

TREES IN TOWN

Urban Forest as Holobiont

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Metrohort

18 April 2024

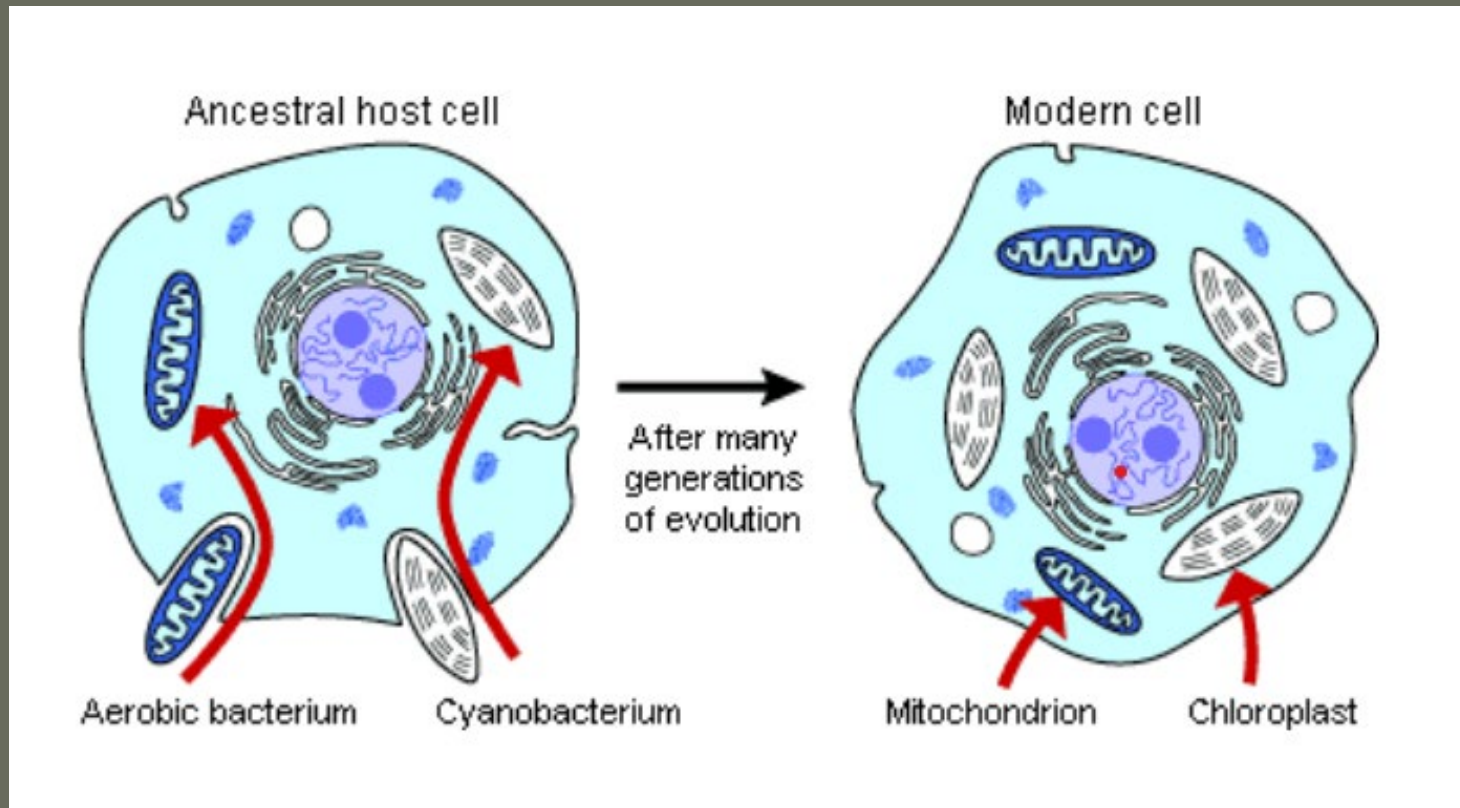
I WANT TO SUGGEST WE AIM FOR TWO THINGS

- 1. In our care and design, look at nature from the whole down, not from the individual up
- 2. Make higher-maintenance, not lower-maintenance landscapes. Increase human connection to the rest of the living world

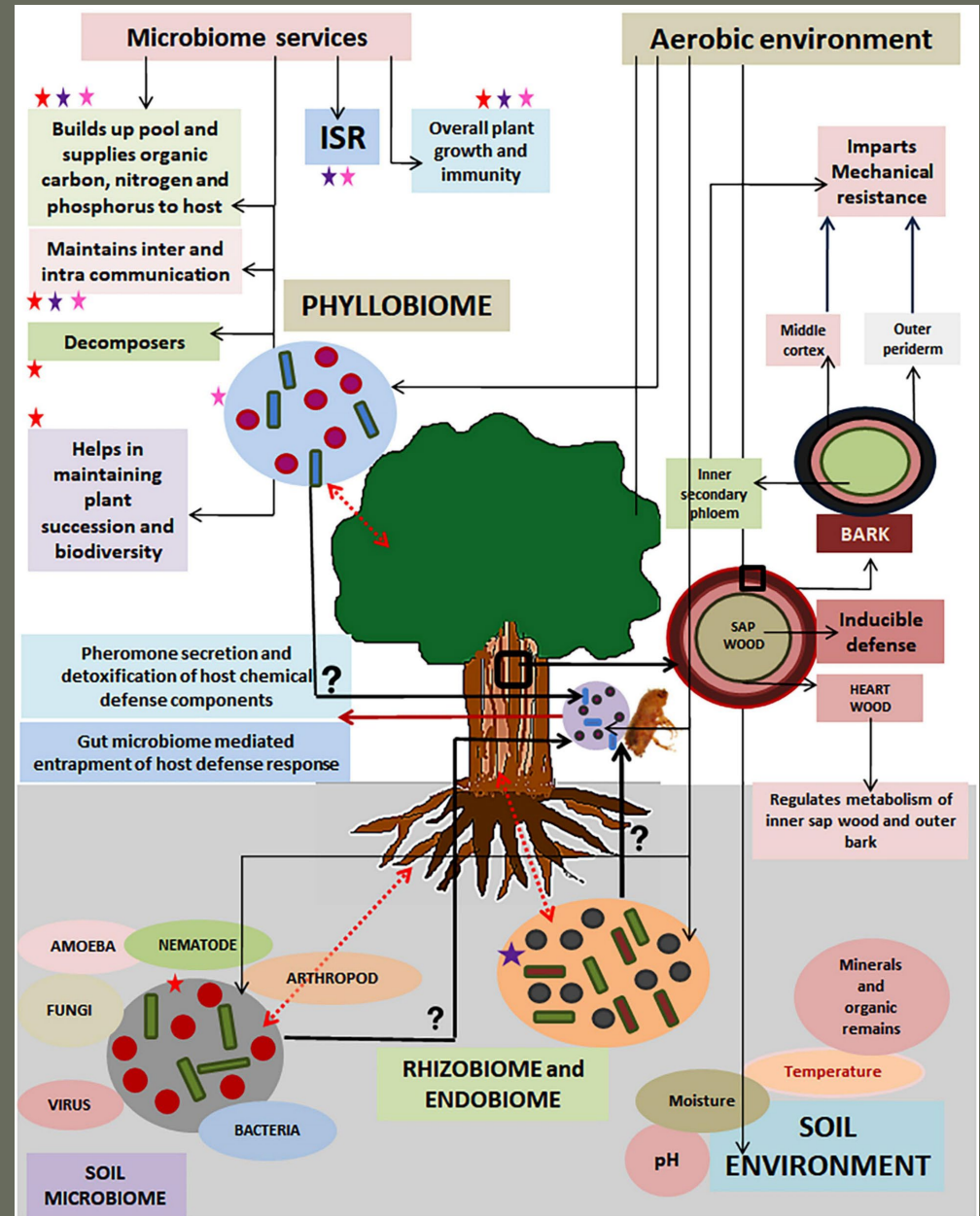
What if we start by thinking not of individuals, but of wholes?

- HOLOBIONT: from HOLO = WHOLE
BIONT = THE LIVING

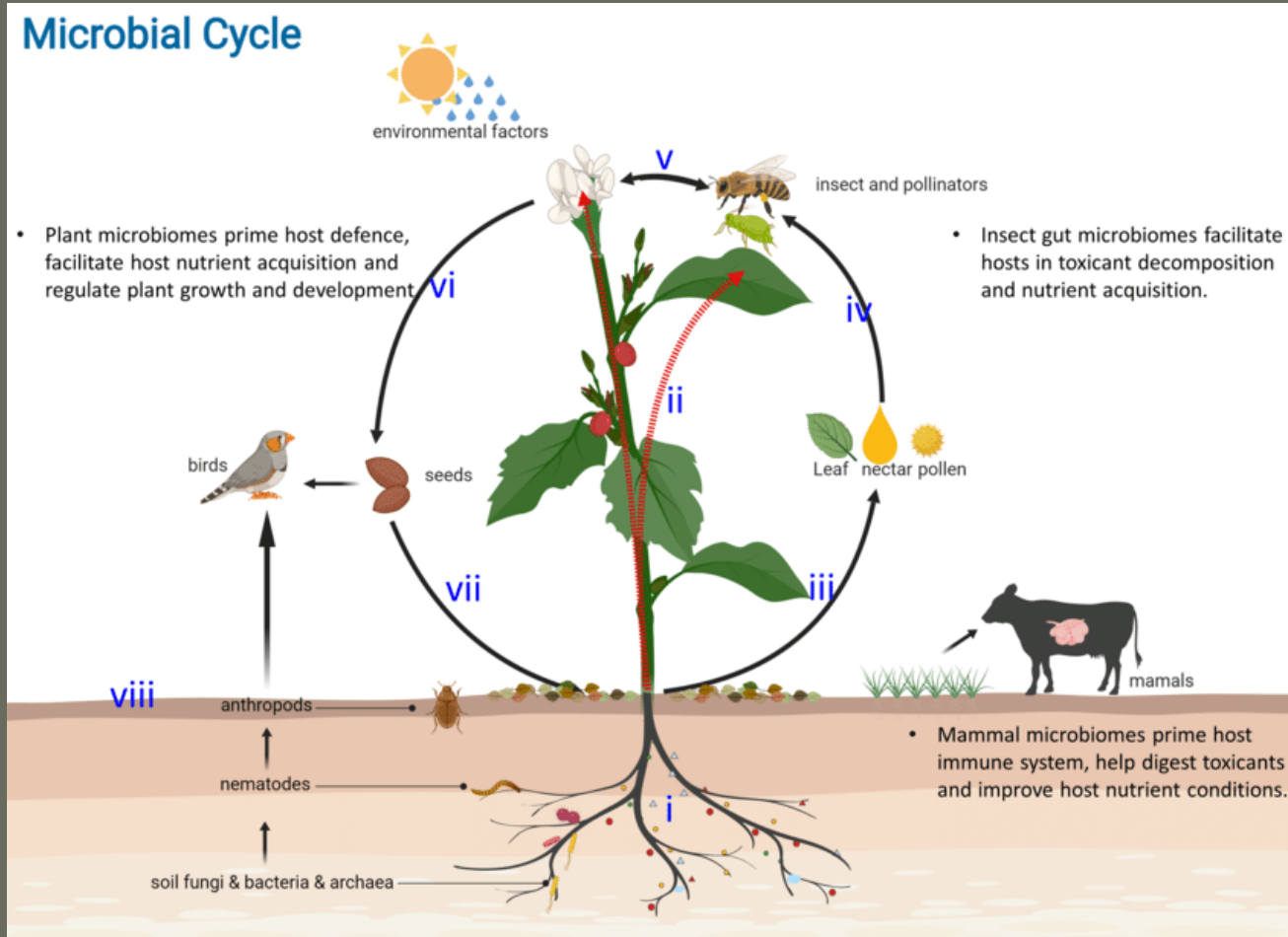
Even the Cell is Community, proved Lynn Margulis



tree as a
 community
 center:
 companions,
 commensals,
 antagonists

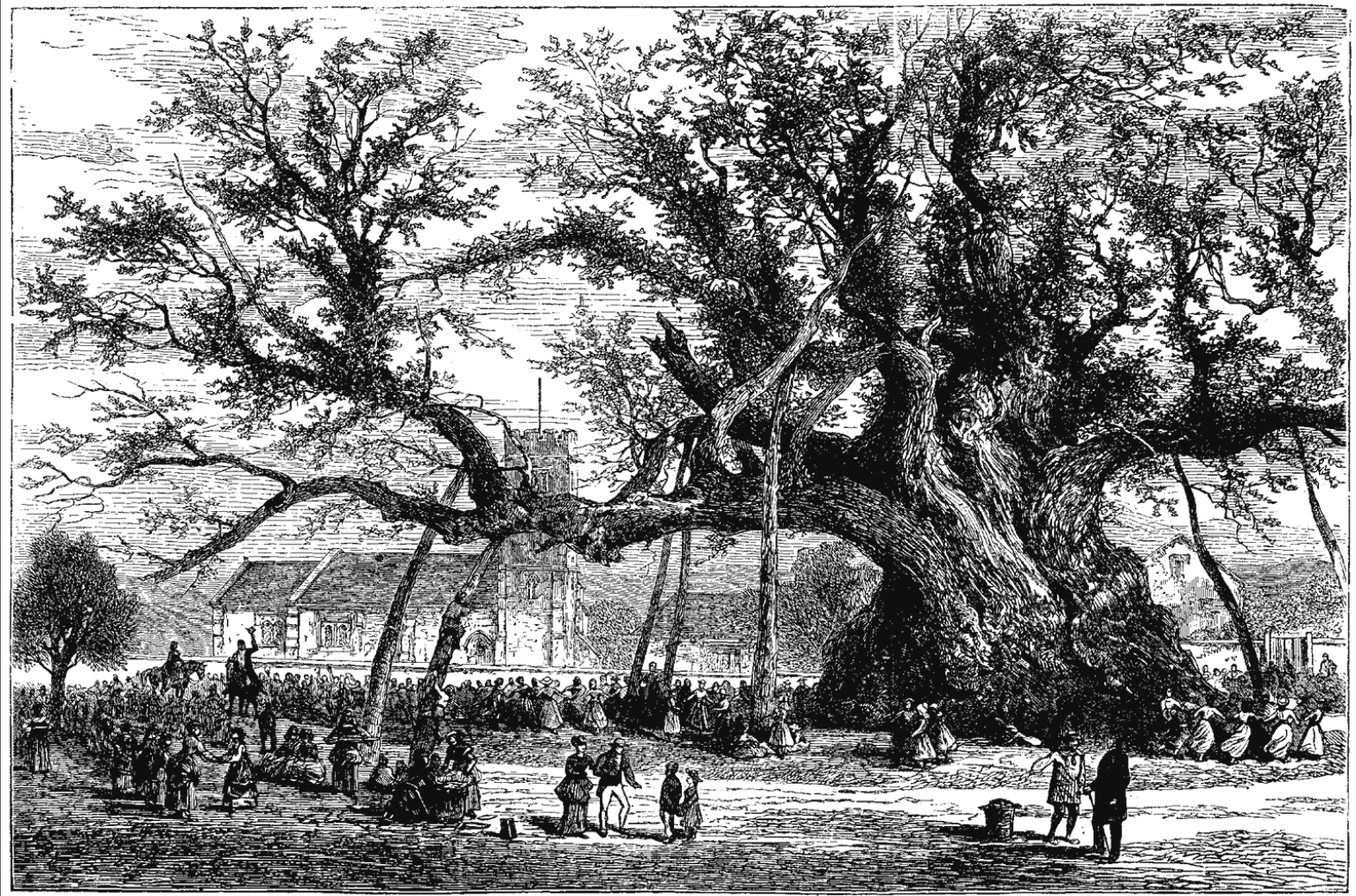


Soil as Holobiont



“Well may one be allowed to ask,
‘What is an individual?’”

People are a part of it,
not rulers, overseers or onlookers

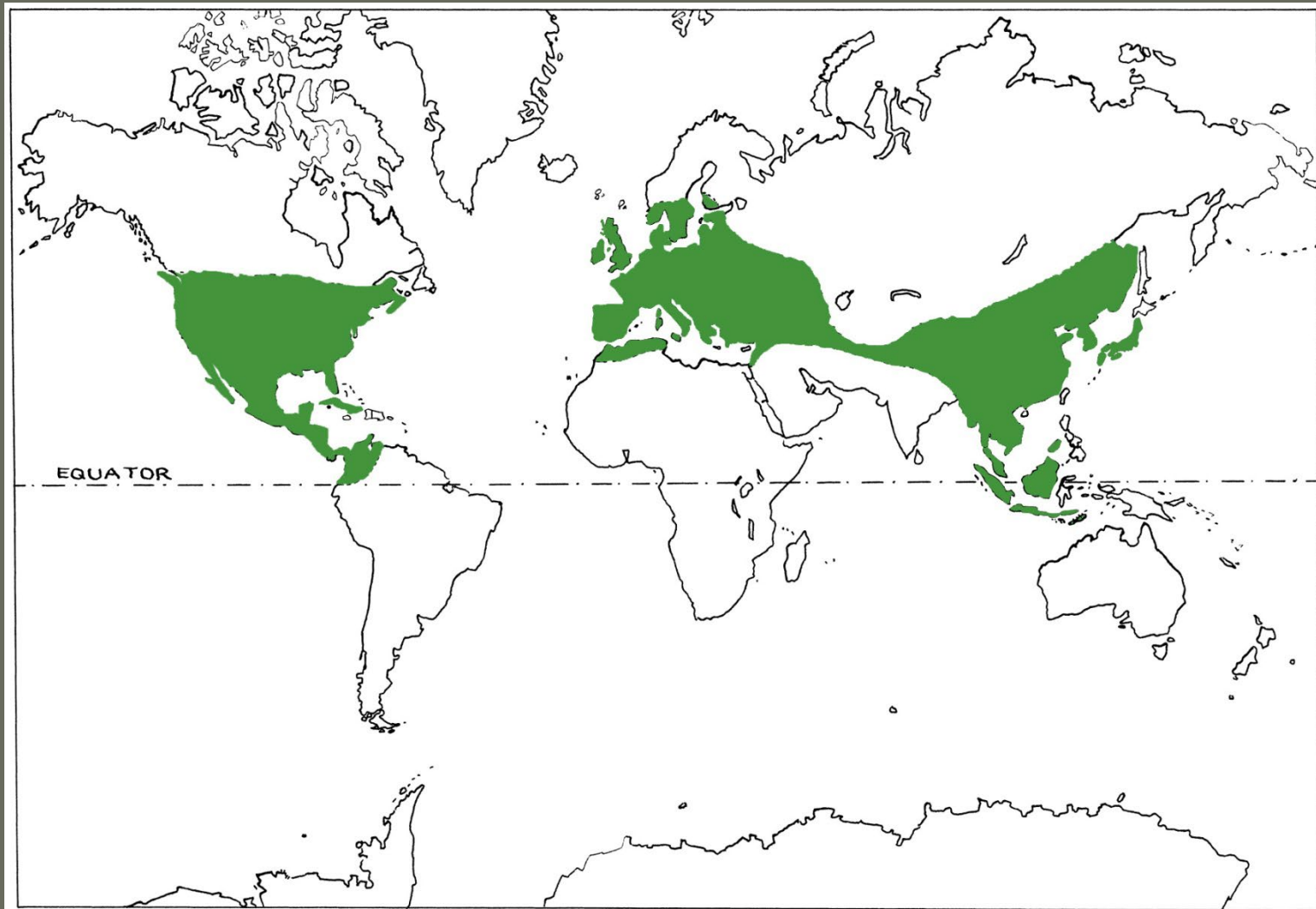


In a city, we can design for a richer, fuller holobiont

- At Brooklyn Bridge Park, by the addition of natives.
- At Madison Square Park, by cosmopolitan ecosystem and making arboretum collections
- At Green-Wood Cemetery, by the increase of diversity and the creation of understory
- At Metropolitan Museum, by creation of a human scale pollard and hedge woodland and a refuge and passageway for birds

STARTING WITH OAKS

World Oak Distribution



THE TRAVELS OF OAKS

- Over 500 species around the world.
- Mexico's Sierra Madre is greatest center of oak diversity (160-230 spp) in the world.
Another 100 species in China and Southeast Asia.
- Probable oak origin in Santonian, 80 million years ago, when the lands containing present China and Mexico were part of one continent
- Later exchange over Bering Land Bridge and North Atlantic Land Bridge.

In American eastern forest alone :

- 50 spp east of the 100th Meridian.
- Best at carbon capture of all eastern trees.
- Most economical with nitrogen.
- 1000 arthropods on red oak alone. Rough bark of oaks provides hiding and living places.
- 534 butterflies and moths feed on leaves.
- 96 spp of birds and animals depend on oak. Long lived, broad spreading, cavity making.
- 90,000 acorns on a red oak in a mast year.
- 5 billion xylem vessels in a mature red oak

Why so widespread and so prolific?

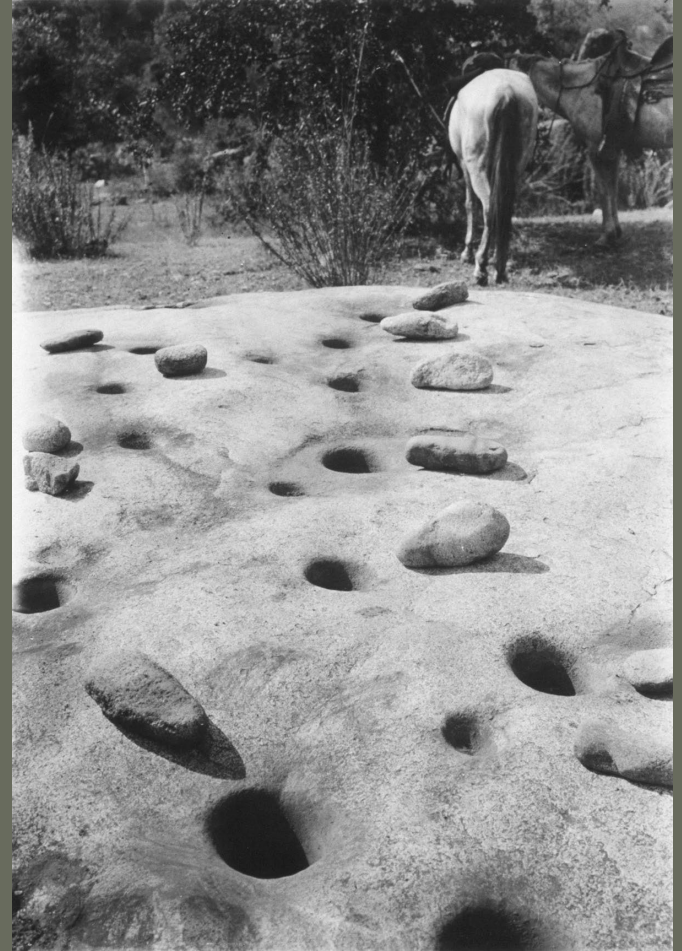
- Not biggest, nor fastest, nor oldest.
- Oaks are promiscuous
- Oaks are adaptable
- We prospered them and they prospered us.
- We lost that role in the industrial age.
- In restoring that relationship, we restore the living world around us.
- Integral ecology: not us apart

**THE OLD WAYS:
ANCIENT URBAN FORESTS**

Balanoculture



Grateful Exchange



C.H. Merriam, courtesy of the Bancroft Library,
University of California, Berkeley



Knocking wakes the oak



MINDING THE OAKS

- *Botanist*: How can you call these oaks your orchard? You didn't plant them.
- *Lois's grandmother*: Of course I didn't plant them! I'd be dead before they'd bear. Planting? That's the blue jays' job

Oaks...and jays... and Us

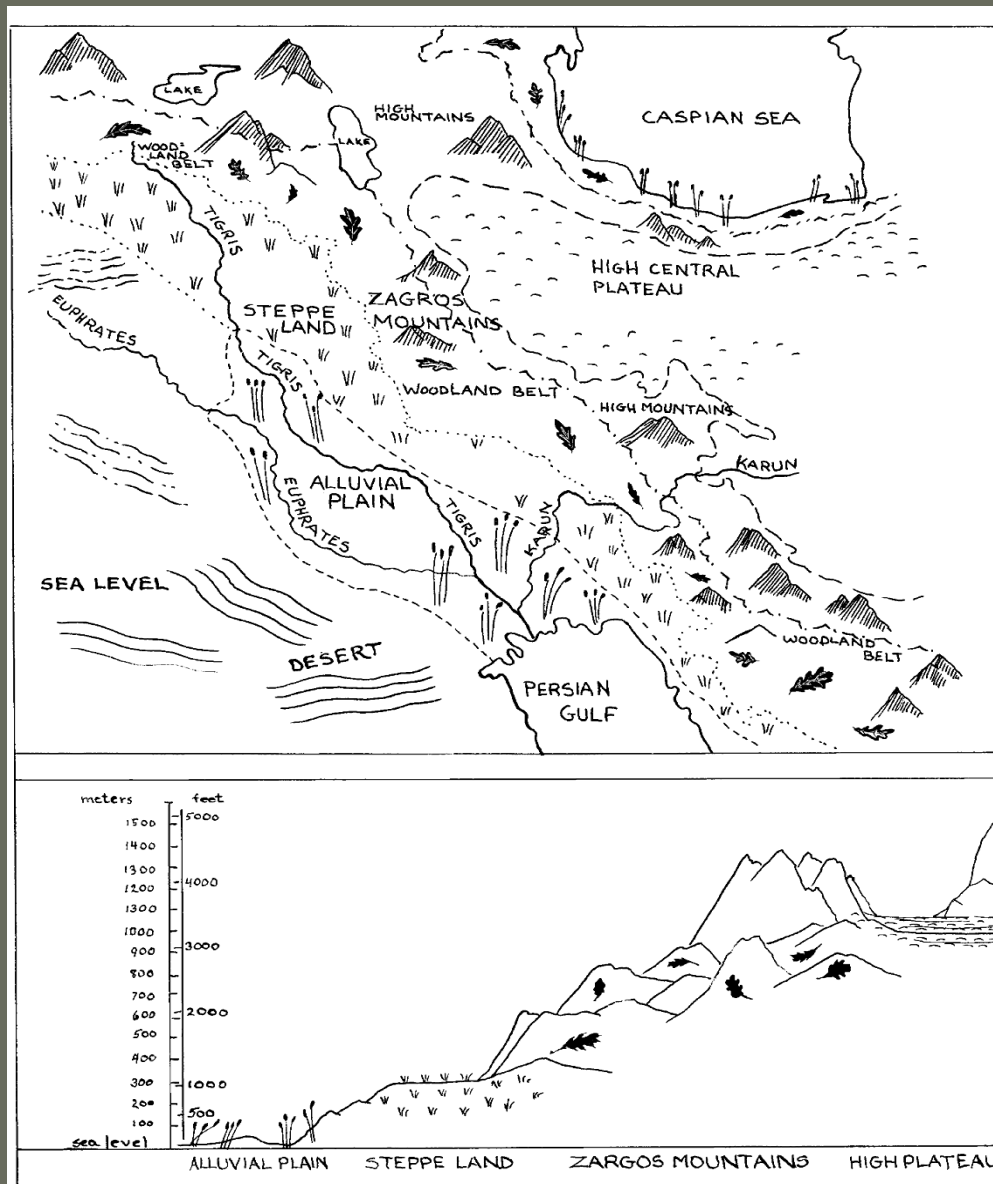


Unburned land





Vertical Economies



Nora H. Logan, after Kent V. Flannery, in "The Ecology of Early Food Production in Mesopotamia," *Science* 147:3663 {1965}: 1249

ON THE COMMONS



Evergreen Oak Pollard (ancient)



Q. Infectoria gall







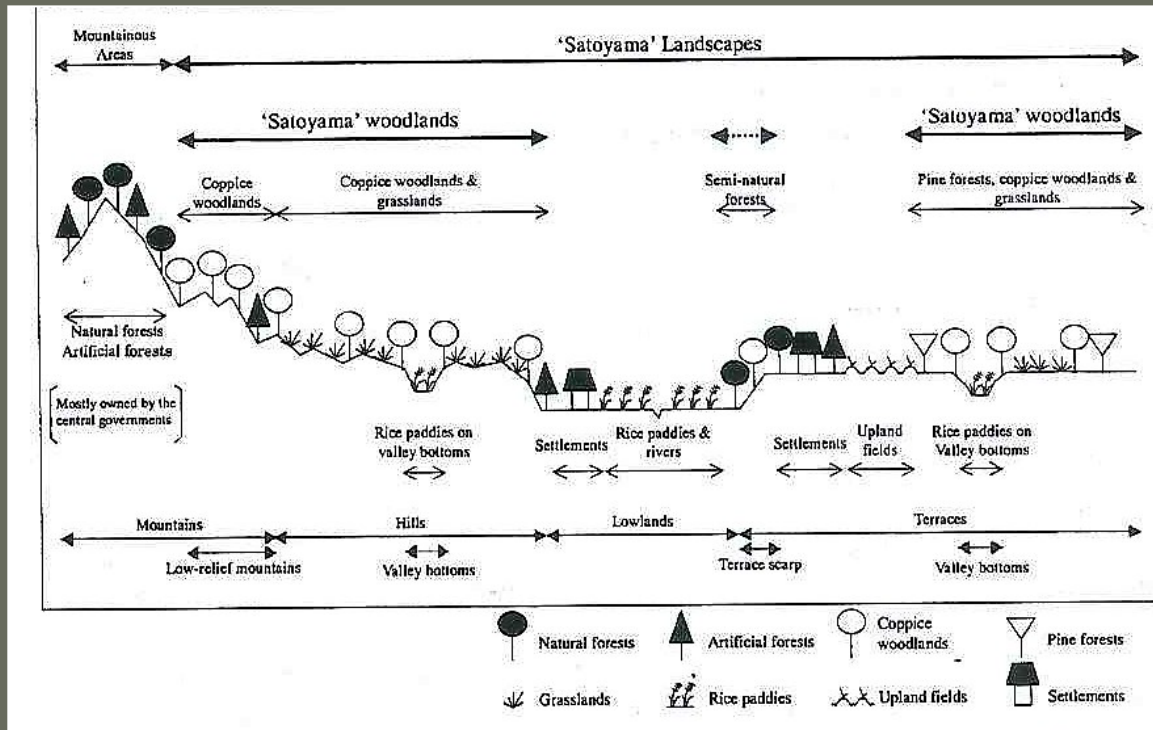
THE BOOGA MORI



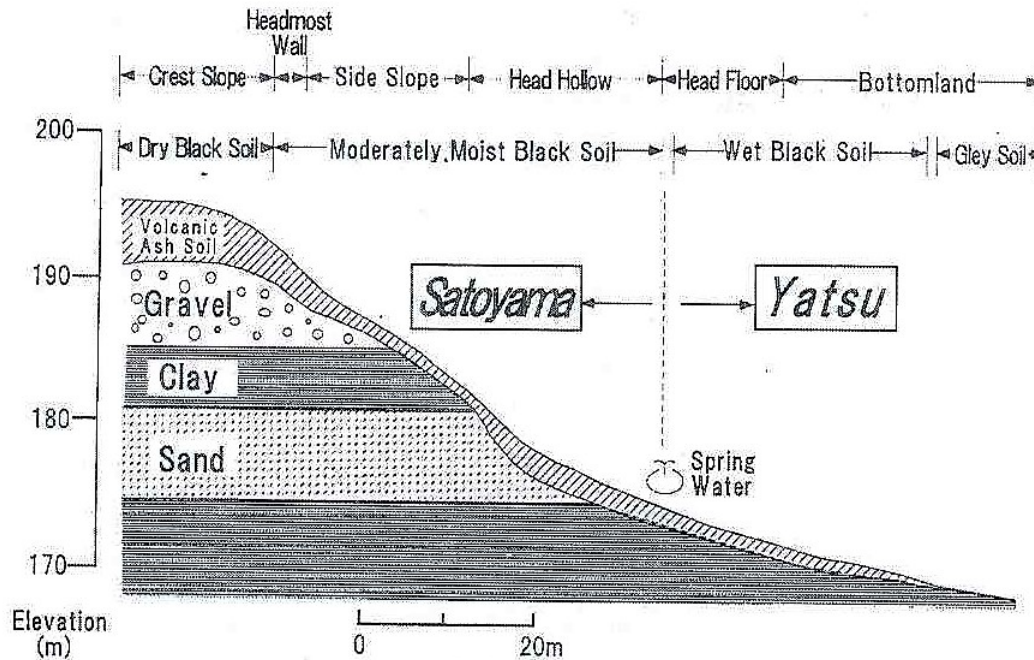
Coppice Woodland and Rice Paddies: The Common Village Landscape of Japan



Satoyama Structure



Satoyama Slope



Satoyama Mosaic



Hahaso: Coppice Woods



A coppice woodland in England continuously used for 1000 years.

BRADFIELD WOOD

Coppice and Sprout



New Cut Ash and Hazel



1 Year Ash and Hazel



Fencing out large herbivores



A Coppice wood as a 15-year performance

- Cut in Cycle, Panel by Panel, so some are in each stage each year.
- Years 1-3: from 39 plant spp. to 195
- Years 4-6: Raspberry and bramble
- Years 7-15: Closed canopy shade spp. 70 spp.
- Some butterflies have evolved to live on several different coppice wood stages.

Open understory natives: From 39 to 195 species in a year



Ingrowth and changes in understory



Growing up



Bluebells under oak

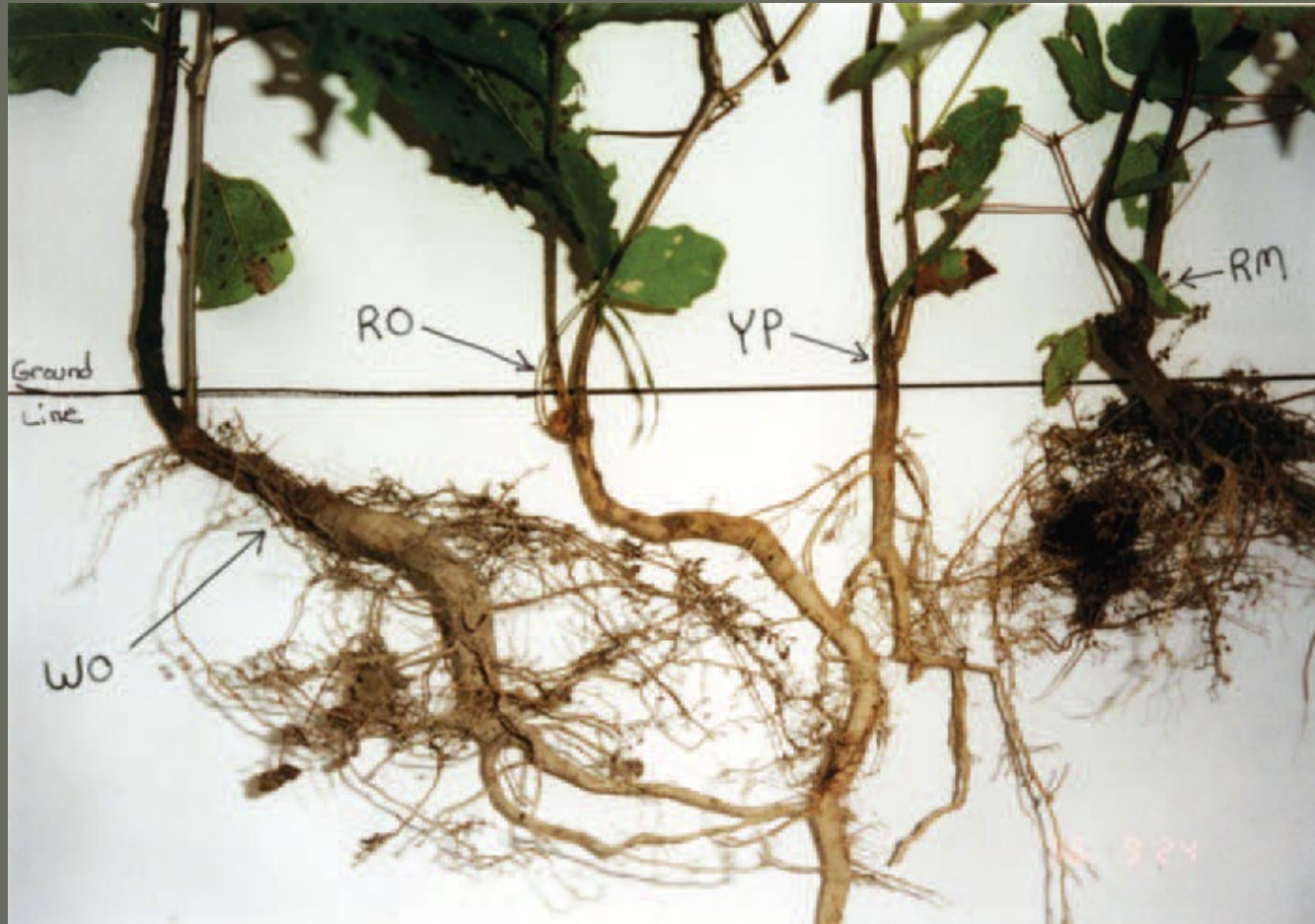


**NEW FOUNDATIONS:
THE NEW URBAN FOREST**

OAK AND FIRE

- 1. Fire has been an integral part of upland oak ecosystems in eastern North America for millennia.
- 2. Oaks are superiorly adapted relative to other hardwoods to survive a periodic fire regime and exploit the postfire environment.
- 3. The cessation of a periodic fire regime in the early 1900s is a major cause for the current oak regeneration problem.
- 4. Prescribed fire can be used in some situations to help regenerate and restore upland oak ecosystems.

Oak sprouts underground making even seedlings hardier in fire.



Capable Seedlings



Opening the Canopy releases seedlings to sprout



OAKS ONE
FOUNDATION
OF URBAN
FOREST
HOLOBIONT

Chinkapin Oak



Red List Recommends: Ex situ conservation

- At Bayard Cutting Arboretum: 39 species/hybrids
- New oak collection at New York Botanical Garden.
- Increasing variety of oaks at cemeteries like Green-Wood, Woodlawn, Evergreens.
- Bring them together and let them work.
- On the streets:

Street into
Woodland.



OAKS ON THE STREETS OF NYC

Species	Comments
<i>Quercus acutissima</i>	Excellent transplant, vigorous and fast-growing.
<i>Quercus alba</i>	Largely positive- takes the full 2 years to establish
<i>Quercus bicolor</i>	Great transplant, dug comfortably in late fall. Establishes within 1 season.
<i>Quercus coccinea</i>	Beautiful tree, but needs TLC. We have had mixed results with this one, seems to depend on the year.
<i>Quercus imbricaria</i>	Great transplant, dug comfortably in late fall. Establishes within 1 season.
<i>Quercus lyrata</i>	We've planted a few of these throughout the year and want to see it planted more. Excellent for compacted or wet sites.
<i>Quercus macrocarpa</i>	Better than believed for transplanting. As with Q alba, takes the full 2 years for establishment, then seems to take off!
<i>Quercus muehlenbergii</i>	Beautiful tree and is a good transplant. Can be dug late fall and seems to take within second watering season
<i>Quercus nuttali</i>	Limited experience, but similar to Q coccinea
<i>Quercus palustris</i>	A classic street tree - has issues with chlorosis but is a reliable in its transplantability
<i>Quercus palustris</i> 'Green Pillar'	Fastigate form of the above. Very tight.
<i>Quercus phellos</i>	Excellent large tree; needs some TLC, but can live in extremely challenging conditions.
<i>Quercus phellos</i> 'Hightower'	The tighter form of the above. Also great.
<i>Quercus</i> 'Regal Prince'	Fastigate hybrid of Q bicolor and Q robur. Transplants well, and establishes quickly. Prune well for good form.
<i>Quercus robur</i>	Not a personal favorite, but does decently well on our streets. Seems to establish during season 2.
<i>Quercus rubra</i>	A native beauty. More readily transplanted than normally thought. Can be dug in late fall, and takes after 2 seasons
<i>Quercus x comptoniae</i>	A hybrid of lyrata and Q virginiana. Planted in limited quantities - need to look into it more.
<i>Quercus shumardii</i>	Similar to red oak, but seems to establish in season 2, rather than after.
<i>Quercus velutina</i>	Similar to red oak, but with some insect issues. A good tree for a wide site without too much foot traffic.

Thanks to Nave Straus, NYCDPR

Easy Transplant Oaks from Bottomlands and Floodplains



Clockwise from upper
left:
pin oak, swamp white
oak, overcup oak,
shingle oak, willow oak

Harder Transplant Oaks from Uplands, gravel and sand

Clockwise
from
upper left:
red oak,
scarlet
oak, white
oak, bur
oak,
Chinkapin
oak,
Shumard
oak



For Planting success

1. Start small
2. Use a full root ball, maybe even larger than standard.
3. Do not let even a small plant dry out. Keep ball moist. If it is held out of ground, must be heeled in or use air pots.
4. After planting, water regularly – weekly at least – for first 2 years The more water the better the chance of getting through spring and having lammas shoots to speed growth. Especially for white oak.
5. Pay attention to pH. Shumard and Chinkapin like alkaline soils. Most of the rest do not.
6. Begin a program of care that treats at least 3x/year for first 2-4 years, or until plant has returned to its pre-dig twig extension.
7. No pruning first year.
8. Root stimulants
9. Induced Systemic Resistance: Salicylic acid. Chitin based.
10. If white oak group, beginning to be propagated on swamp white oak root stocks, which may well improve survival. This is good since white oak group less susceptible to oak wilt.

New Experiments

- Hardiness of Southern live oak?
- Tough Chestnut oak (*Q. prinus* or *montana*)
Can grow right out of a rock! But a traprooter.
- Hybrids based on swamp white oak: Regal
Prince et al.

Going High



Rooftop Chestnut Oak





Southern Live Oak at Green-Wood



New hybrids

**Regal
Prince**



**Kindred
Spirit**



Oak Wilt and Bacterial Leaf Scorch (BLS)

Oak Wilt



BLS



How a Whole Tree Looks

Oak Wilt



BLS



Susceptible and Symptoms

Oak Wilt

- Red oak group is more susceptible. No tyloses.
- Sudden wilting of leaves in spring and summer
- Sapwood streaking
- From tips and edges back to center.
- May defoliate all or part of trees within a few months.
- Death within one season.

BLS

- Pin and red oak most susceptible, but also swamp white oak and shingle oak.
- Seen midsummer to fall.
- Different branches affected, often a few at a time. May cause decline over several years.
- No sapwood streaking
- Begins on old leaves and works towards new leaves.

PEOPLE AS ACTORS
AMONG THE TREES

OLD WAYS IN NEW FOUNDATION



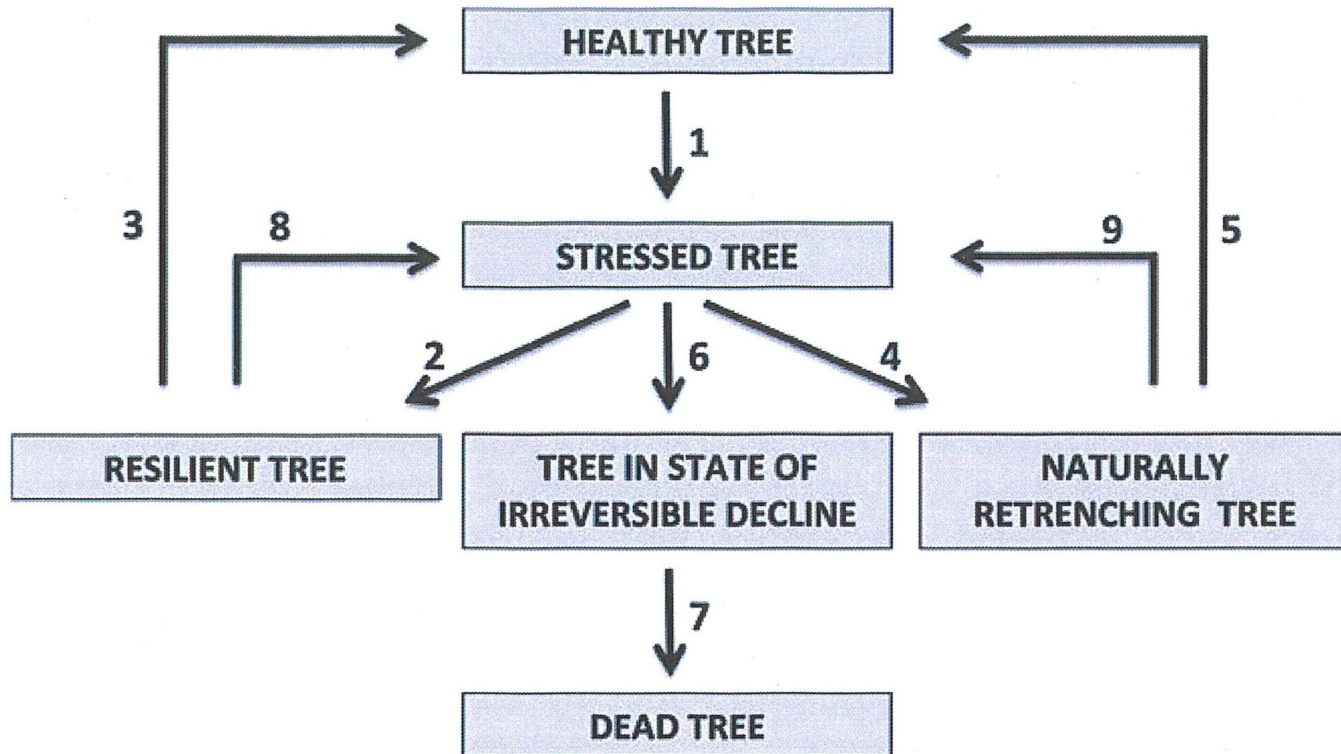
Cedar Creek Ecosystem Reserve

Minnesota

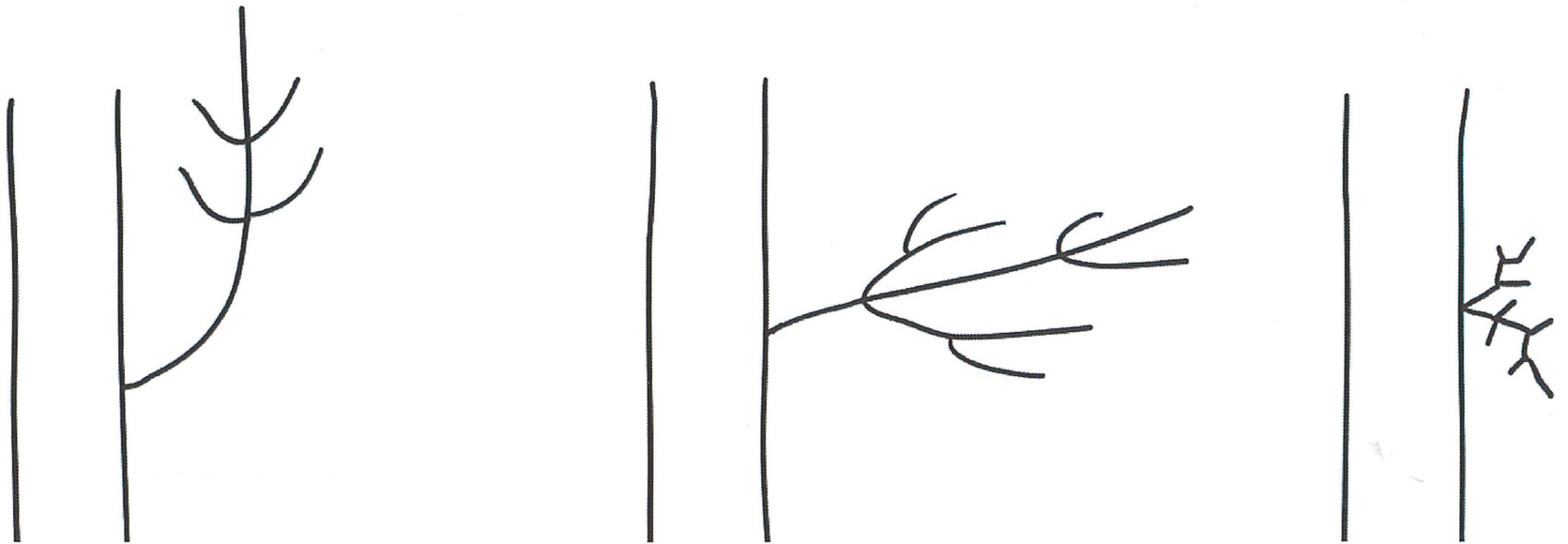
- Question: Does prescribed burning reduce the presence of oak wilt?
- Answer: Yes, it does.

LOOK LISTEN AND RESPOND

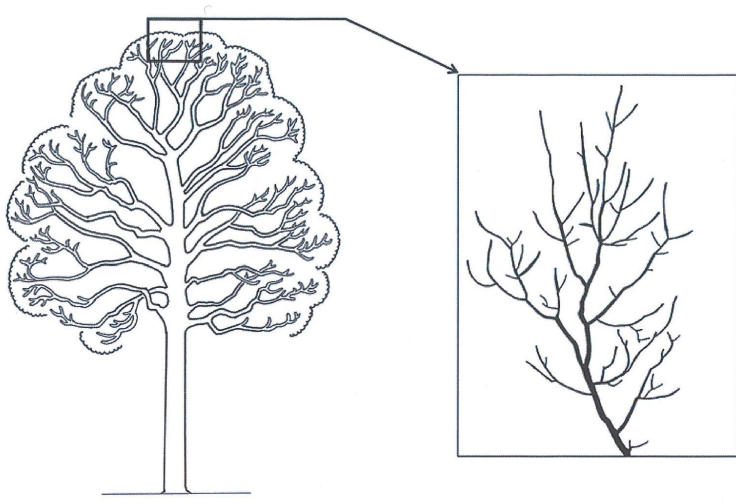
The States



The kind of watersprouts show tree state:

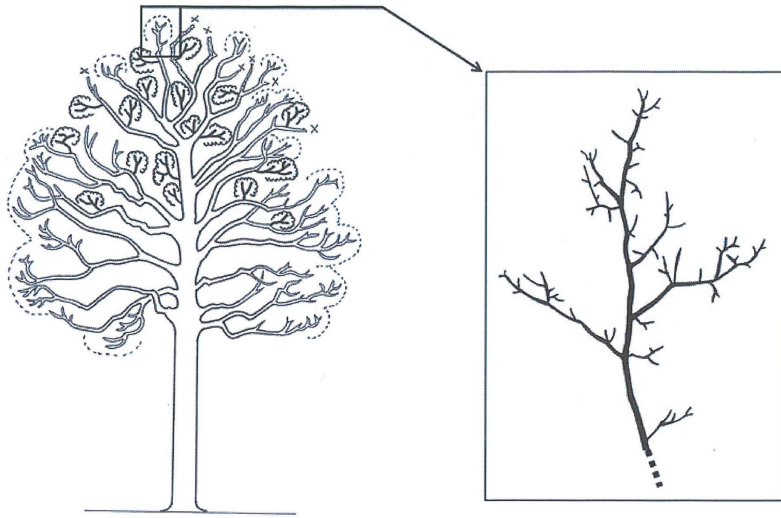


Healthy Tree



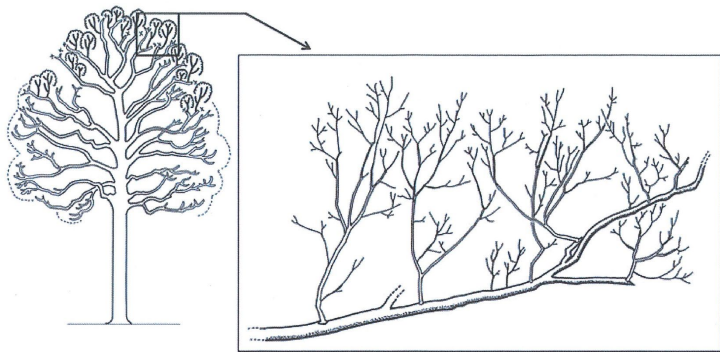
Courtesy Christophe Drenou

Stressed Tree



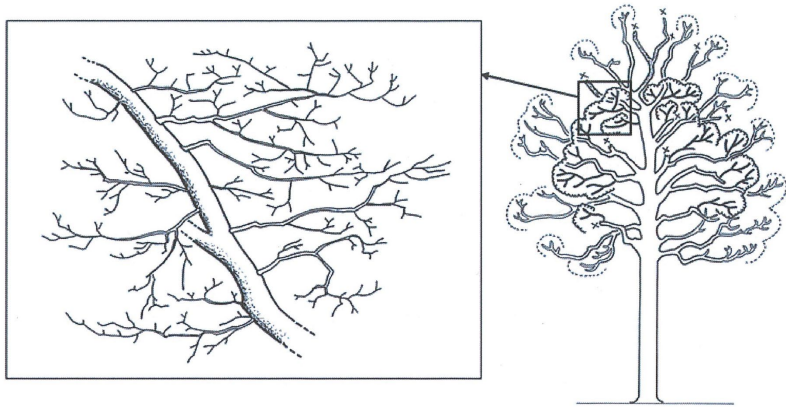
Courtesy Christophe Drenou

Resilient Tree

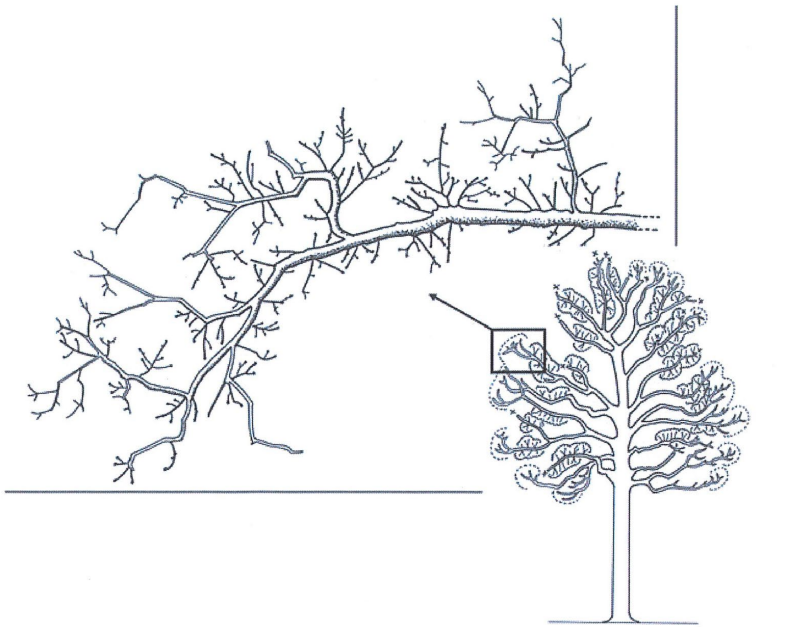


Courtesy Christophe Drenou

Retrenching Tree



Tree in Irreversible Decline



Courtesy Christophe Drenou



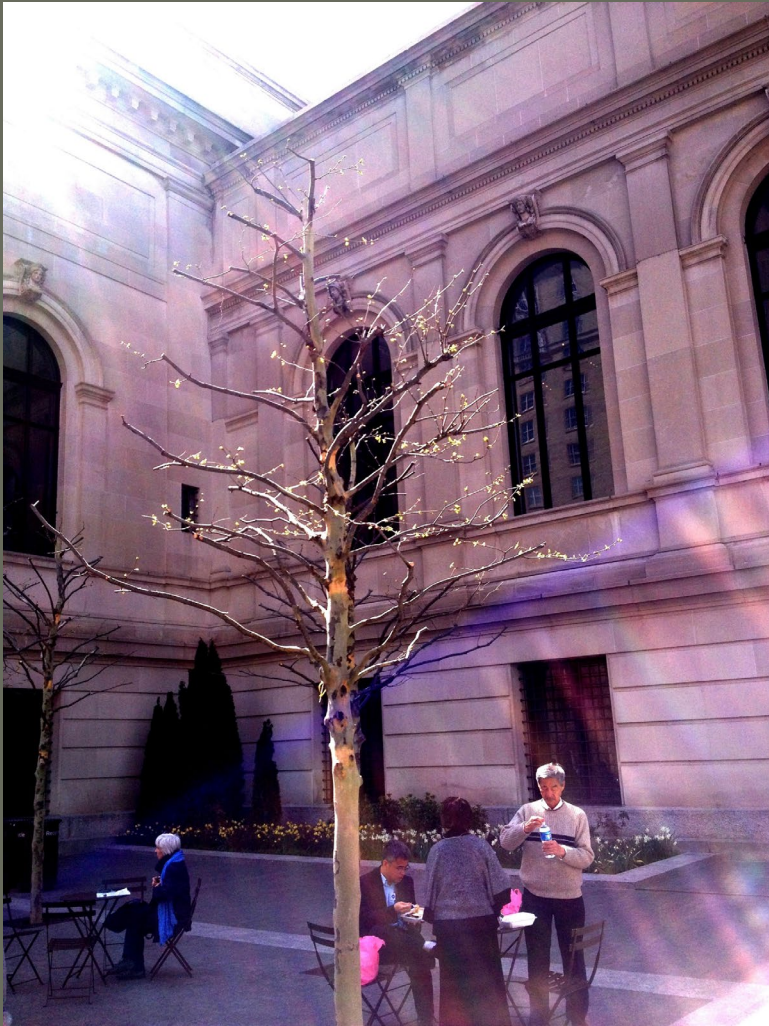
Old Pruning in New Forests









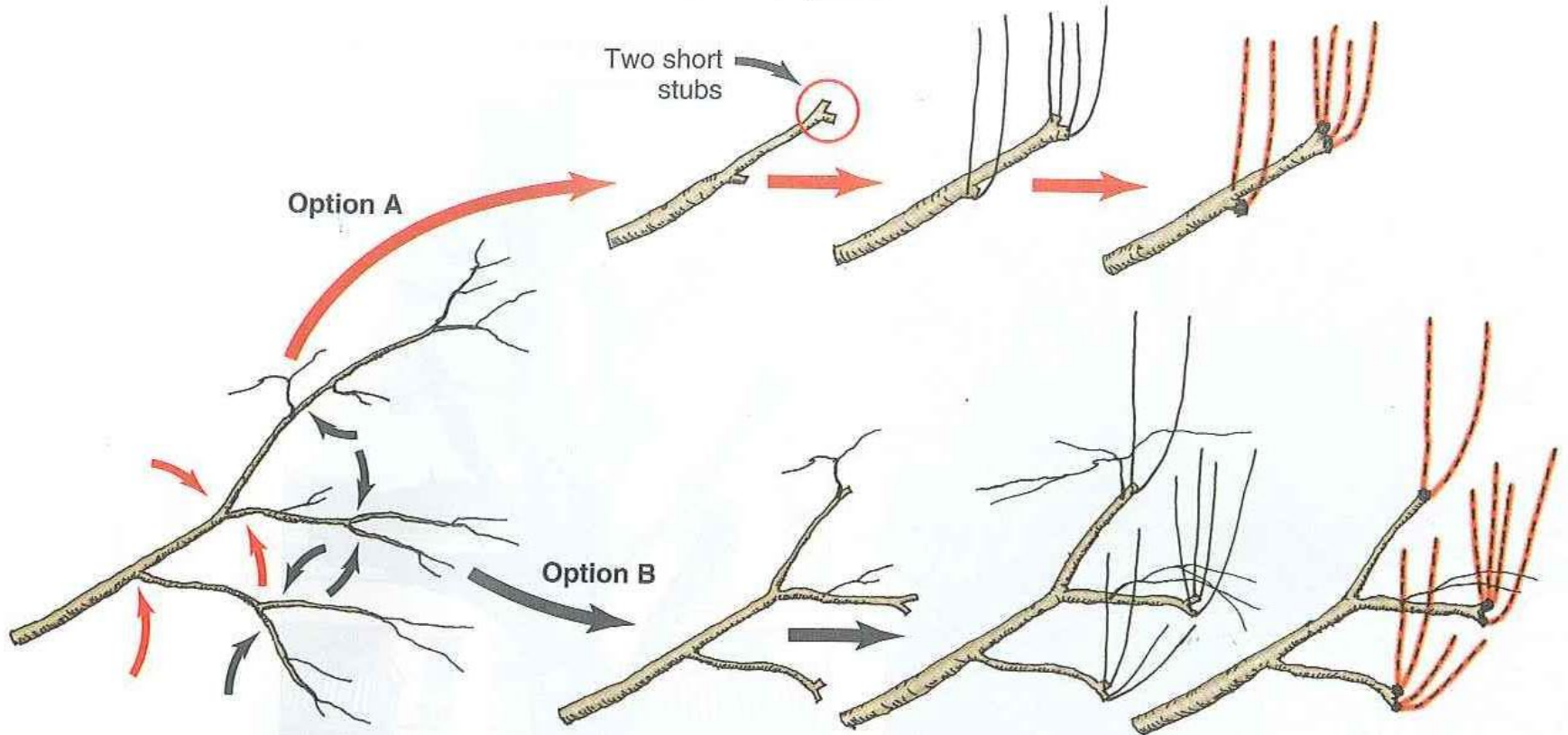








Pollarding detail



















Acrobatic Pollard



Training In





THE URBAN HOLOBIONT

- Trees
- Fruit trees and vines
- Shrubs and hedges
- Vegetables
- Compost
- Birding
- Mushroom
- Pruning
- Planting

NOT LESS CARE AND
LESS ATTENTION
BUT
MORE CARE AND
MORE ATTENTION

The Aims

- To make people active participants
- To change local areas from bottom up, not top down.
- To make the urban holobiont ultimately as diverse and long-lived as a coppice woodland of old.

TREE EQUITY?

- Don't just talk. Listen.
- The underserved may teach as well as learn.
- As exemplified by tribal peoples' fire knowledge.
- Not just rattling off ecosystem services or “educating” people to accept trees that the city will forget to take care of.
- How about Mange trottoir?
- How about Decorating the Decorations?

Break the Pits



Swamp white
Oak

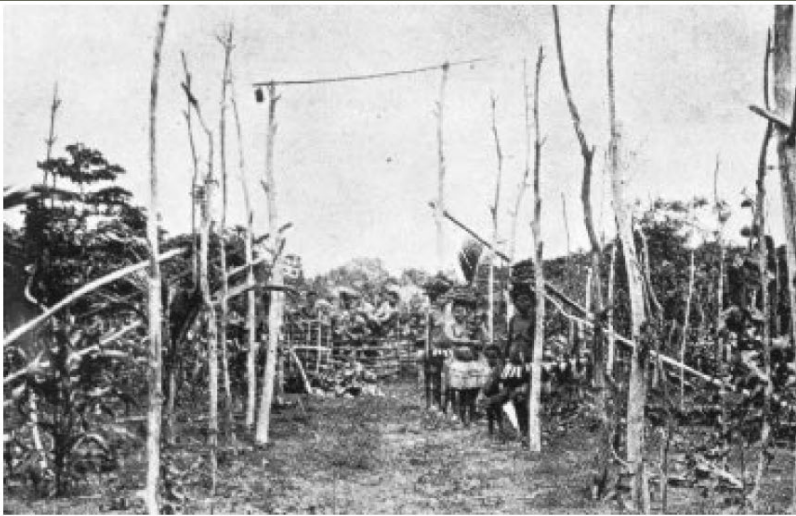
Prune And Train Trees



Le Mange-Trottoir “Eat the Sidewalk”



Decorate The Decorations



1. *Waiting for a magic ceremony in a Trobriand garden (from Malinowski, Coral Gardens, fig. 103)*



Weave willow



Grow Fruit



Make the branch as long as you
can.....

Pine Training



Keep the leading candle



COUNT BIRDS



HELP POLLINATORS

4 Ways to Help Pollinators

Food

(flowering plants)
throughout the
growing season



Habitat

(shelter & nesting sites)
like dead wood,
host plants, and
bare ground



Protection

from pesticides



Advocates

that help spread
the word



Sustainable
Saratoga  Educate.
Advocate.
Act.

“Nothing about us without us”
‘USE EVERYONE’S WISDOM.
WORK WITH, NOT FOR....

A WAY TO BE HUMAN:
ACT
IN THE URBAN HOLOBIONT