Georgia's Native Pines (*PINUS*):

General Information For Identification

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Pines (*Pinus* species) are found around the world almost entirely in the Northern Hemisphere. They live in many different places under highly variable conditions. Pines have been the historic foundation for industrial development and wealth building. Pines continue to be a valuable renewable natural resource generating paper, cardboard, lumber, plywood, composite products, chemicals, and food. Pines are the centerpiece and the backdrop of our homes and communities.

Canít See The Trees

As important as pines have been, and continue to be in Georgia, many people have difficulty identifying one native pine species from another. This publication was designed to assist people to identify the pines around them. Remember there is great variation among the many attributes of pines across their growth range. Pine can interbreed (hybridize) naturally. Because hybrid pines can share features of both genetic parents, they can be difficult to identify. See the pine hybrid net of interactions and potential shared characteristics on page 3.

In addition, highly stressed and pest impacted trees may have characteristics representing the symptoms of stress or pests, not of the basic pine species. Pine growing outside their native range can appear slightly different than individual pines growig at the center of their native range. Page 4 shows the Coder Tree Grow Zones (CTGZ) in Georgia which are based upon multiple interacting variable climatic data set analysis.

Natives

The native pines of Georgia can be grouped taxonomically into three major groups:

1) white pine group =	*Pinus strobus*	Eastern white pine.
2) southern yellow pine group =	*Pinus echinata*	shortleaf pine
	Pinus elliottii	slash pine
	Pinus glabra	spruce pine
	Pinus palustris	longleaf pine
	Pinus pungens	table mountain pine
	Pinus rigida	pitch pine
	Pinus serotina	pond pine
	Pinus taeda	loblolly pine
3) jack pine group =	*Pinus clausa*	sand pine
	Pinus virginiana	Virginia pine

Looking & Seeing

In identifying pines, gather as much information regarding its native range and normal characteristics as possible. Collect twigs, examine multiple terminal buds, and many different needle bundles (fascicles) from different places in the crown. Note the bark texture, pattern, color, and thickness. Collect female cones and note the shape and size of the entire cone and its parts, especially the outer tips of the individual bracts or scales.

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Examine each cone for how it was attached to the tree and how the base of the cone broke off from the tree. Note the number and distribution of female cones throughout the crown. Record the pine height, girth, crown size and relative proportions. The age of the tree should be estimated. Notice any sprouting, needle growth, and female cones growing from the main stem and primary branches. Be observant for the minutia of pine growth and for how the whole tree appears.

General Pine Identification Features

Leaves ñ Young children can usually discern pines from most other trees. Pines have leaves which are long and narrow termed ìneedles.î Pine leaves or needles are semicircular to triangular in cross-section and not noticeable flattened. The needles are held in multiple needle bundles called fascicles. The bundles of needles on the twig of each pine species may have different lengths and different numbers of needles per bundle. The needle bases in each bundle are held together with a papery sheath. Having evergreen, bunched, needle-shaped leaves are key identifiers for pines. Native Georgia pines can have either 2, 3, or 5 needles within each bundle.

Flowers ñ Pines have both sexes of flowers on the same tree (monoecious), although the male and female flowers are separated throughout the tree crown. The female flowers (which produce woody cones) tend to be in higher crown locations to keep predators away from seeds and provide a high distribution point for the viable seeds. Male flowers (pollen cones) tend to be lower and to the outer edge of the crown in order to place male cones in the way of swirling wind which provides buoyancy and a lower relative humidity, allowing the airborne pollen to be delivered to the receptive female cones.

Pine pollen has two small wings and is carried by the wind to small female cones in the tree crown. The receptive female cones are small and aerodynamically designed to capture pollen of its own species most effectively. Once the pollen is captured, the female cones close and seeds develop over time. Seeds are distributed in the fall of the year following pollen capture. In other words, from pollen capture to seed release takes two growing seasons with an intervening dormant season

Cones -- Pines need two growing seasons to generate one set of female cones containing viable seed. In the Spring of one year, the tiny receptive female cones usually go unnoticed among the foliage. By the second year the female cones are rapidly growing and yield species-specific woody pine cones seen on the tree and the ground. Open pine cones on the ground usually have already distributed their viable seeds in most species. Some species of pine keep their cones glued shut with resin until the heat from a ground fire causes them to open. These resinous cones may fall to the ground with viable seeds inside or stay on the tree for several years.

Pine cones are a unique way of holding winged seeds. These seed holders are woody spirals of many flat fingers (bracts or scales) with two seeds developing near the center or inside column of the cone. The seed wings develop toward the outside edge of the cone. The scales can have several different shapes and can be tipped with various types of points depending upon the species. The whole spiral collection of woody fingers holding winged seeds connected by a short center stalk is called a cone. The woody fingers close in high humidity or can be glued together with pine resin. When the seeds are ready and humidity is low, the fingers open up and the wind blowing past the seed wings sets the seeds flying. Pine cones can be used to differentiate between the various pine species.

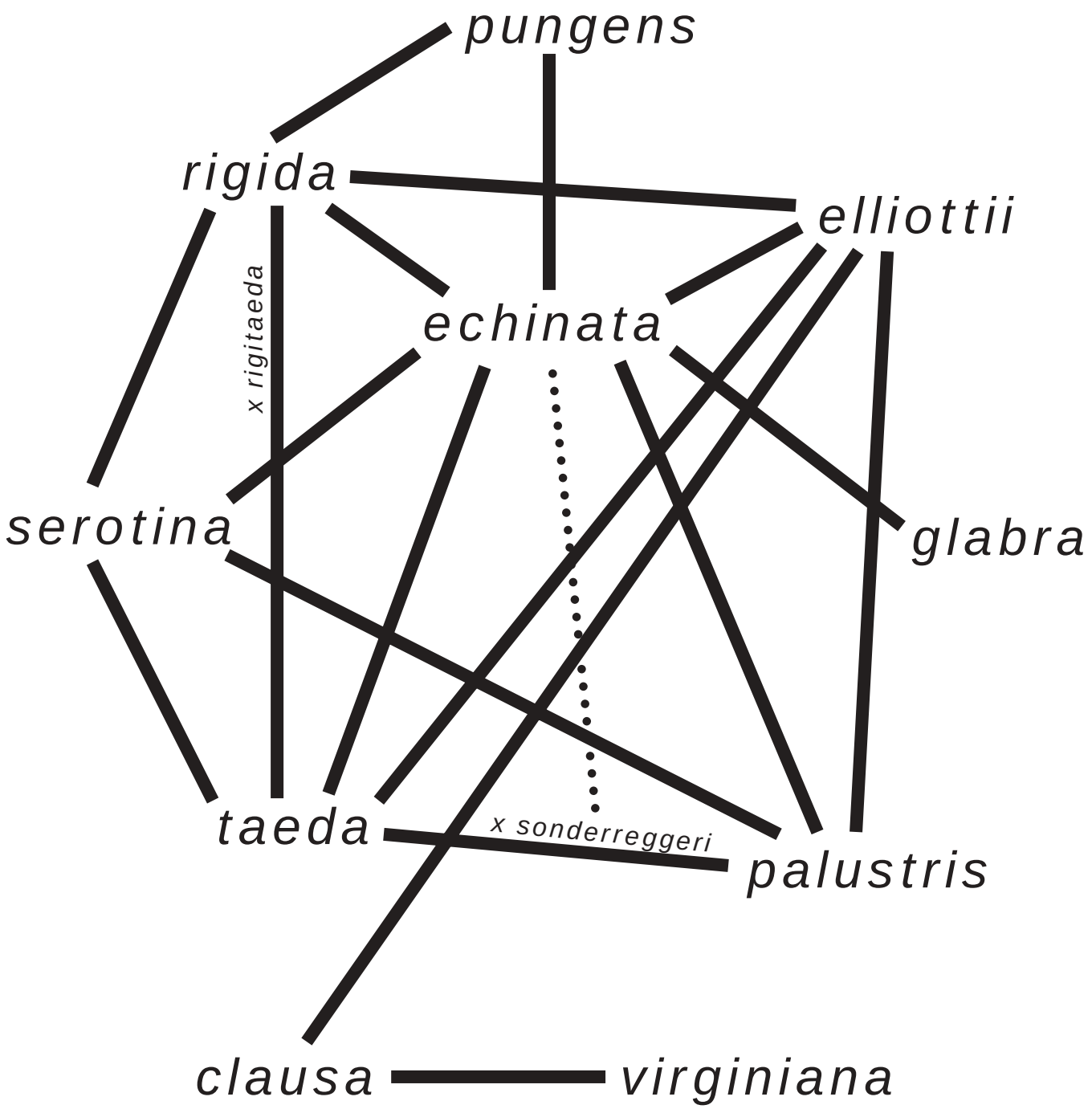
Buds -- The terminal buds on different pines appear to be different from one another due to the color and amount of plant hairs (tricombes) present. Some pines have long white or silvery tricombes covering and enclosing the terminal bud. Other pines have buds which are unadorned. Terminal bud size varies greatly.

Bark -- Pine bark has great variation in thickness, blockyness, ease of separating layers, and number and length of longitudinal fissures. Bark color can vary, but other organisms growing on the bark surface can change bark appearance. Older bark has oxidized and changed color from when it was first exposed to the air and sunlight. Often wet bark will look different from always dry or protected bark.

Resin ñ Pines generate resin, which is a mixture of solids and liquid materials. Essential pine oils, turpentine, tars, and rosin are generated by specialized cells in the living wood of the trees. The liquids in resin can evaporate leaving behind any solids and dissolved materials. The residues of resin flow can be seen on the bark near wounds.

Pine Hybrid Net

(gene sharing -- intermediate characters generated)



strobus *(none)*

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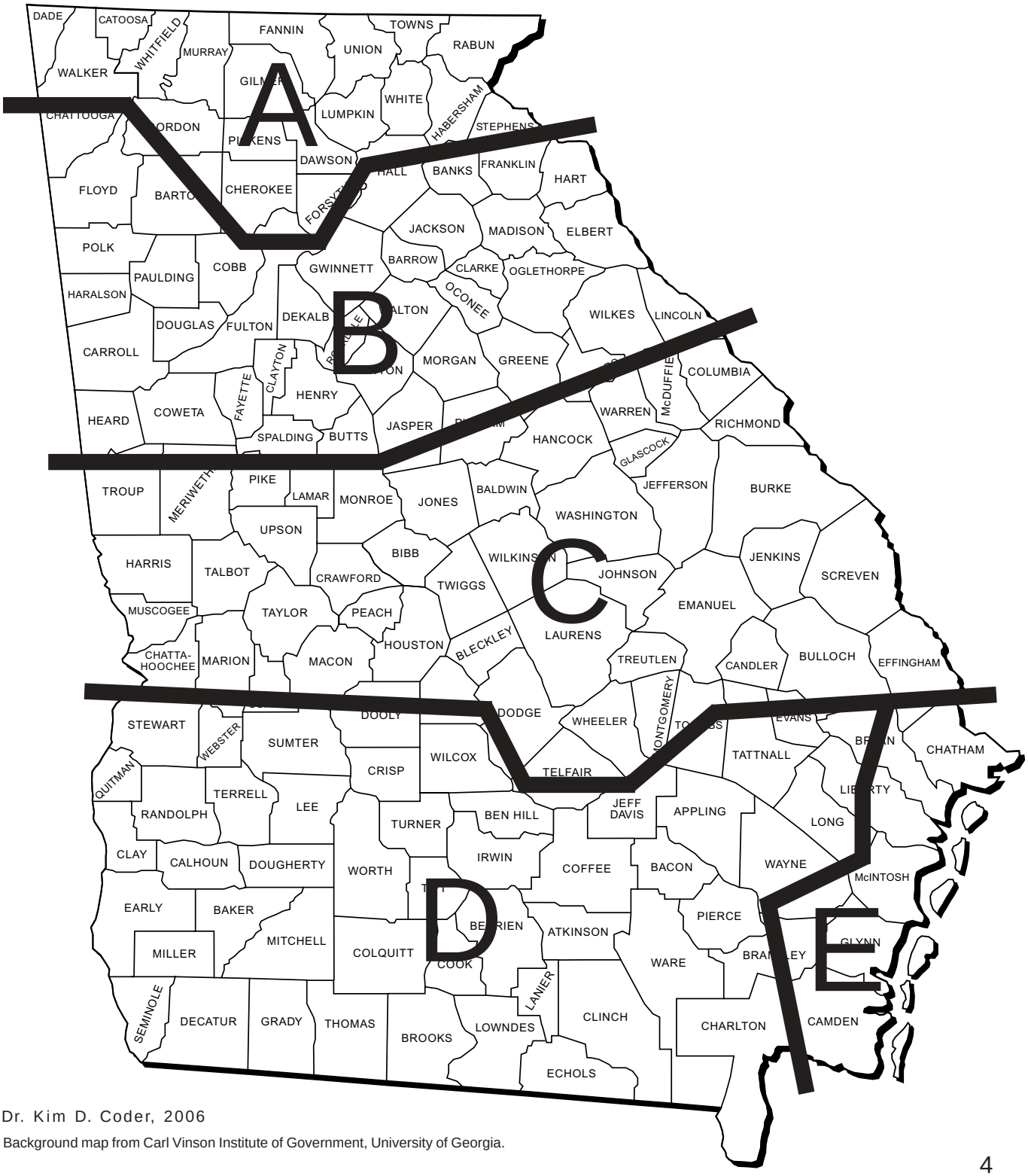
Coder Tree Grow Zones (CTGZ) In Georgia

This map was generated using cluster analysis with a combination of climatic data which included average monthly precipitation, average annual precipitation, average monthly temperature, high and low temperature extremes, average monthly evaporation, and average monthly solar radiation for the past 30 years. This map represents the homoclimates of Georgia.



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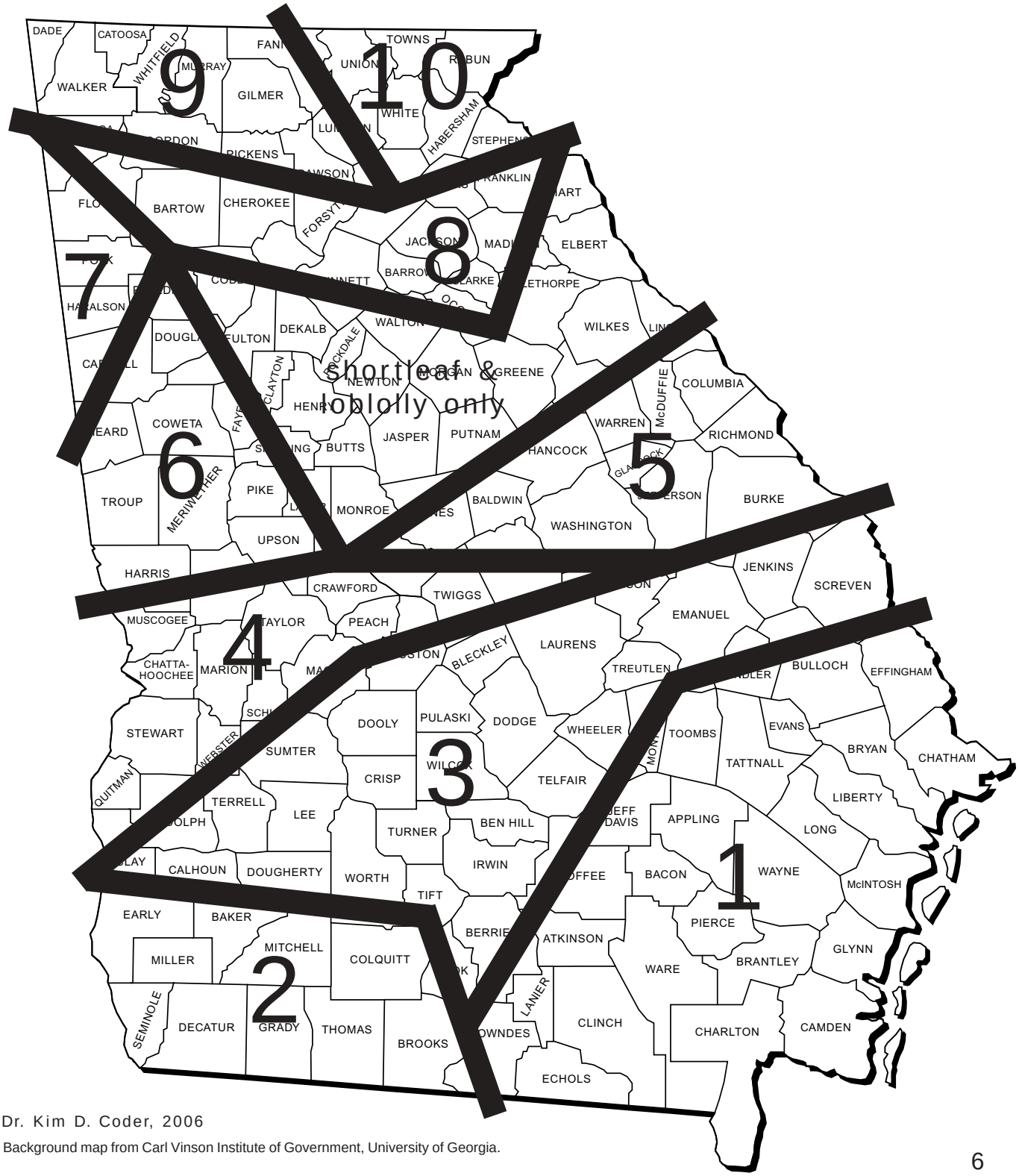
Background map from Carl Vinson Institute of Government, University of Georgia.

needles	*needle length (inches)*	*needles per bundle*	*needle form*	*general tree location (zone)**
Pinus clausa sand pine	2 - 3.5	2	twisted slender flexible	zone 1, 2 far south Georgia CTGZ = D
Pinus echinata shortleaf pine	2.5 - 5	2 or 3	slender flexible	statewide except zone 1 CTGZ = A-D
Pinus elliottii slash pine	7 - 11	2 or 3	thick rigid	zones 1, 2, 3 south Georgia CTGZ = C-E
Pinus glabra spruce pine	1.8 - 3.8	2	twisted flexible slender	zones 1, 2, 3, 4 south half Georgia CTGZ = C-E
Pinus palustris longleaf pine	9 - 17	3	thick flexible	zones 1, 2, 3, 4, 5, 6, 7 south & west Georgia CTGZ = B-E
Pinus pungens Table Mountain pine	1.3 - 2.6	2	twisted rigid	zone 10 far north east Georgia CTGZ = A
Pinus rigida pitch pine	2.2 - 5.4	3	twisted rigid thick	zone 10 far north east Georgia CTGZ = A
Pinus serotina pond pine	5.4 - 8	3	twisted flexible slender	zone 1, 2, 3, 4, 5 southern half Georgia CTGZ = C-E
Pinus strobus Eastern white pine	2.7 - 5	5	soft flexible slender	zone 9, 10 far north Georgia CTGZ = A
Pinus taeda loblolly pine	5.4 - 9	3	thick rigid	statewide except zone 10 CTGZ = A-E
Pinus virginiana Virginia pine	1 - 3	2	twisted thick rigid	zone 7, 8, 9, 10 north Georgia CTGZ = A & B

(* = see Georgia maps which follow this page.)

Pine Location Zones In Georgia



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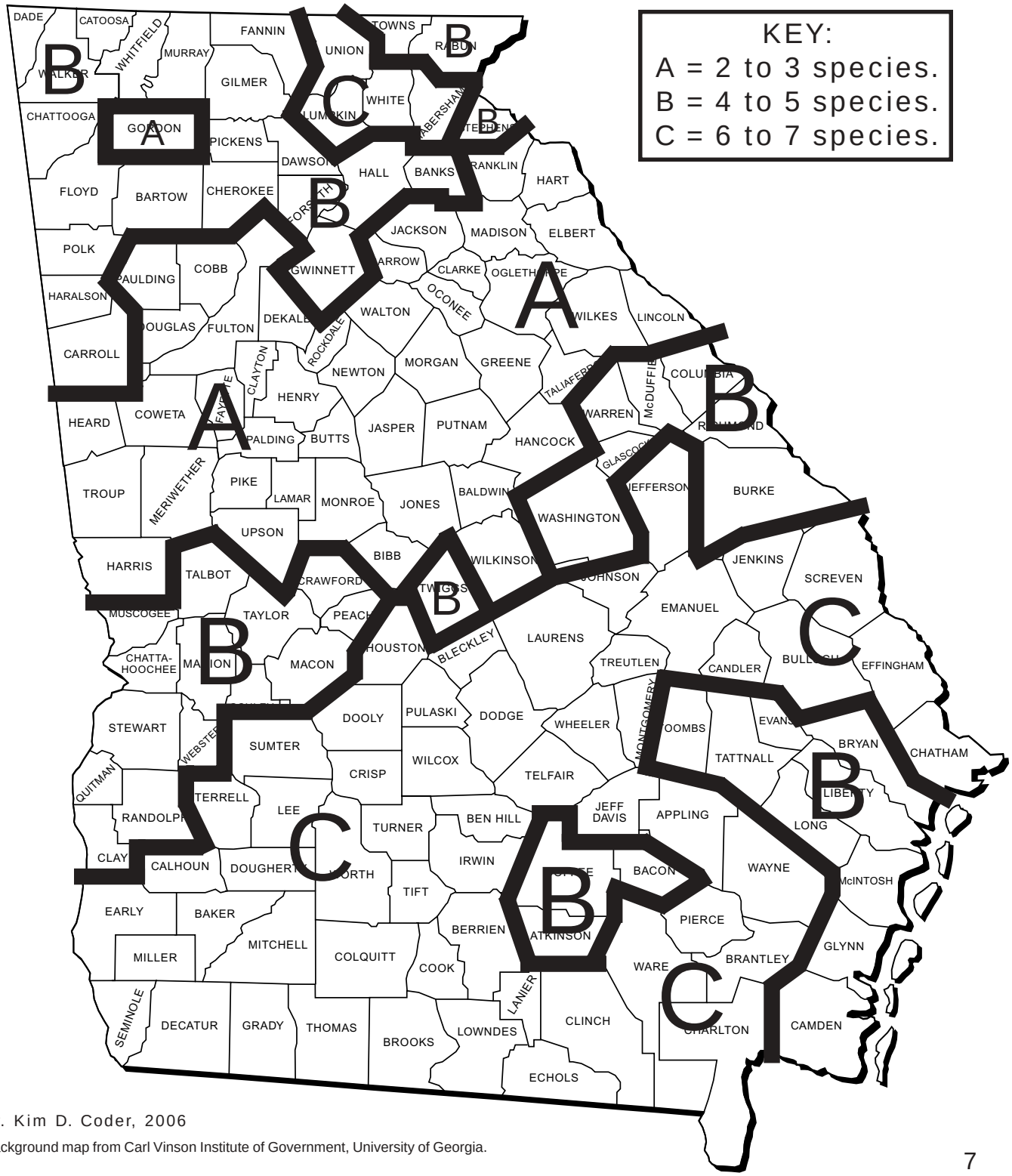
Background map from Carl Vinson Institute of Government, University of Georgia.

Number of Native Pine Species In Each Georgia County

Native range counts derived from federal and state maps, herbarium samples and personal observations.



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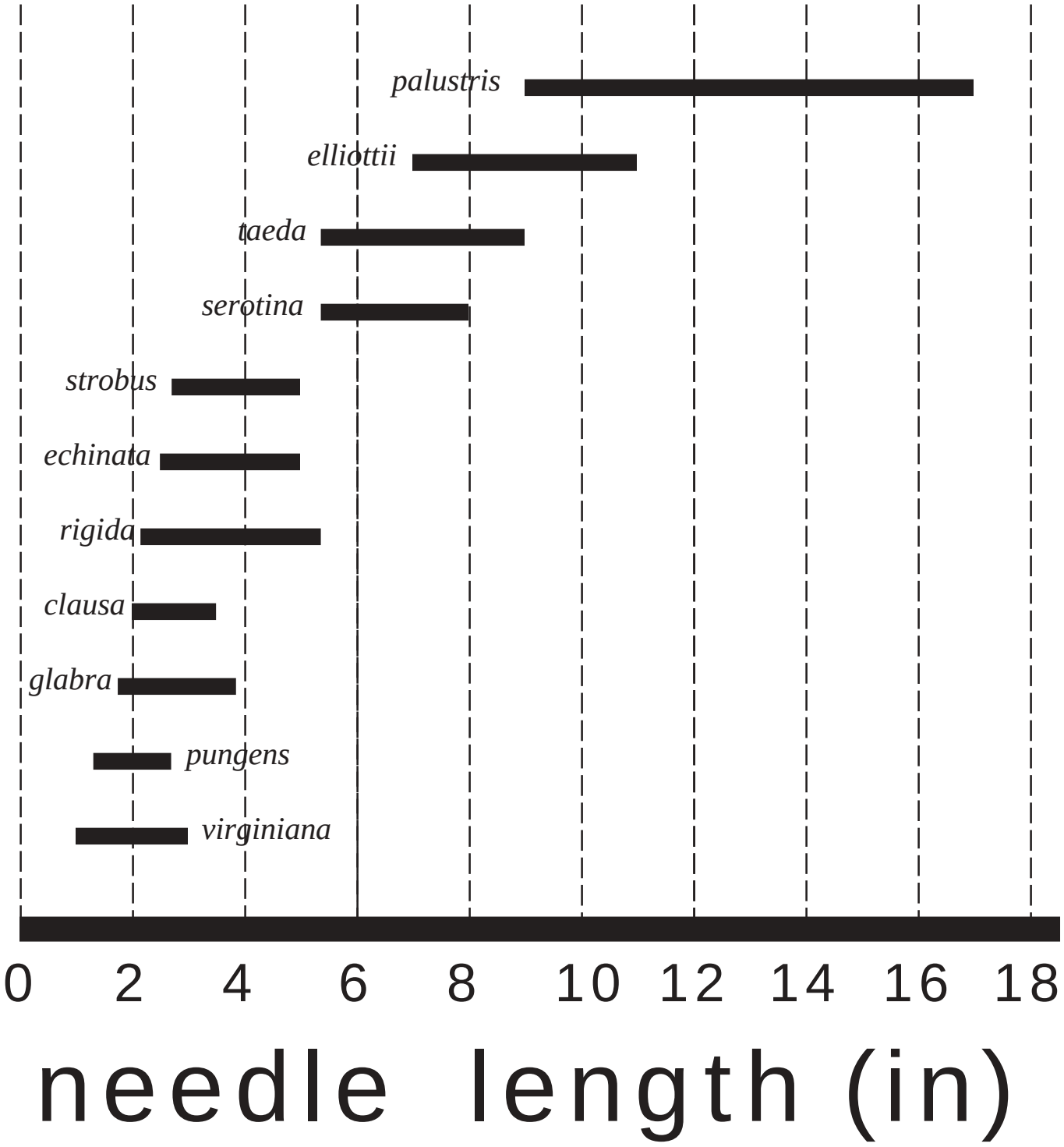
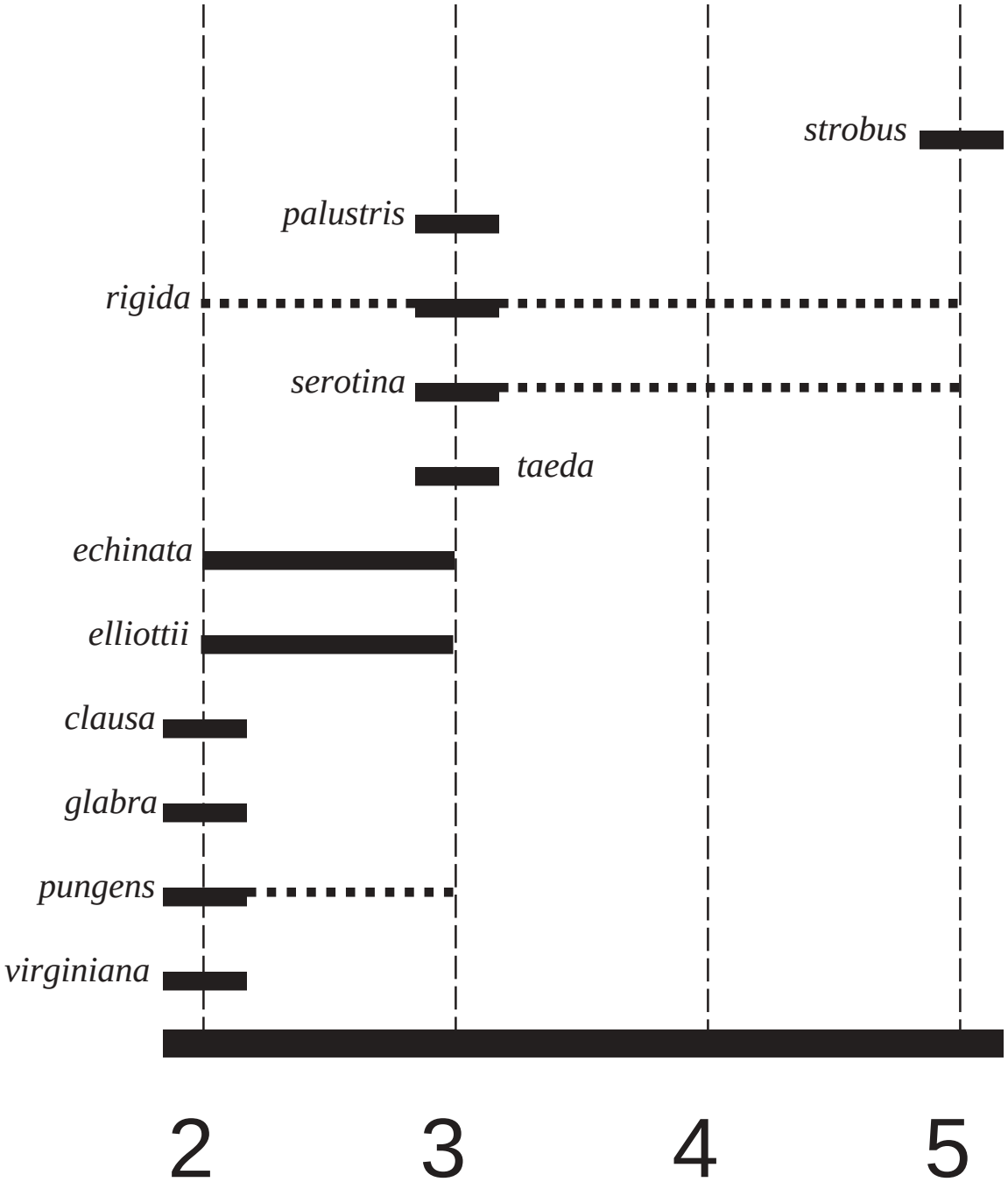
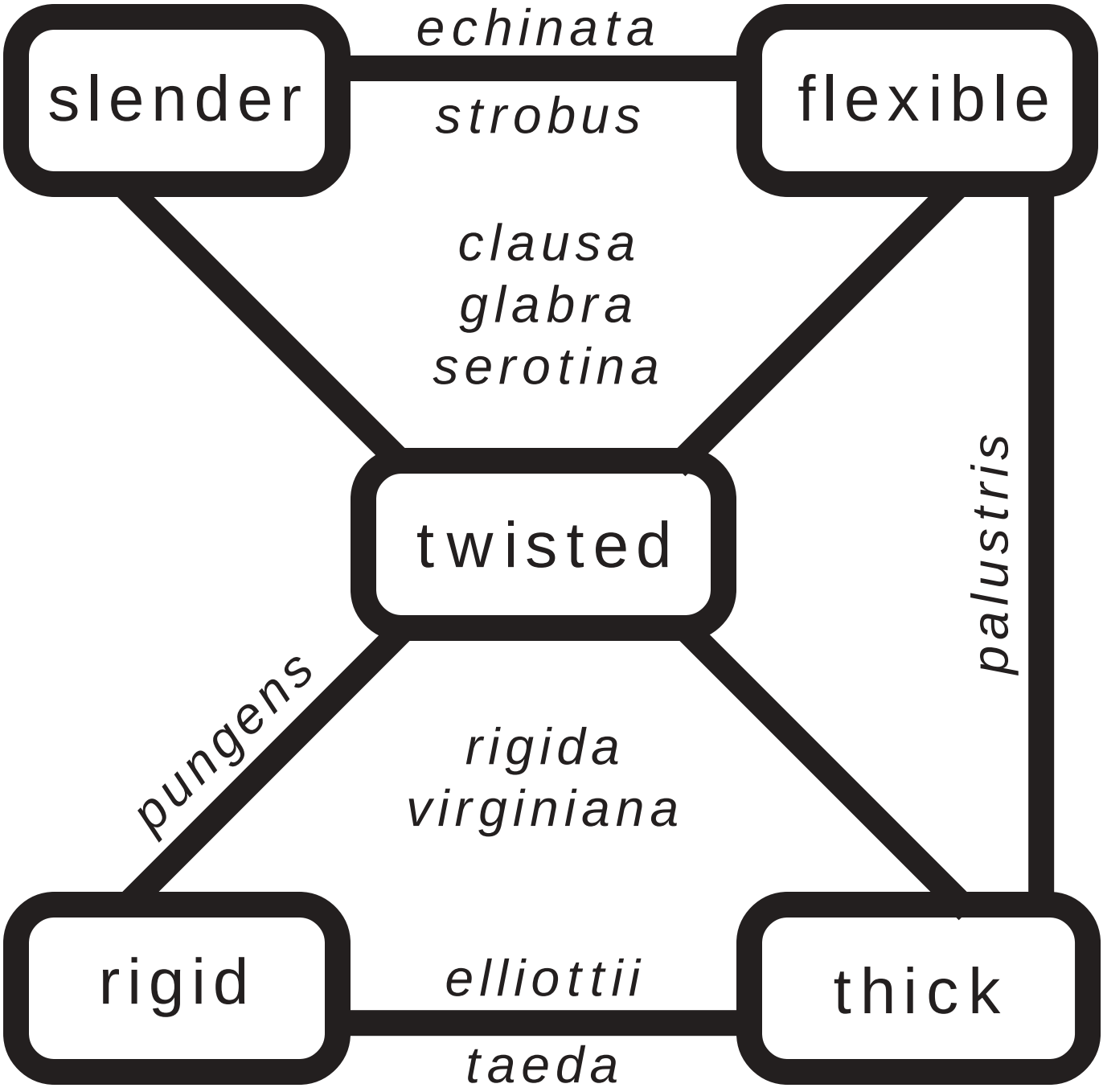

palustris
elliottii
taeda
serotina
strobus
echinata
rigida
clausa
glabra
pungens
virginiana
0 2 4 6 8 10 12 14 16 18
needle length (in)

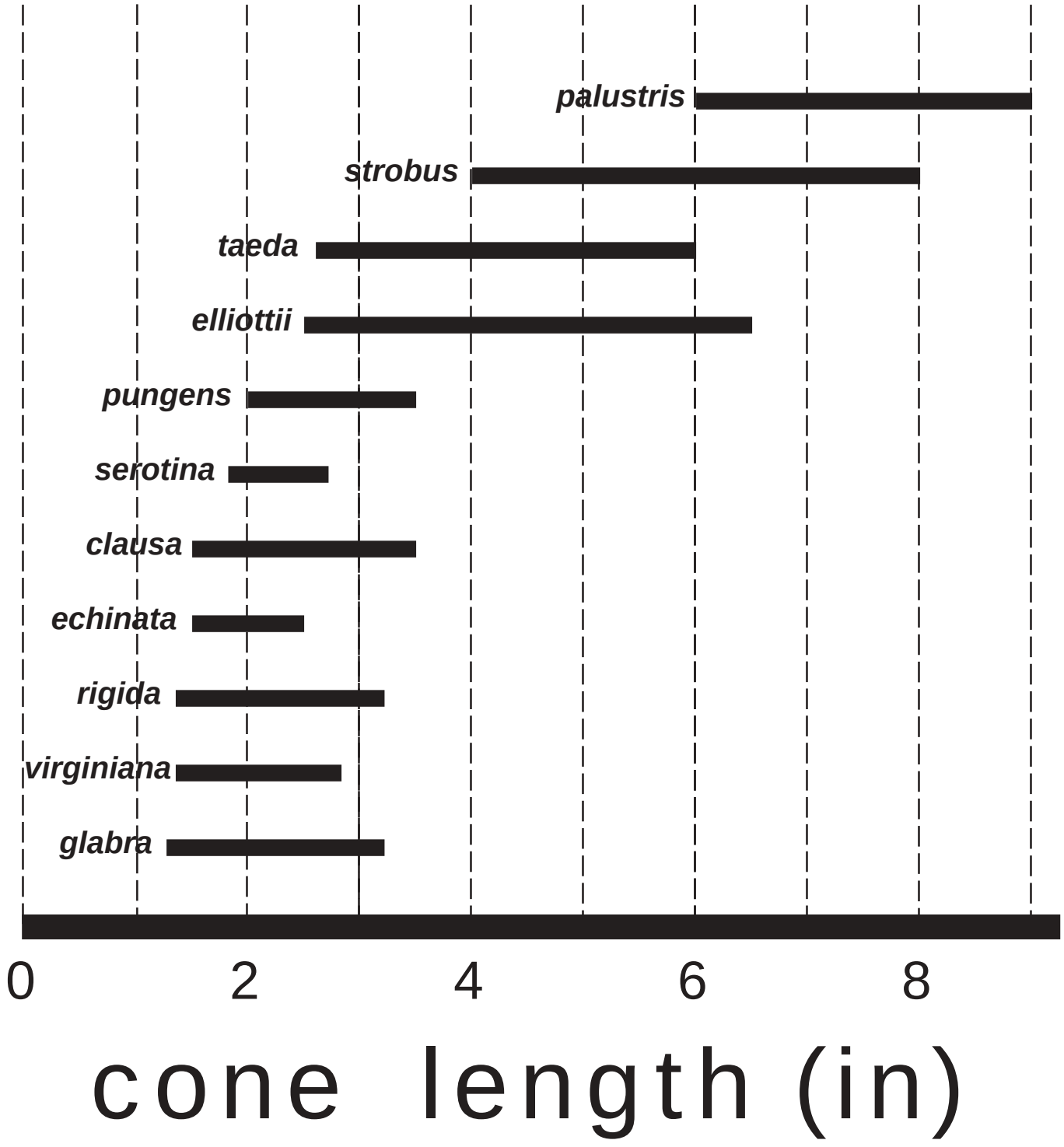

strobus
palustris
rigida
serotina
taeda
echinata
elliottii
clausa
glabra
pungens
virginiana
2
3
4
5
needles per bundle

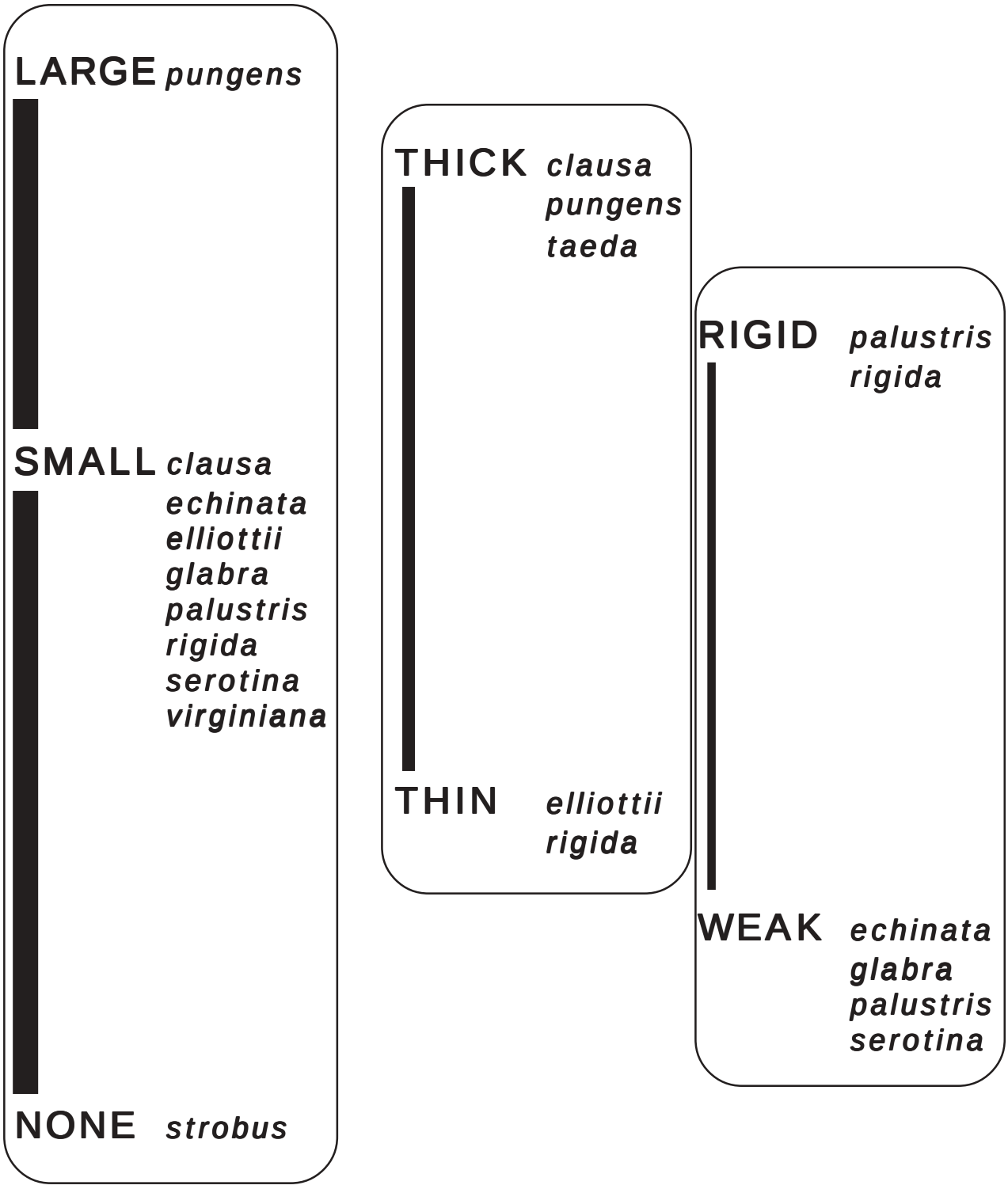

slender
flexible
twisted
rigid
thick
echinata
strobus
clausa
glabra
serotina
palustris
pungens
rigida
virginiana
elliottii
taeda

needle form

female cones

	length (inches)	prickle form	appearance
Pinus clausa sand pine	1.5 - 3.5	small thick	mature cone closed
Pinus echinata shortleaf pine	1.5 - 2.5	small weak	dull grey color
Pinus elliottii slash pine	2.5 - 6.5	small thin	shiny tan color
Pinus glabra spruce pine	1.3 - 3.2	small deciduous weak	
Pinus palustris longleaf pine	6 -9	small weak	
Pinus pungens Table Mountain pine	2 - 3.5	thick hooked large	mature cone closed
Pinus rigida pitch pine	1.4 - 3.2	thin rigid small	mature cone closed
Pinus serotina pond pine	1.8 - 2.7	small weak	mature cone closed
Pinus strobus Eastern white pine	4 - 8	none	
Pinus taeda loblolly pine	2.6 - 6	thick sharp	
Pinus virginiana Virginia pine	1.4 - 2.8	small thin rigid	purple / red scale lip


palustris
strobus
taeda
elliottii
pungens
serotina
clausa
echinata
rigida
virginiana
glabra
0
2
4
6
8
cone length (in)



Cone Scale Prickles

prickle description -- pine species

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