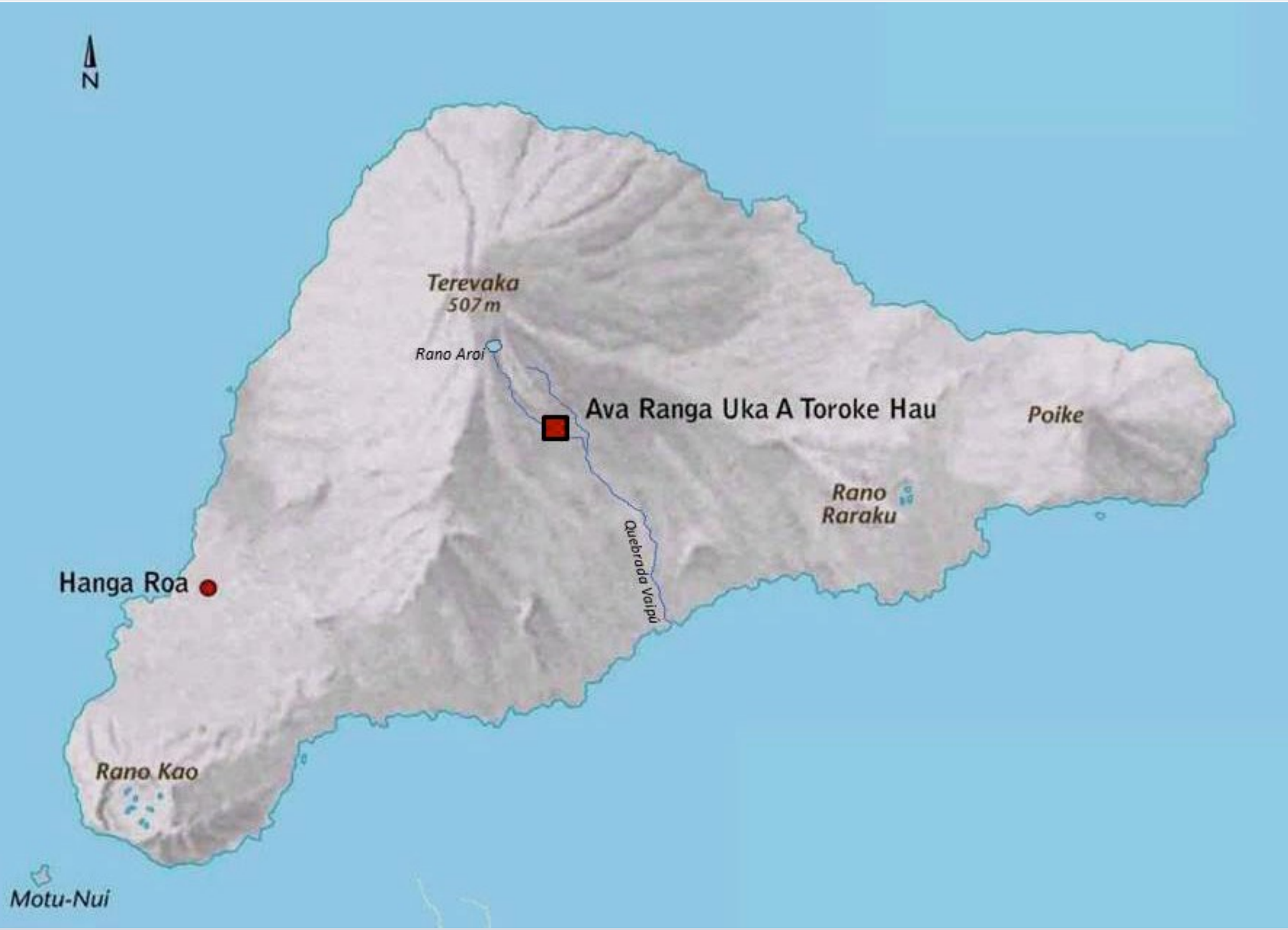
Dr. Candace Gossen
info!@blackcoyotemedicine.org
971-222-5112

Measuring the depth of the lake 2014

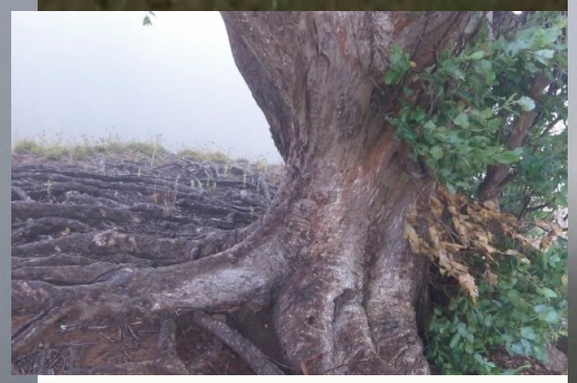

150m
500m
53°
37°
53°
Volume = ((pi * h2)/3) * (3r-h)
In 2005 & 2008, the lake 12.5m deep
In 2014 - 10.5m deep
Loss of 2 meters
In 2008 = 1650m3 of water
In 2014= 1605 m3 of water
Difference = 45m3 = 45,000L less
over 6 years = 45,000 = 20L a day loss
through evaporation or ?

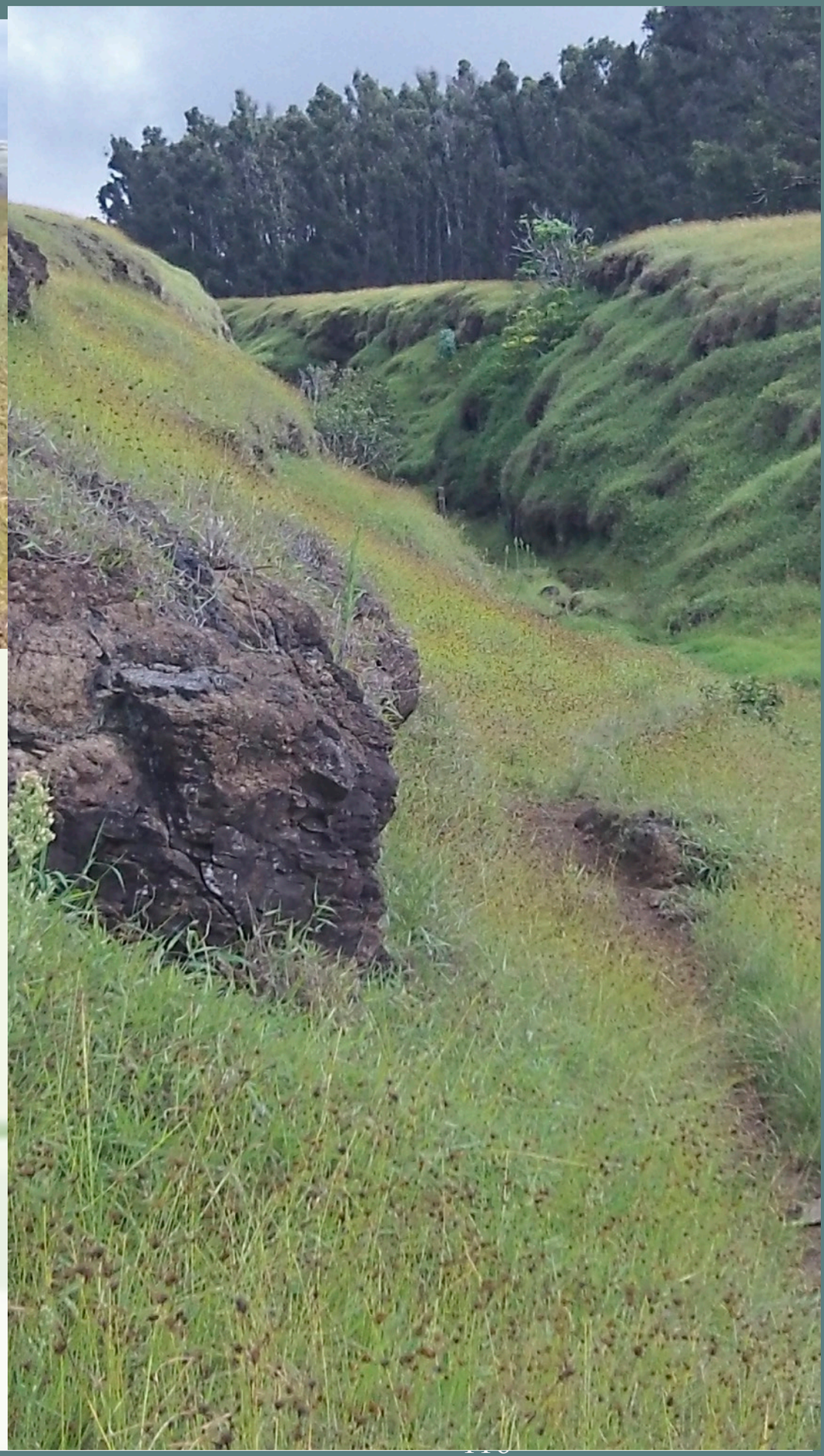
2008

Ava Ranga Uka

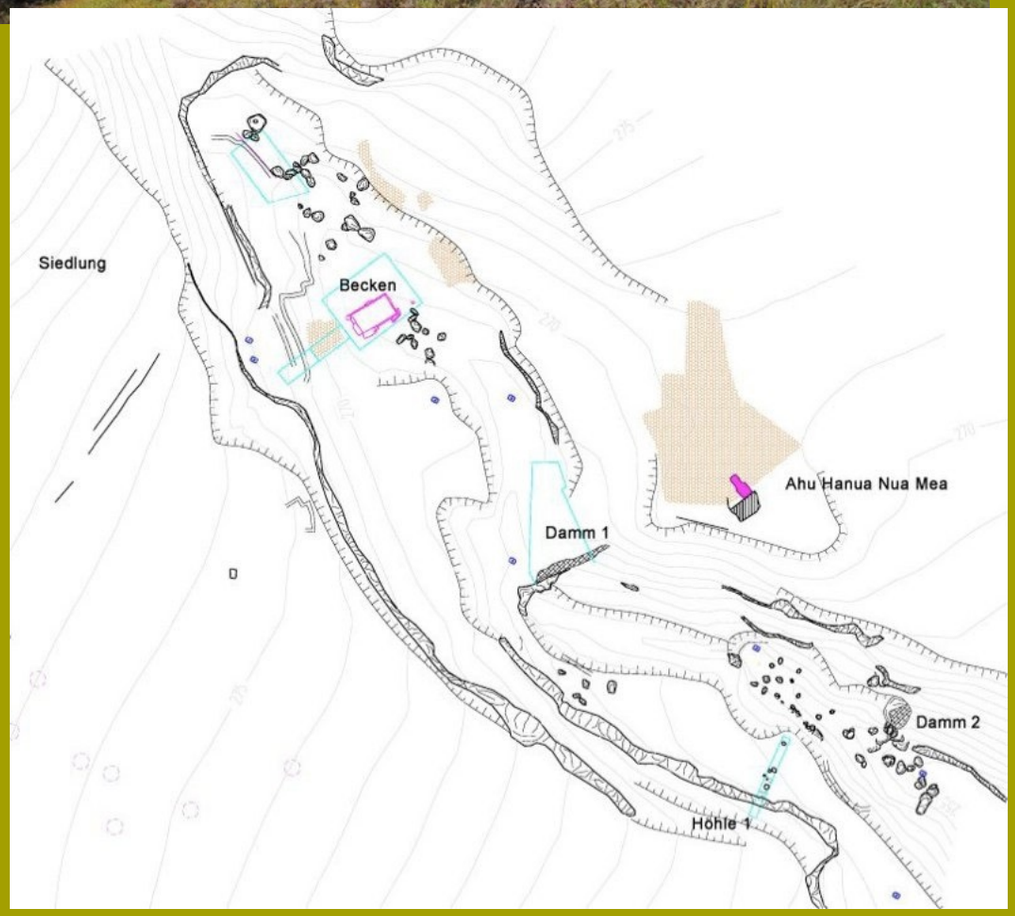

N
Terevaka
507 m
Rano Aroi
Ava Ranga Uka A Toroke Hau
Poike
Rano
Raraku
Quebrada Vaipu
Hanga Roa
Rano Kao
Motu-Nui


Isla de Pascua (Easter Island)





Ahu Henua Nua Mea



3 sq.

27º 10’ S lat 109º 26’ W long

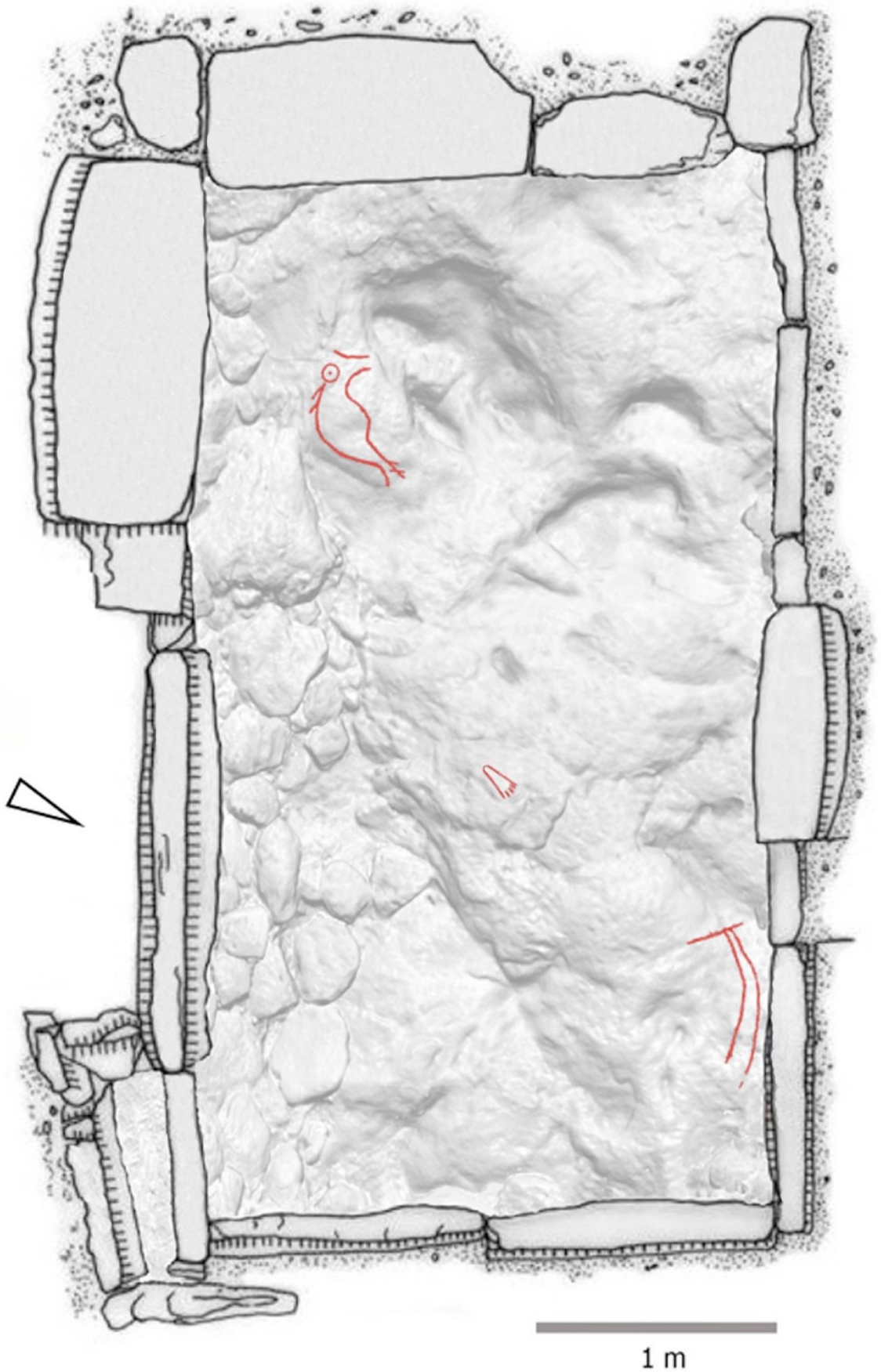
Ava Ranga Uka

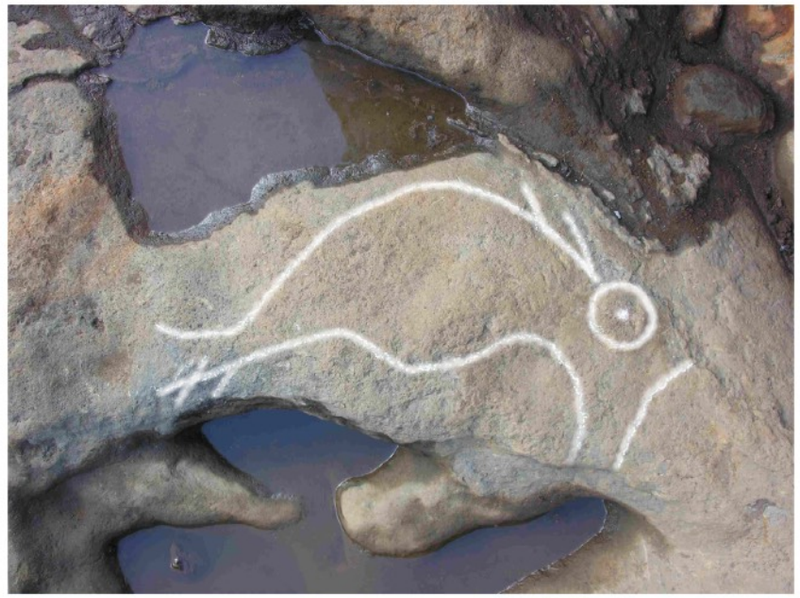
27º 10’ S lat 109º 26’ W long

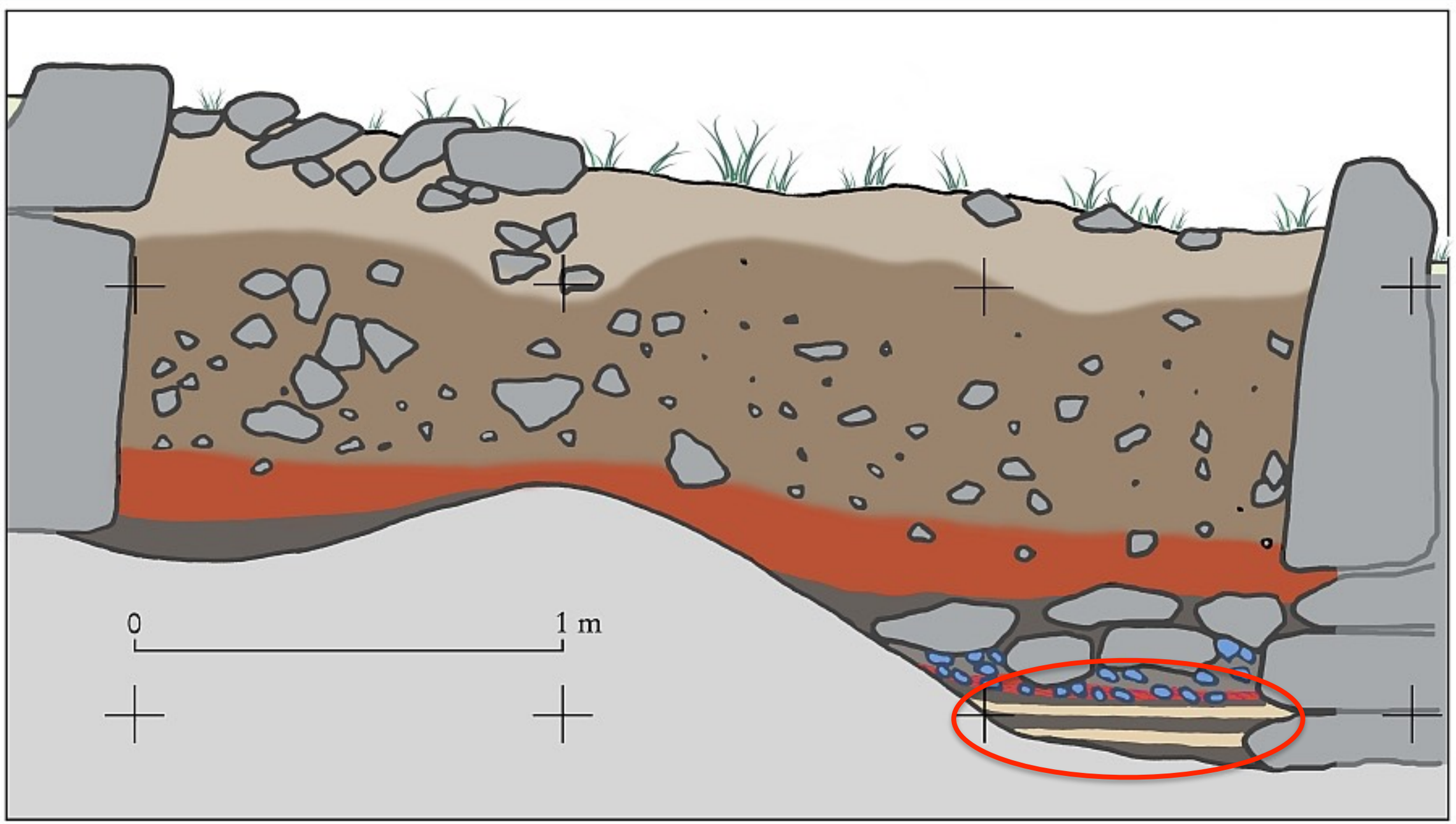

phase 3
phase 2
phase 1


pavement 3
pavement 2
pavement 1
packing


pavement 3
pavement 2
pavement 1


1 m




0
1 m

27o 10’ S lat 109o 26’ W long

km


South Pacific Ocean
Easter Island (Rapa Nui)
Hanga Roa
Hanga Piko
Mataveri
Mataveri International Airport
VAIHU
HATU HI
POIKE
Cape Nord
Vai Mata
Maikati Te Moa
Te Peu
Motu Ko Hepoko
Motu Tautara
A Kivi
Tahai
Te Ata Hero
Ana Kai Tangata
A Tanga
Papa Tekena
Point San Juan
Vai Tara Kai Ua
Caleta Anakena
Nau Nau
Point Rosalia
Te Pito Kura
Hekii Bay
La Pérouse
Tau A Ure Taharoa
Cape O'Higgins
Cape Cumming
Cape Roggeveen
Motu Marotiri
Tongariki
Hutuiti
Point One Tea
One Makihi
Tu'u Tahi
Point Cuidado
Hanga Tetenga
Runga Va'e
Orvoi
Akahanga
Ura Uranga Te Mahina
Point Baja
Hanga Te'e
Tarakiu
Hanga Poukura
Hanga Hahave
Benepu Harbour
Vinapu
Orongo
Volcano Rano Kau
Point Kikiri Roa
Cape South
Motu Kau Kau
Motu Iti
Motu Nui
Volcano Terevaka 507 m
Volcano Puakatike 370 m
Volcano Rano Raraku
Mount Pui 302 m
Maunga Ana Marama 165 m
Vaka Kipo 216 m
Maunga O Tu'u 300 m
Mount Tuutapu 270 m
Huri A Urenga
Maunga Kote Miro Oone 194 m
Maunga Orito 220 m
Road or major track
Minor track
Populated place
Ahu (ceremonial platform)
Moai
Petroglyphs
Ruins
UTM projection (WGS84 datum)
Scale: 1:372,000

173 sq. km

4 half-meter cores were obtained from 4 locations on the Quebrada Vaihu 30 March 2014

core 2,
creek at lava tube, north of hibiscus

S27.06.135
W109.21.769

core 3,
waterfall north of site

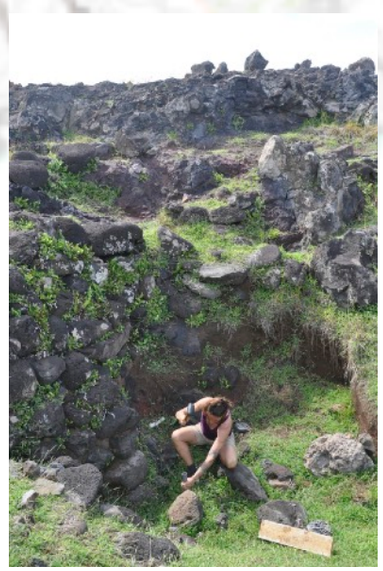
S27.06.513
W109.21.831

core 1,
lower waterfall at Henua Nua Mea site

S27.06.578
W109.21.754

S27.06.859
W109.21.047

core 4,
basin at O'pipiri



Dr. Candace Gossen
www.blackcoyotemedicine.org

https://umn.academia.edu/CandaceGossenPhD

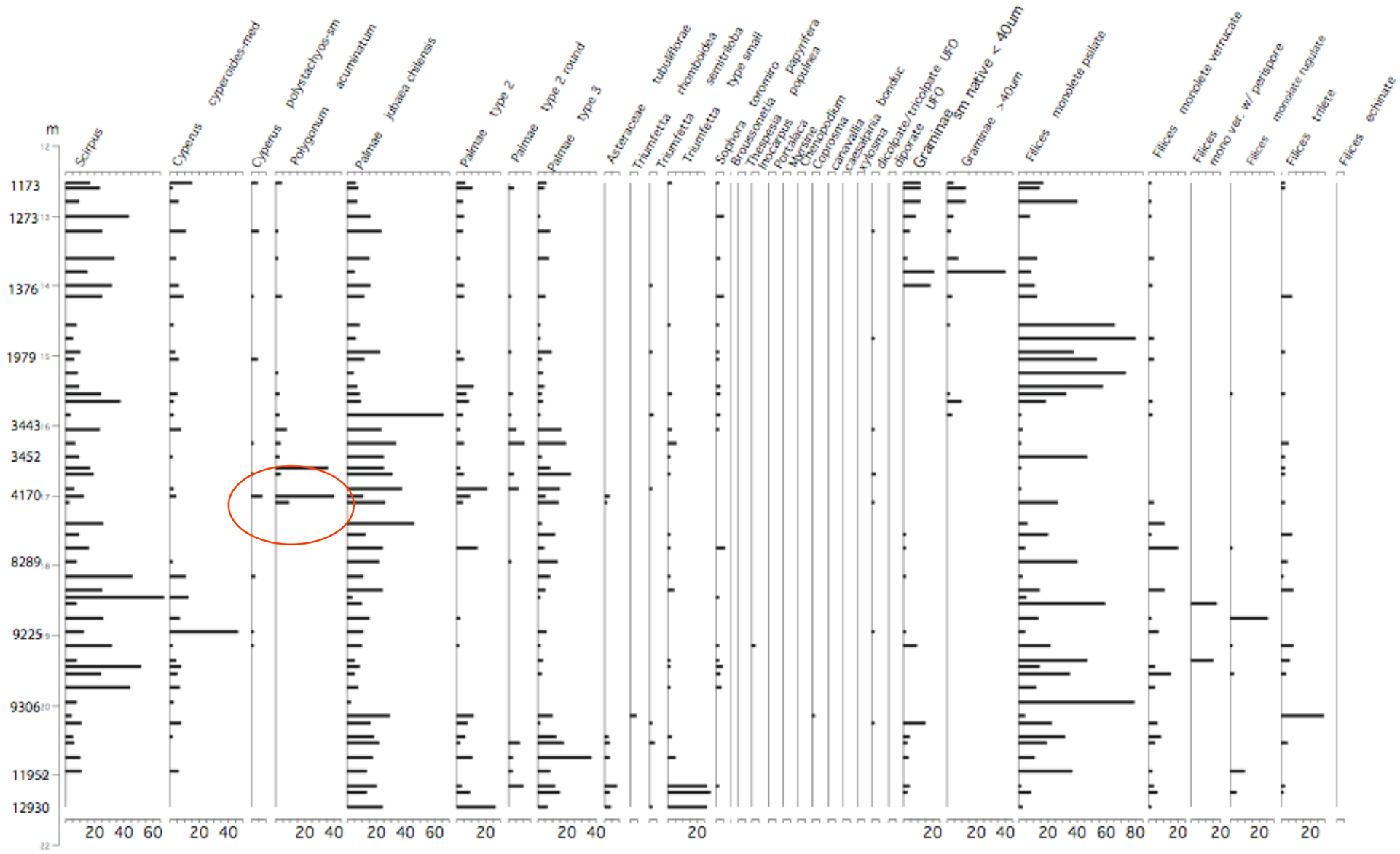
A changing ecology

Pollen fossils

Results of pollen analysis

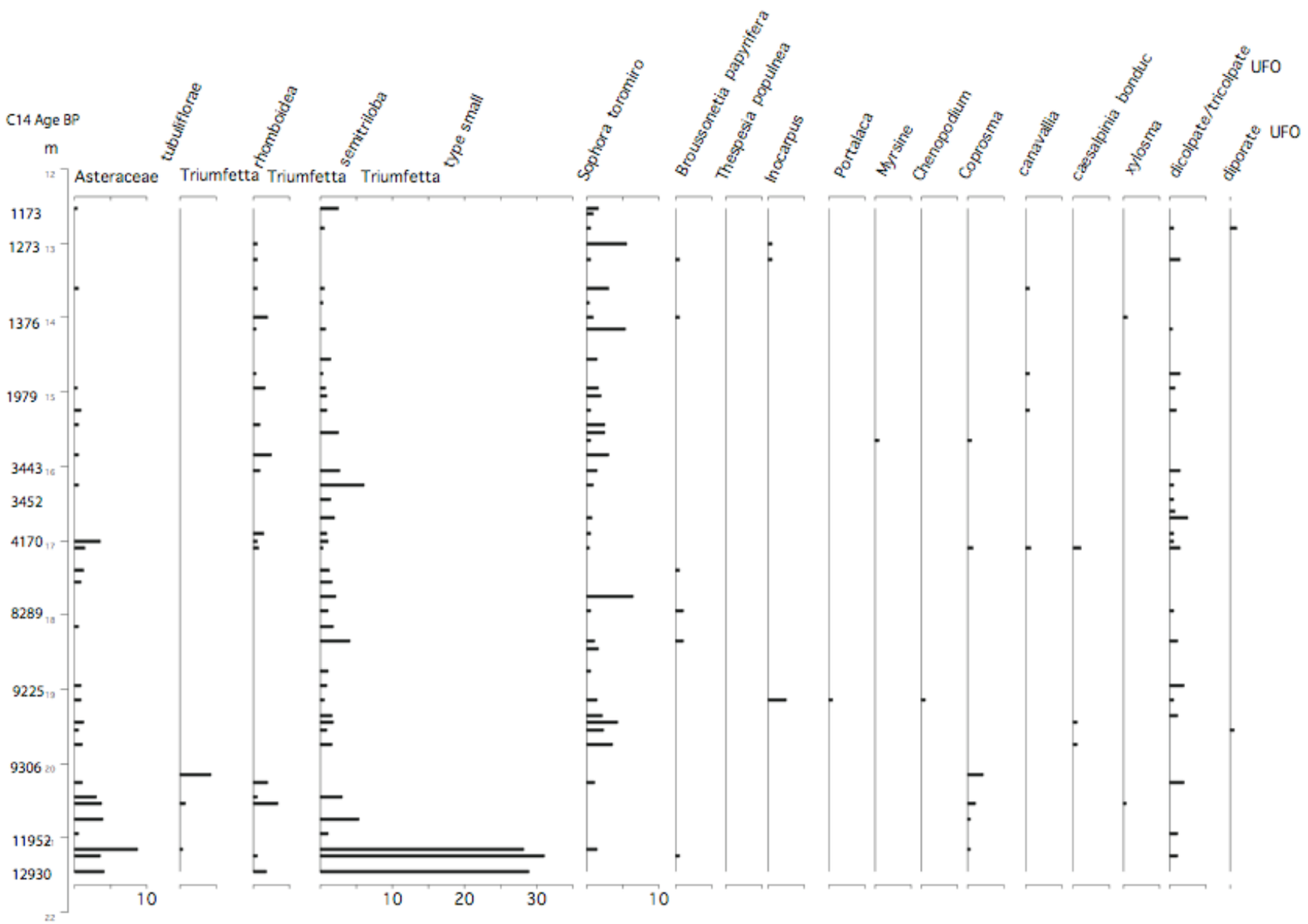
- 33 plant types identified
- At least 4 types of palm species noted
- Scirpus and polygonum are allies
- Ferns both dry and wet indicators
- Palm pollen higher when island dry, airborne pollen
- Scirpus existed on island for 15k years, but seed type changes DNA shows some variation between Kao and Raraku
- Severe drought 9000BP to 5000BP pollen low
- Lake dessicated by 4.2k event-polygonum arrives

RANO KAO KAO3 CORE EASTER ISLAND 2008

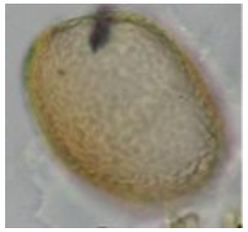


ALL POLLEN

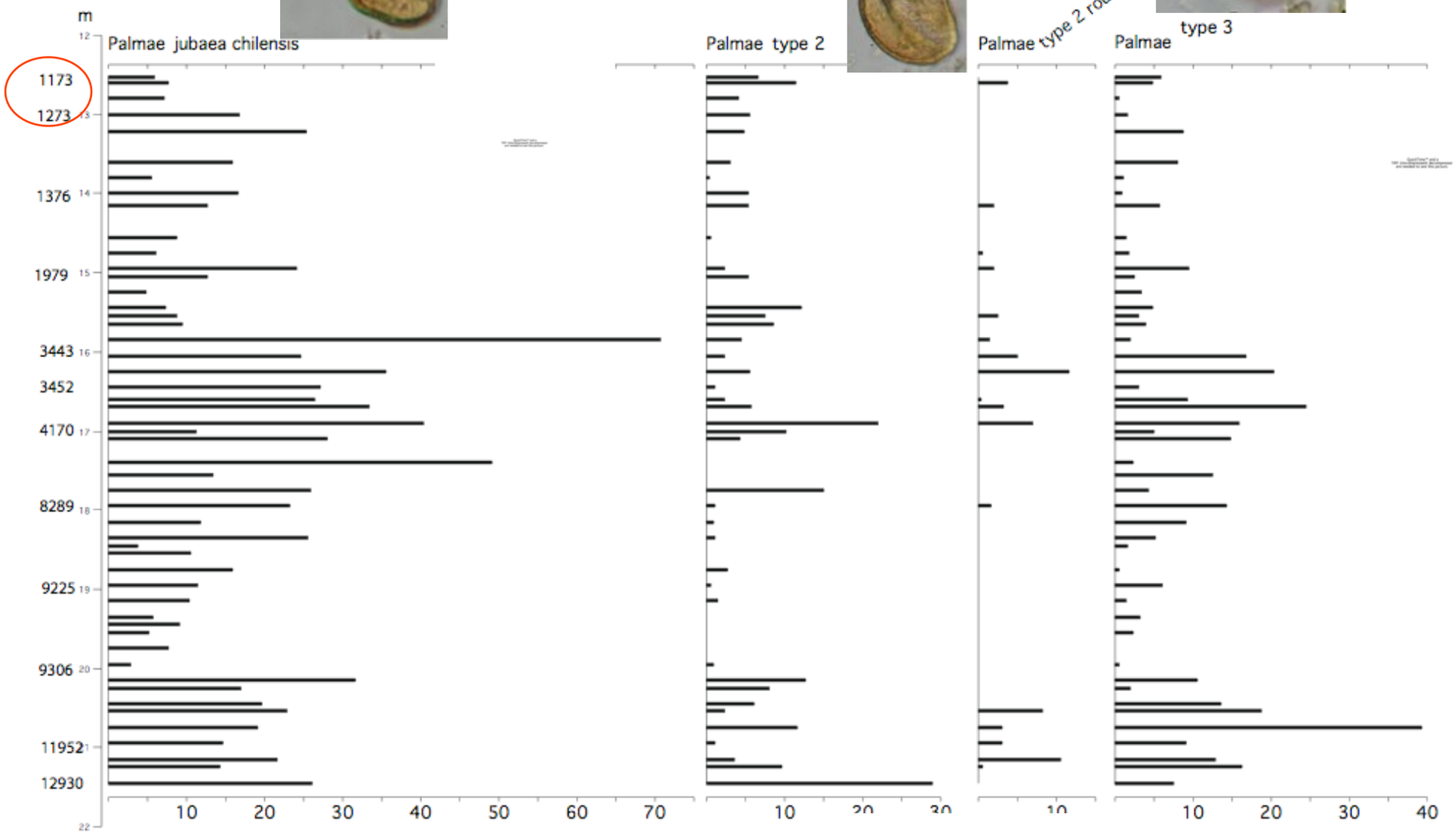
RANO KAO KAO3 CORE EASTER ISLAND 2008



TREES



RANO KAO KAO3 CORE EASTER ISLAND 2008



PALMS

Jubaea

Paschalococos

Inside contains 100 gal (400L) of
sweet 18% sugar = to sugarcane
tolerant of everything except cold
The tree cannot go dormant, or else it will die
one part cannot be injured or else it will die

The palm, each is a unique organism, each different from the other, with an animal-like vascular system

The essence “mana” of the island (antigua)

Evidence of Humans

- Charcoal > 100um
- introduced grass species >40um
- Exotic pollen
- Trenching in lake found between kao3 and kao6
- High deposition but dry
- Quantity of pollen changes without evidence of climate change

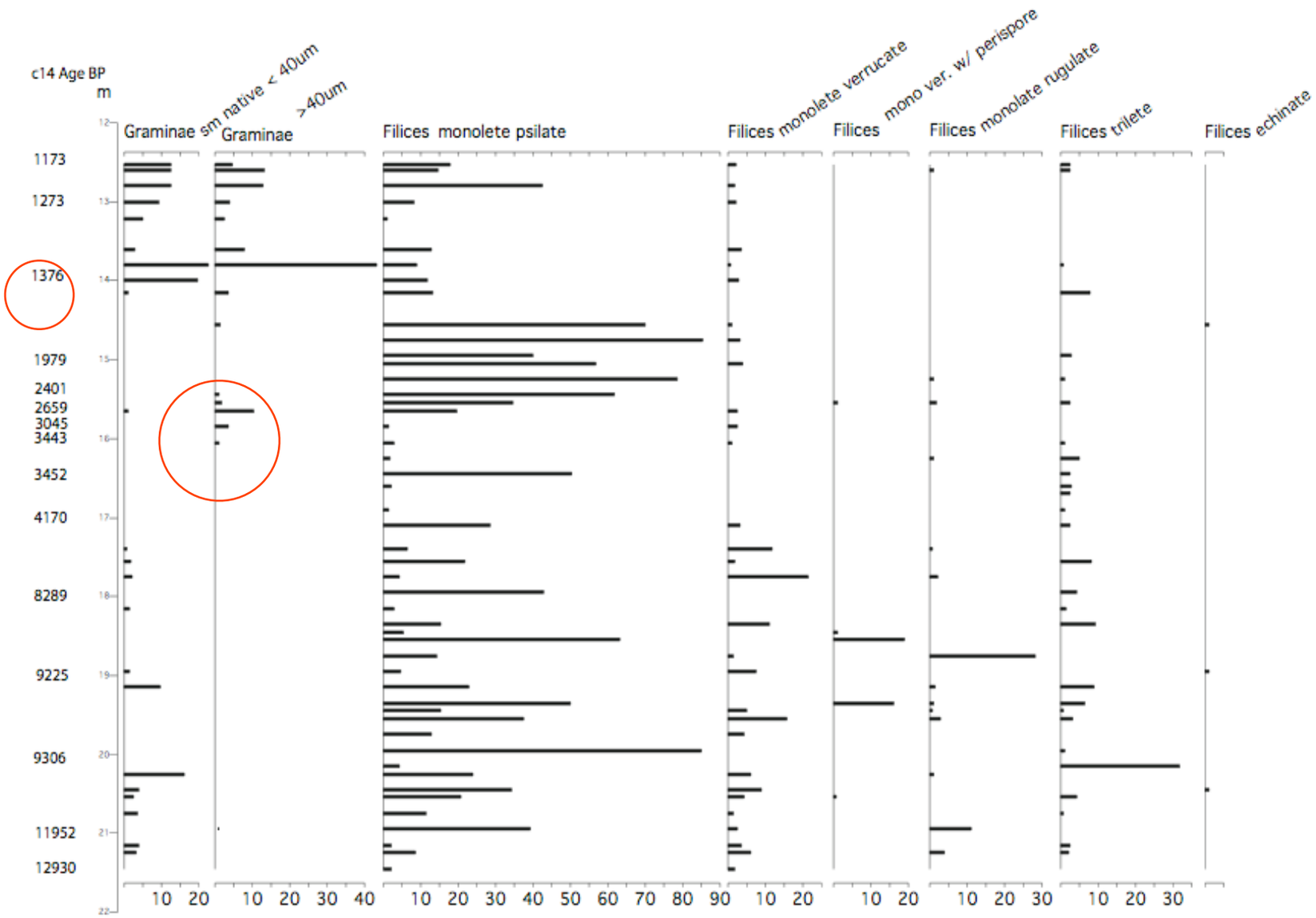
Curious events…

The 3500BP event..

Lake dessicated (soil balls 5L 50cm)
4L95cm only bug found in slide (mite)
Charcoal large more than 25 pieces >100um
Only obsidian flakes found in lake angular not rounded
Exotic pollen found (sapindus, myrsine, ….)
Polygonum introduced to island
High deposition for 100cm over 20 years
Trenching between kao3 and kao6
1877 starch count highest in core
2659BP first introduction of round grass pollen (sugarcane?)

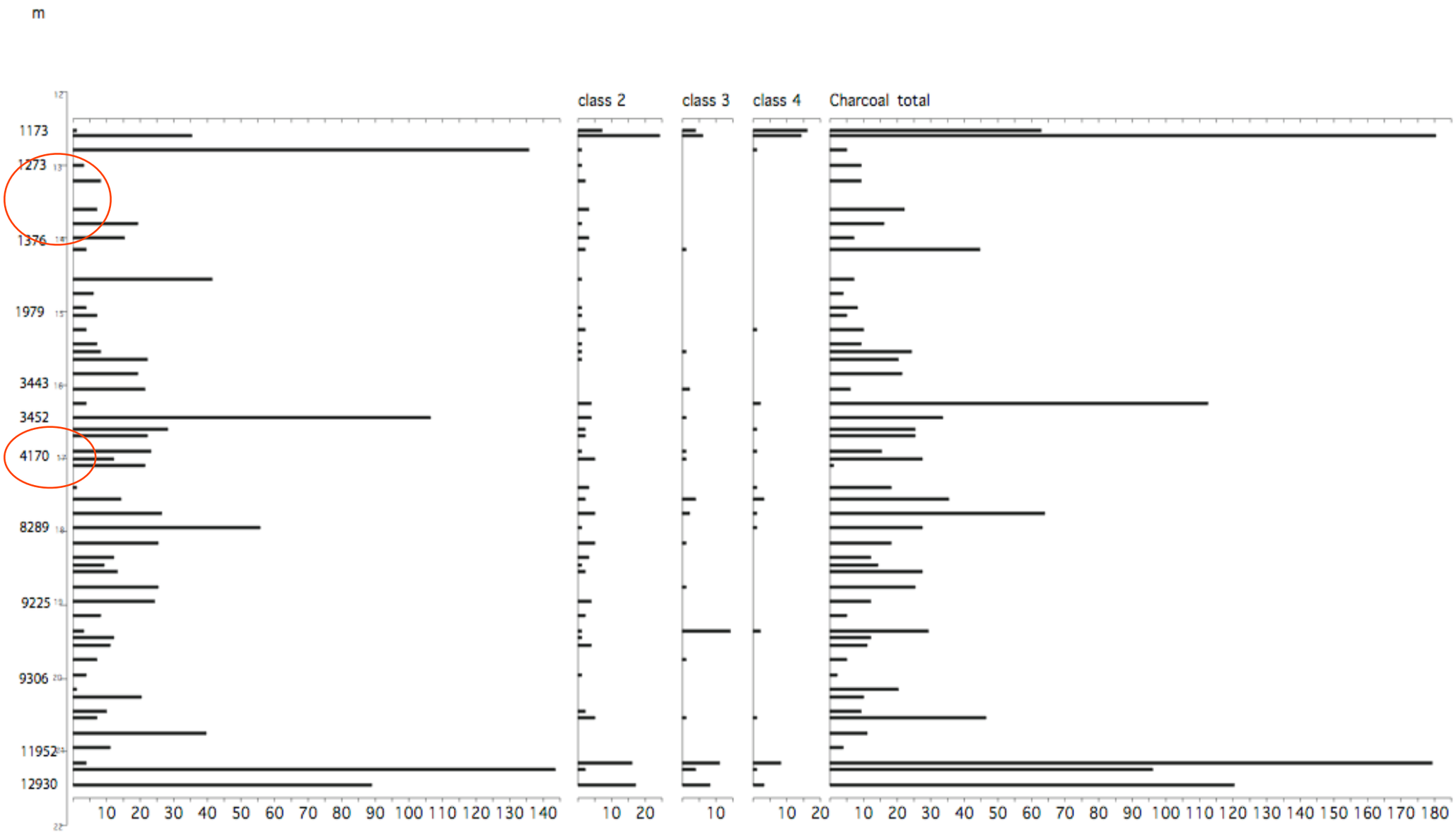
Kao6 has 4.5 meters less Sediment but dates at the Same level to KAO3 3500BP

RANO KAO KAO3 CORE EASTER ISLAND 2008



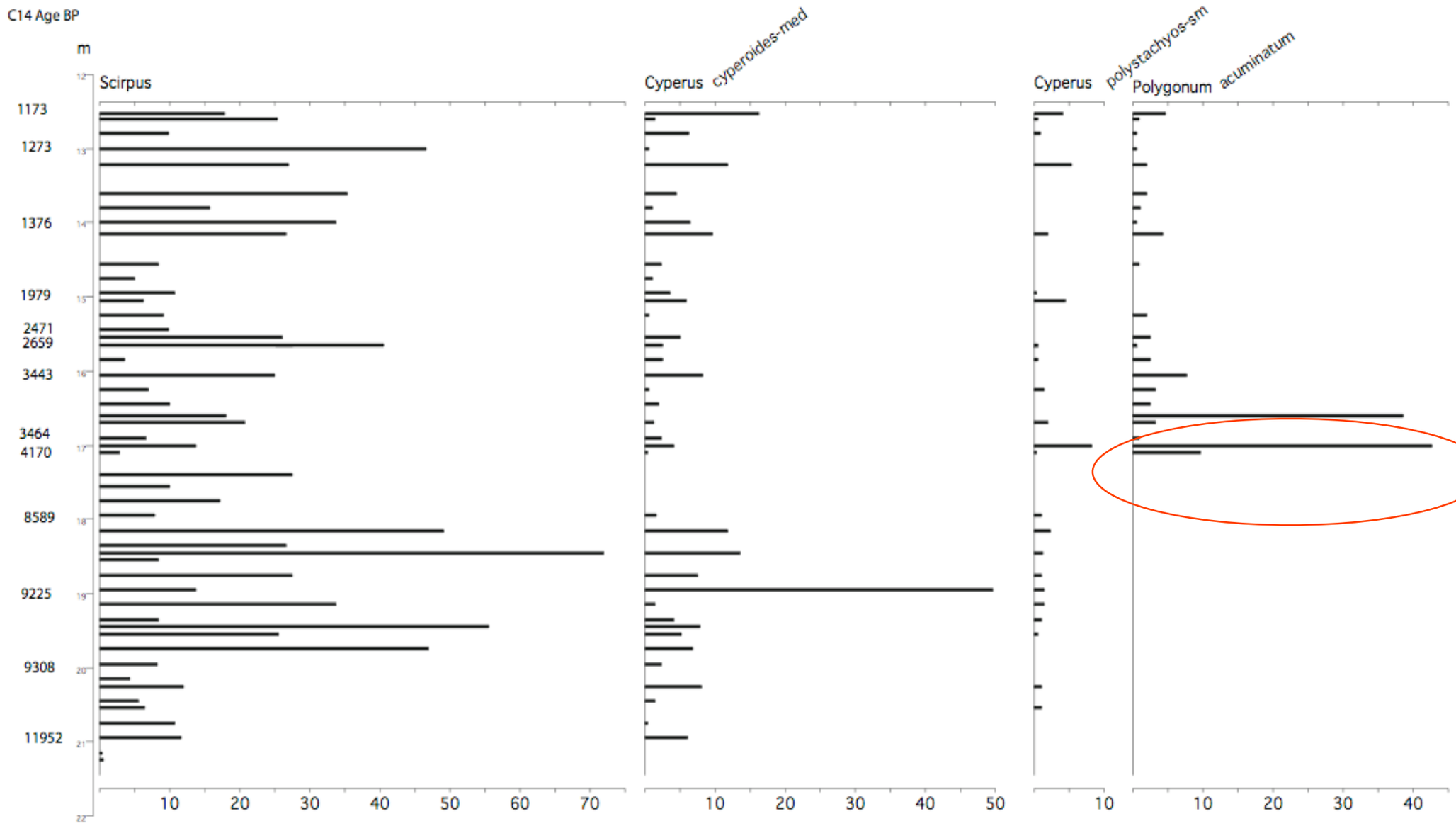
GRASS AND FERNS

RANO KAO KAO3 CORE EASTER ISLAND 2008



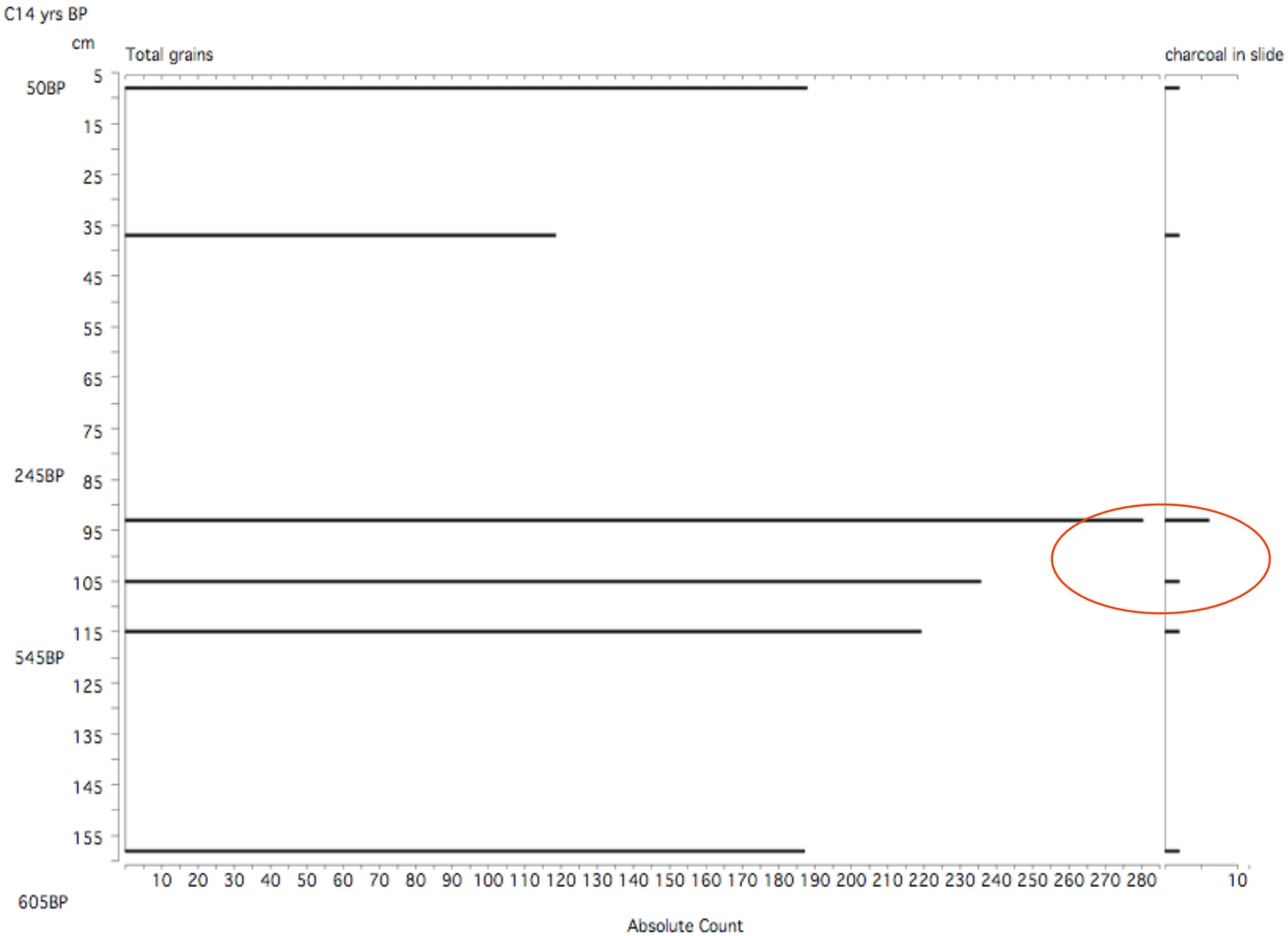
CHARCOAL ABSOLUTE COUNTS

RANO KAO KAO3 CORE EASTER ISLAND 2008



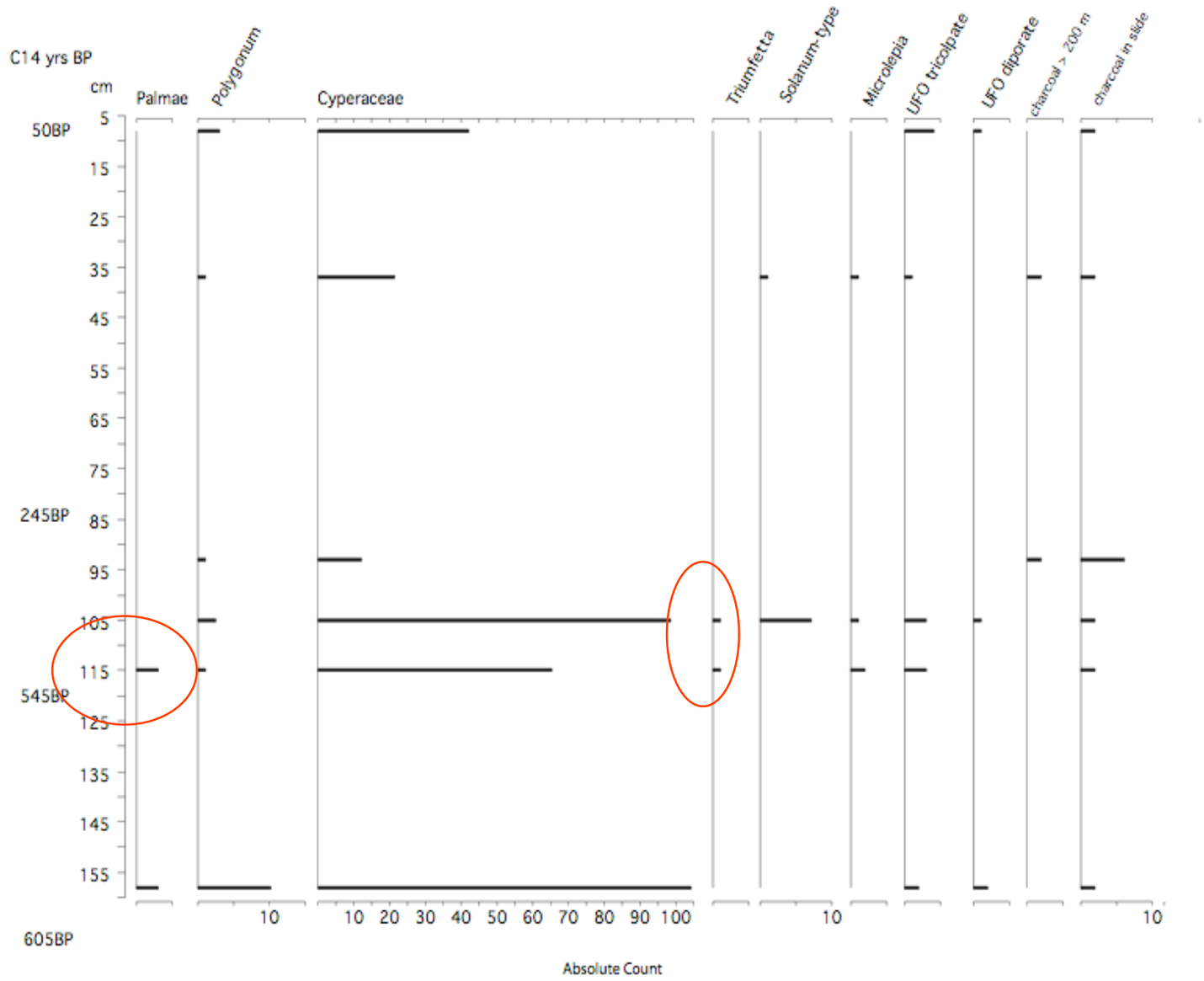
AQUATICS

RANO KAO KAO3 CORE EASTER ISLAND 2008



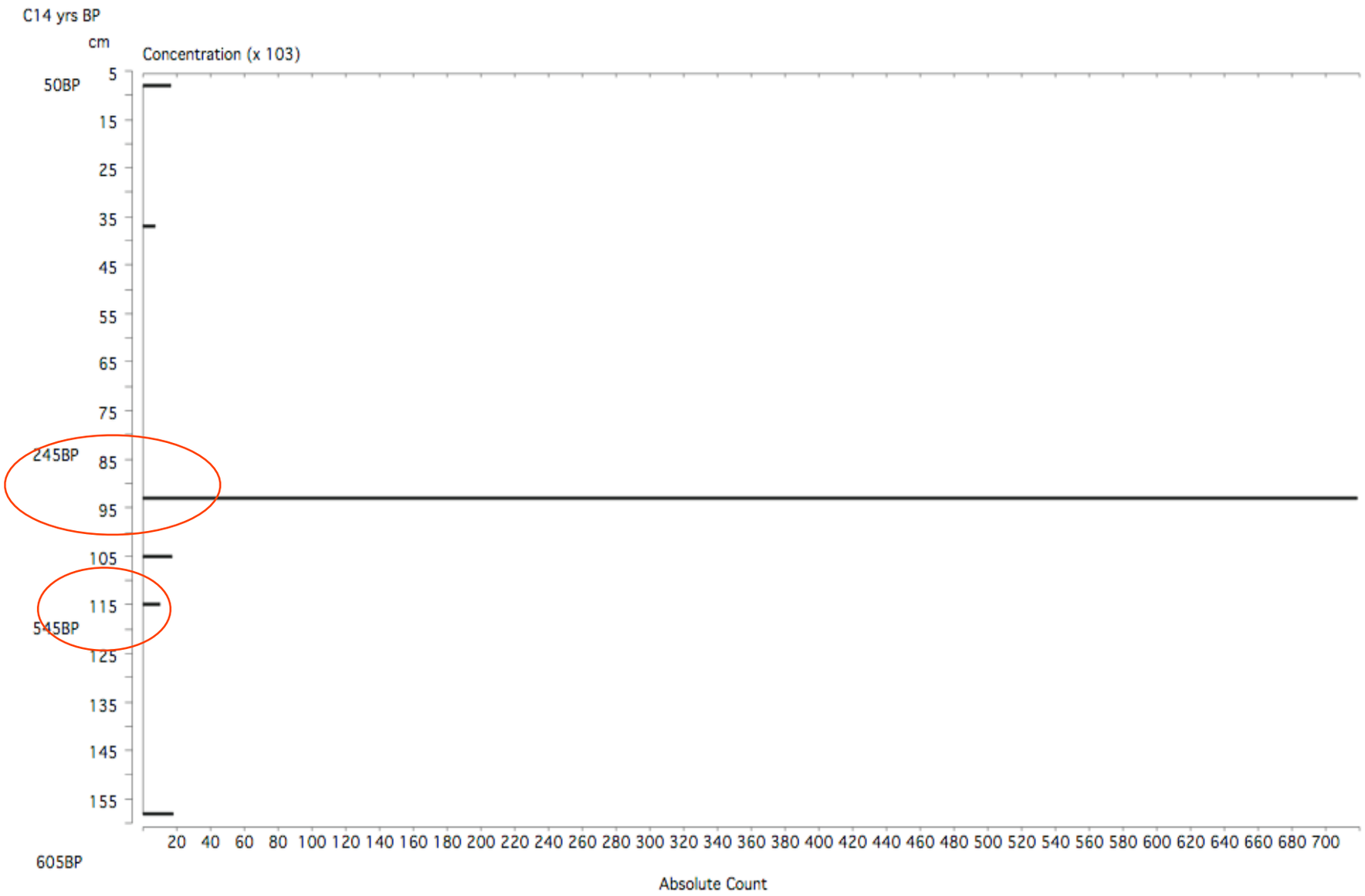
TOTAL POLLEN MAT

RANO KAO KAO3 CORE EASTER ISLAND 2008



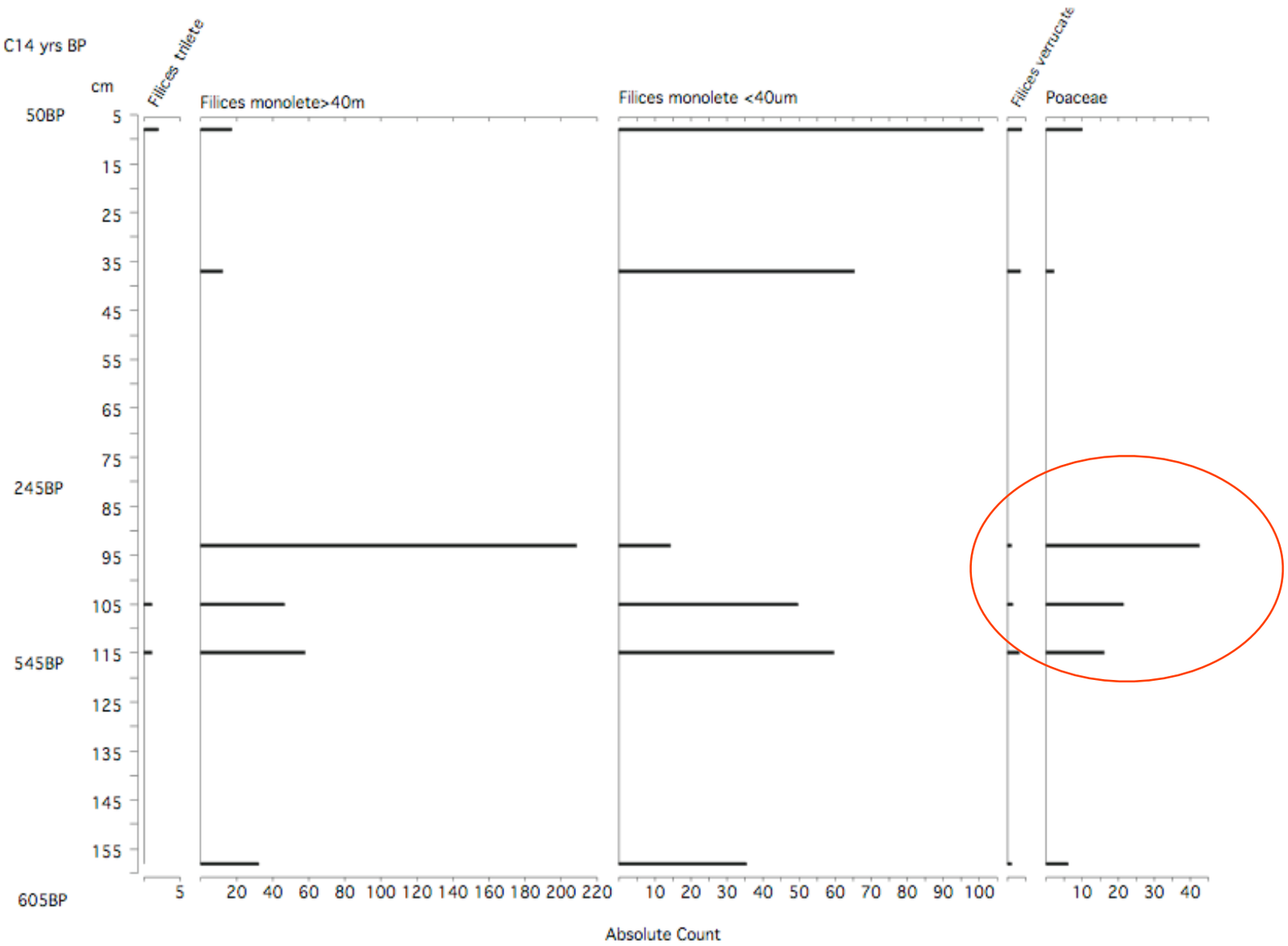
POLLEN MAT

RANO KAO KAO3 CORE EASTER ISLAND 2008



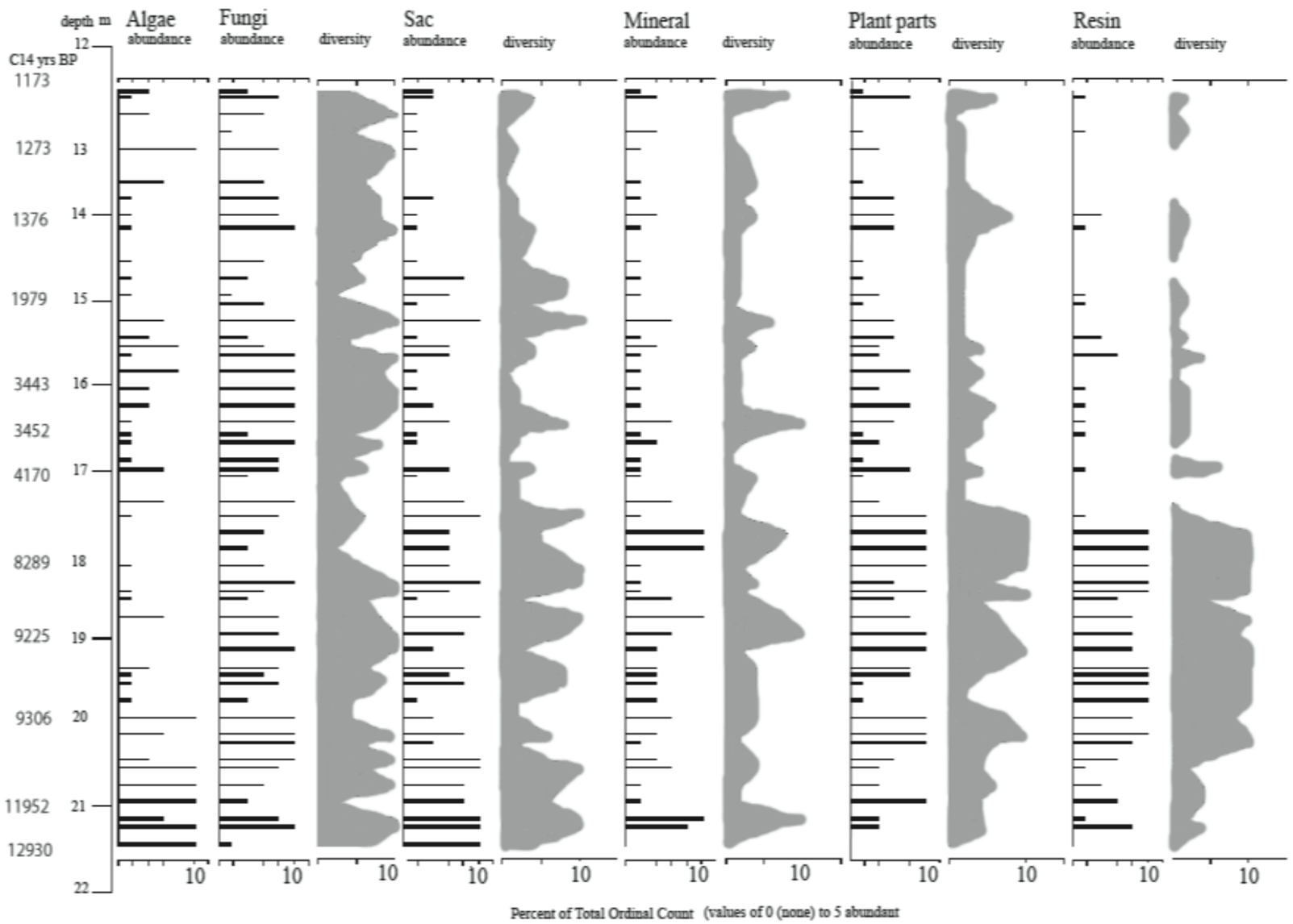
POLLEN CONCENTRATION MAT

RANO KAO KAO3 CORE EASTER ISLAND 2008



FERNS AND GRASS

Non-pollen Palynomorphs KAO3 Rano Kao



Percent of Total Ordinal Count (values of 0 (none) to 5 abundant

Iorana

hello and goodbye

Maururu

thank you