



University of California
Agriculture and Natural Resources



Budding and Grafting Demystified

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UC Cooperative Extension, Sacramento County

2011 California Master Gardener Conference

Santa Rosa

GRAFT / BUD UNIONS



English on
Black Walnut



Almond



English on
Paradox Walnut



Rootstock Sucker,
Main Tree Never
Grew

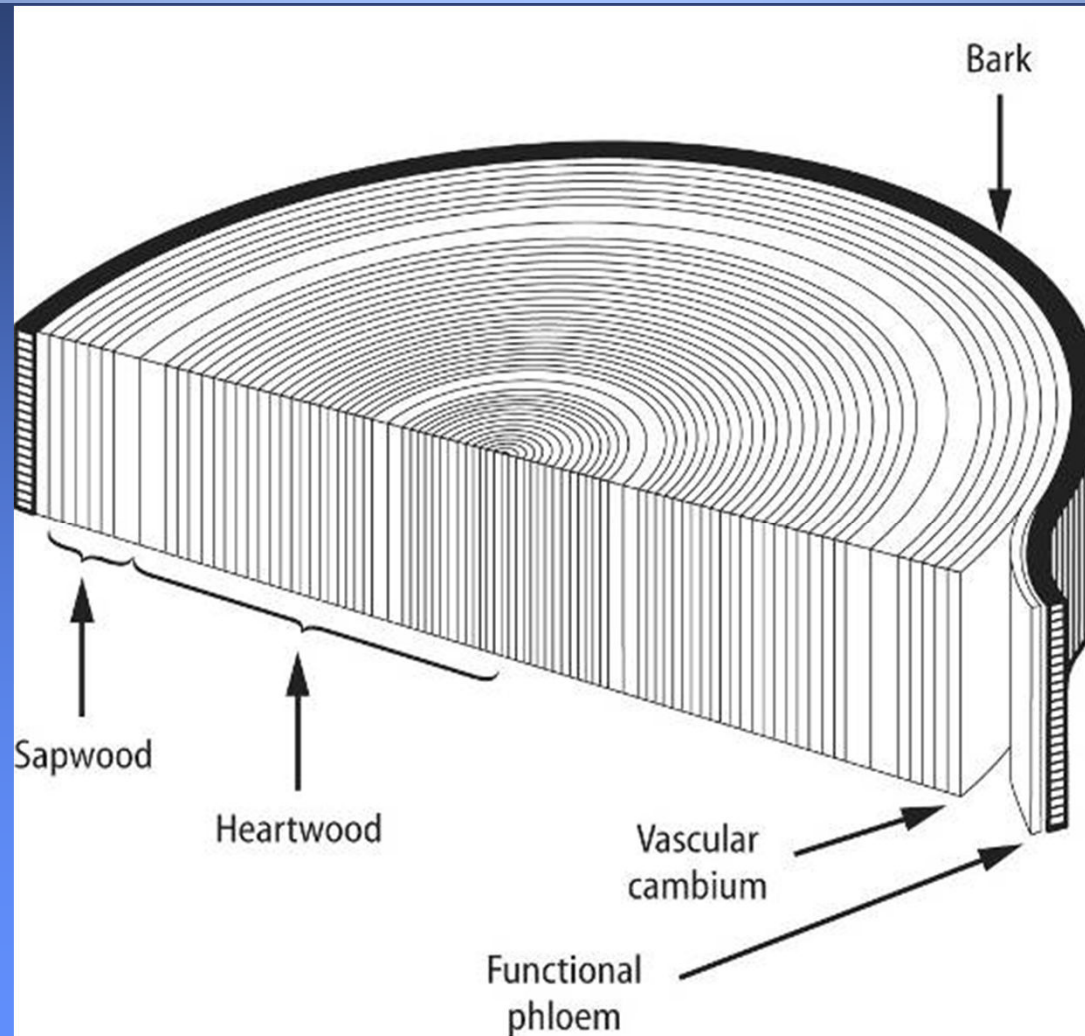


Apricot

Grafting Terms

- Grafting – branch or bud of a plant inserted into the stem or trunk of another
- Budding / bud grafting - inserting a single bud (scion) onto a stock
- Budwood – current-season's shoot used for budding
- Scion wood - 1-year-old branch for grafting
- Topworking – grafting onto large limbs to change the species or variety

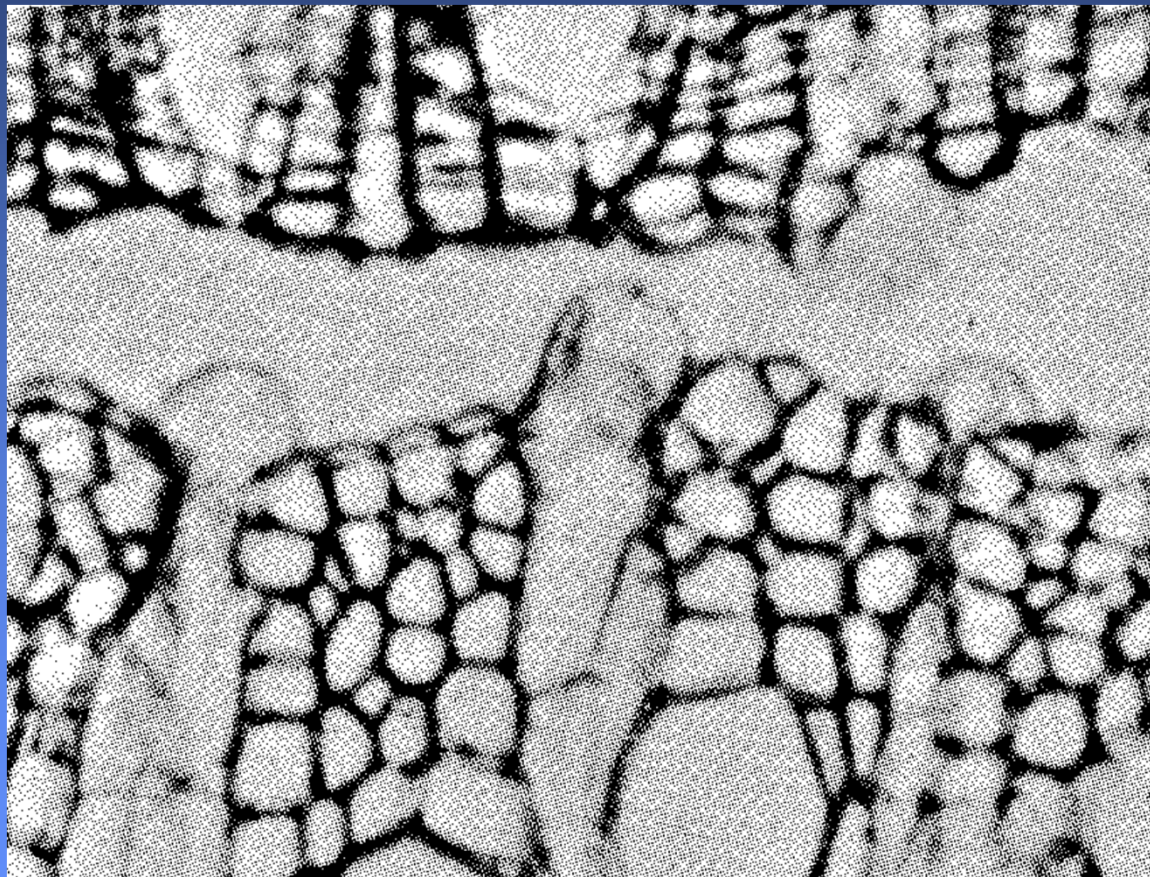
Cross-Section of Trunk



Meristematic Growth

- Meristem – undifferentiated plant tissue from which new cells and new plant tissues arise.
 1. Apical meristem – forms terminal growth
 2. Vascular cambium (“cambium”) – actively dividing layer of cells between bark and wood; produces new sapwood to the inside and new phloem to the outside; causes thickening
- Callus – undifferentiated tissue that forms a around a wounded plant surface

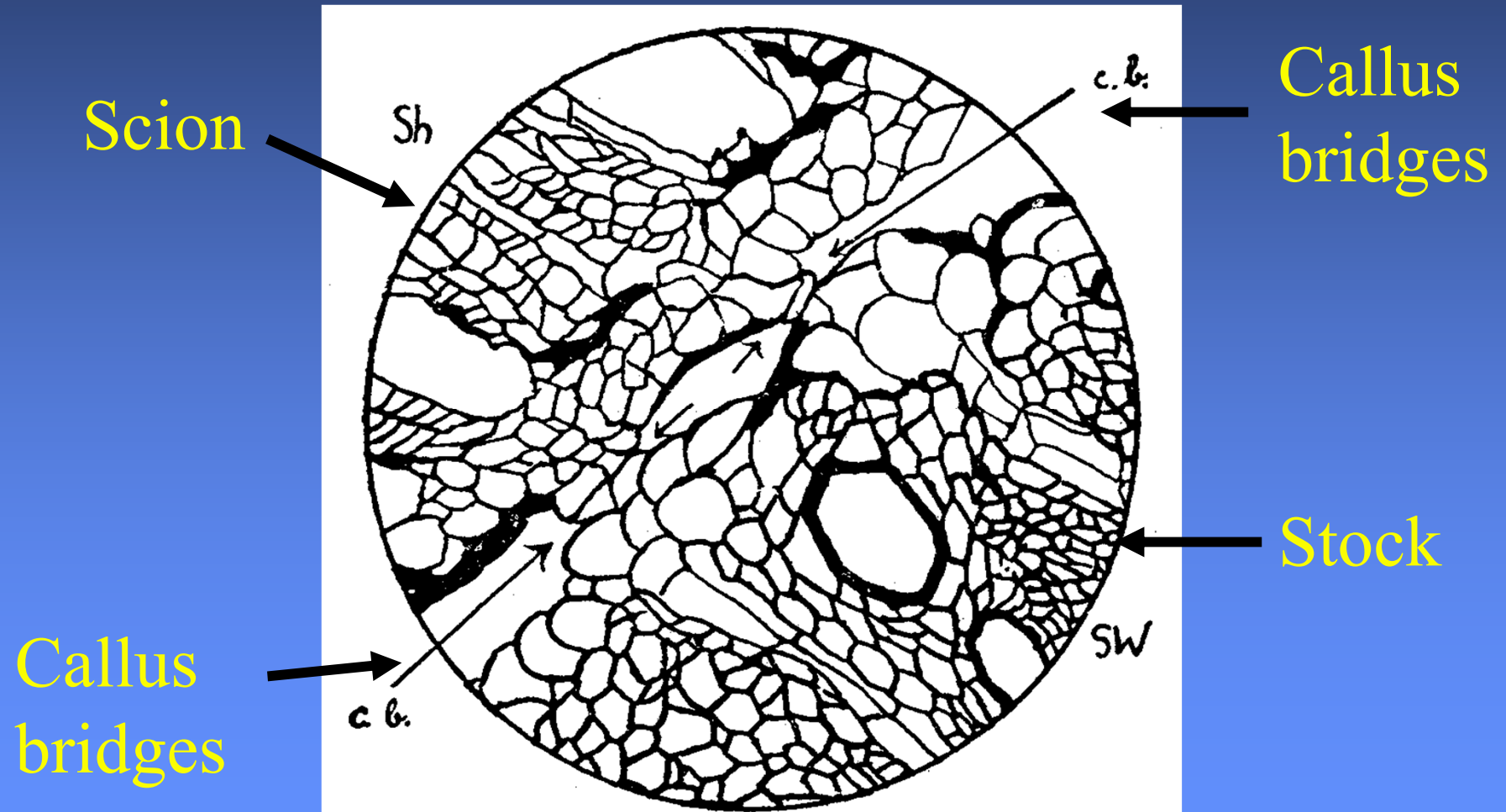
Growth of Cells 1 Day After Graft



Stock

Scion

Growth of Callus Cells 5 Days After Graft



Budding and Grafting

Reasons

- Produce new fruiting tree from rootstock sucker of dead, injured, or fruitless tree
- Repair tree with dying trunk
- Add pollenizers
- Make fruit salad trees
- Make tree or shrub with different colored flowers

Folding T-budding knife with bark lifter



Knife with folding T-budding
and grafting blades

Popular Grafting Methods

Budding

- T-budding
- Chip budding



Grafting

- Whip graft
- Bark graft
- Cleft graft



Popular Grafting Methods

Budding

- T-budding
- Chip budding



Grafting

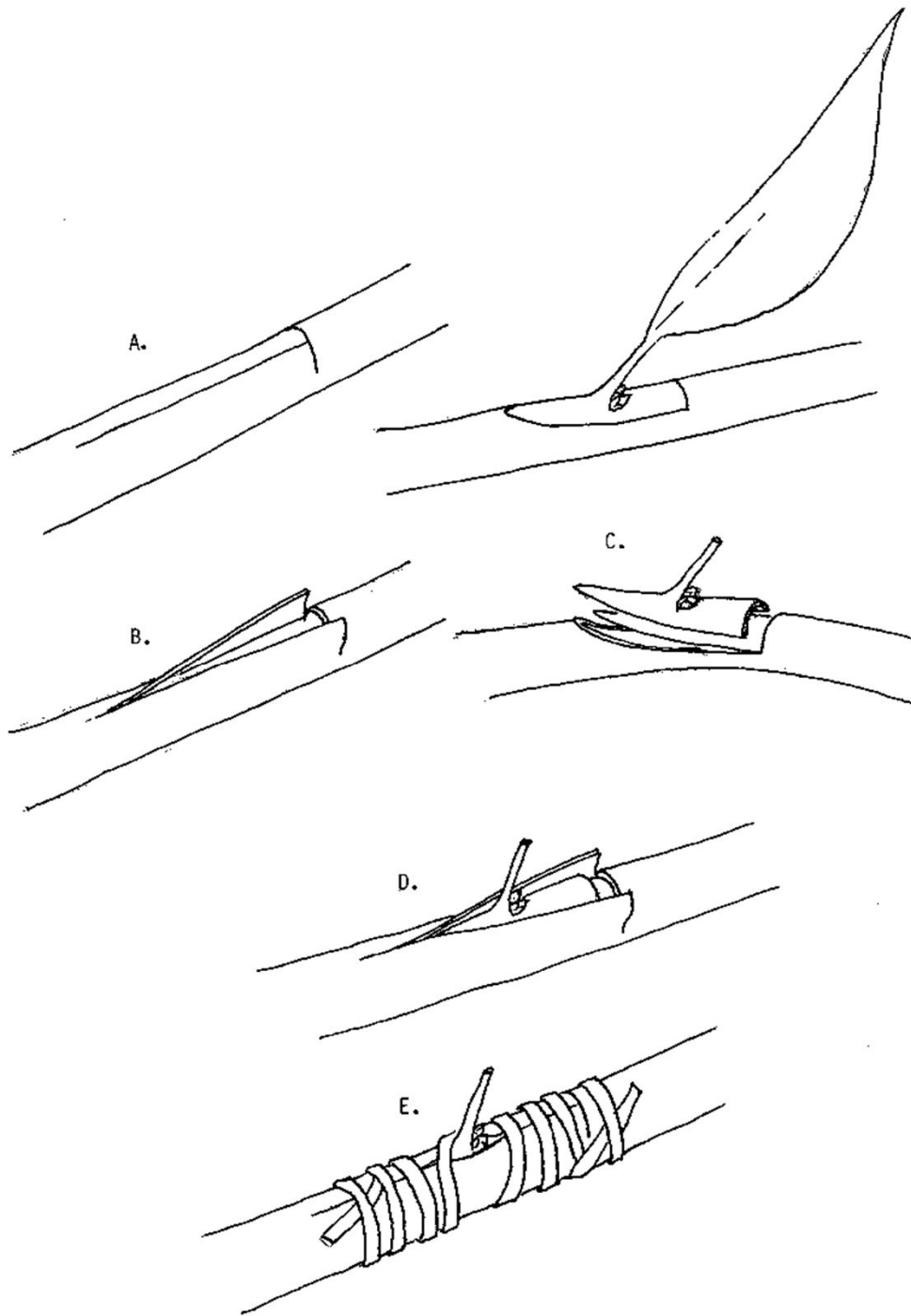
- Whip graft
- Bark graft
- Cleft graft



T-Budding

- Removal of bud of desired variety (without wood), insertion in stock
- Bark must be “slipping”
- Spring → branch for current season
Late summer → branch for next season
- Use vigorous 1-year-old shoots, $> \frac{1}{4}$ in.
- Cut branch $\frac{1}{2}$ in. above top of bud to force growth

T-Budding



T-Budding



Remove leaves from
scion, leave petiole

T-Budding

STOCK

Top of T cut into bark



Downward cut into bark



T-Budding

STOCK

Peel back bark



T-Budding



Cut under bud,
starting $\frac{1}{2}$ " below bud

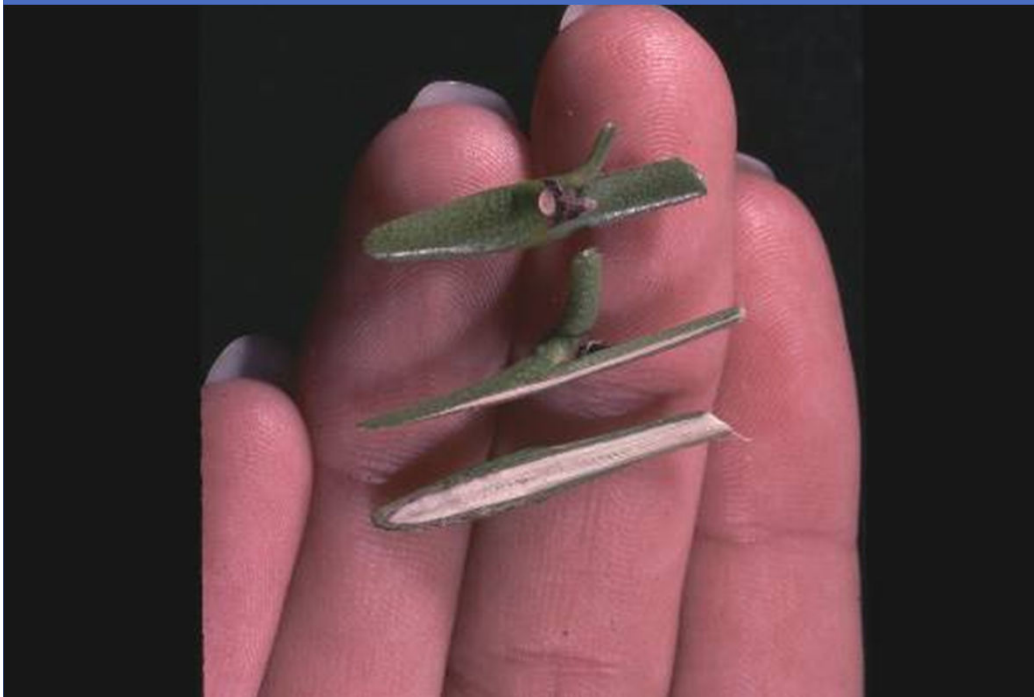


Cut through bark only,
 $\frac{1}{2}$ " above bud



T-Budding

Squeeze bark, remove
bud shield from wood



Or remove thin strip
of wood too

T-Budding

Insert bud shield into T cut



T-Budding

Wrap with budding rubber or parafilm



T-Budding

Bud that “took”



Fall budded, headed in winter, new spring growth

Forcing Growth (if needed)

Girdling (Shown Here)
and Notching



3 months after
spring girdling

Dormant
season



Popular Grafting Methods

Budding

- T-budding
- Chip budding

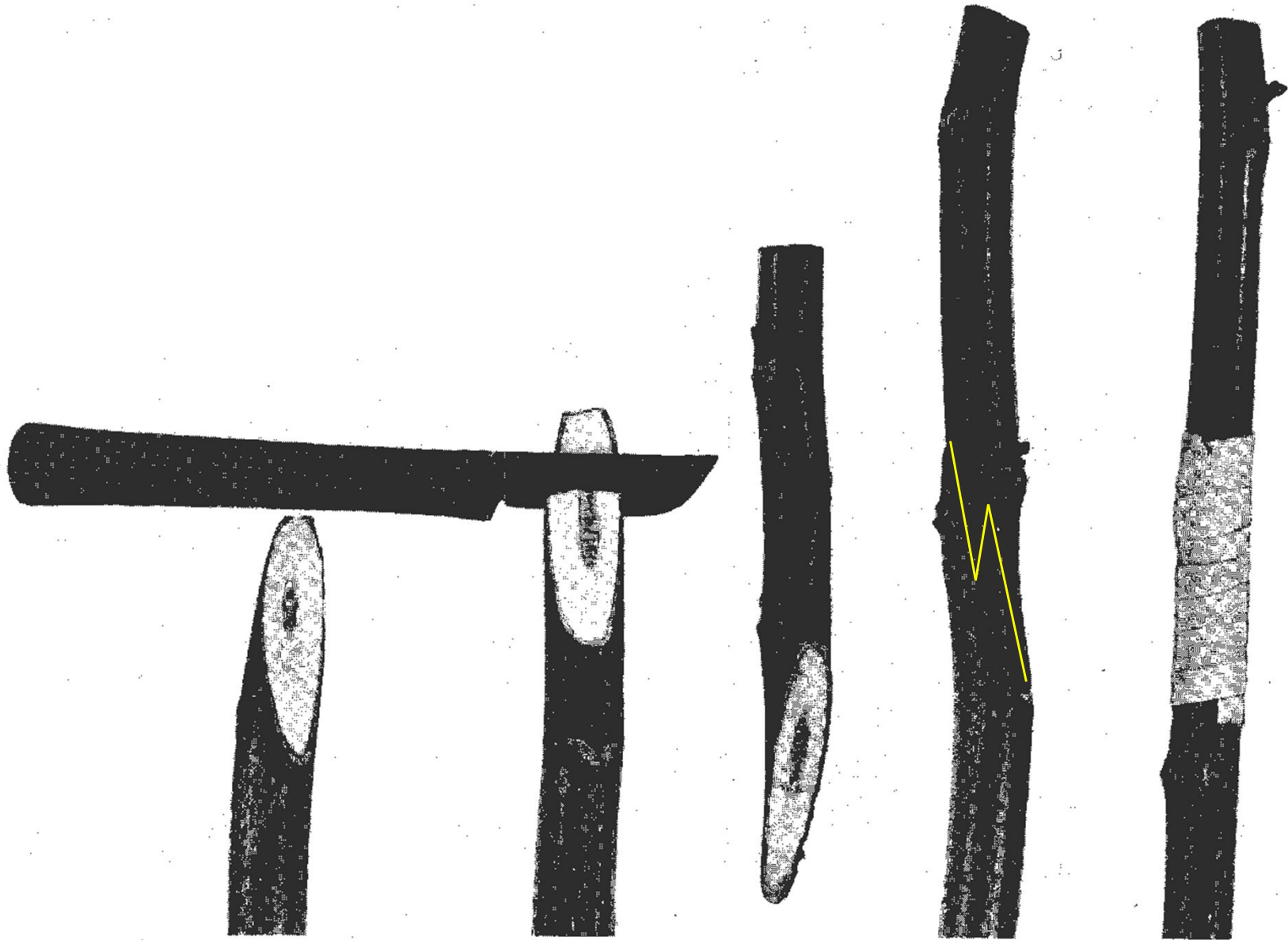


Grafting

- Whip graft
- Bark graft
- Cleft graft

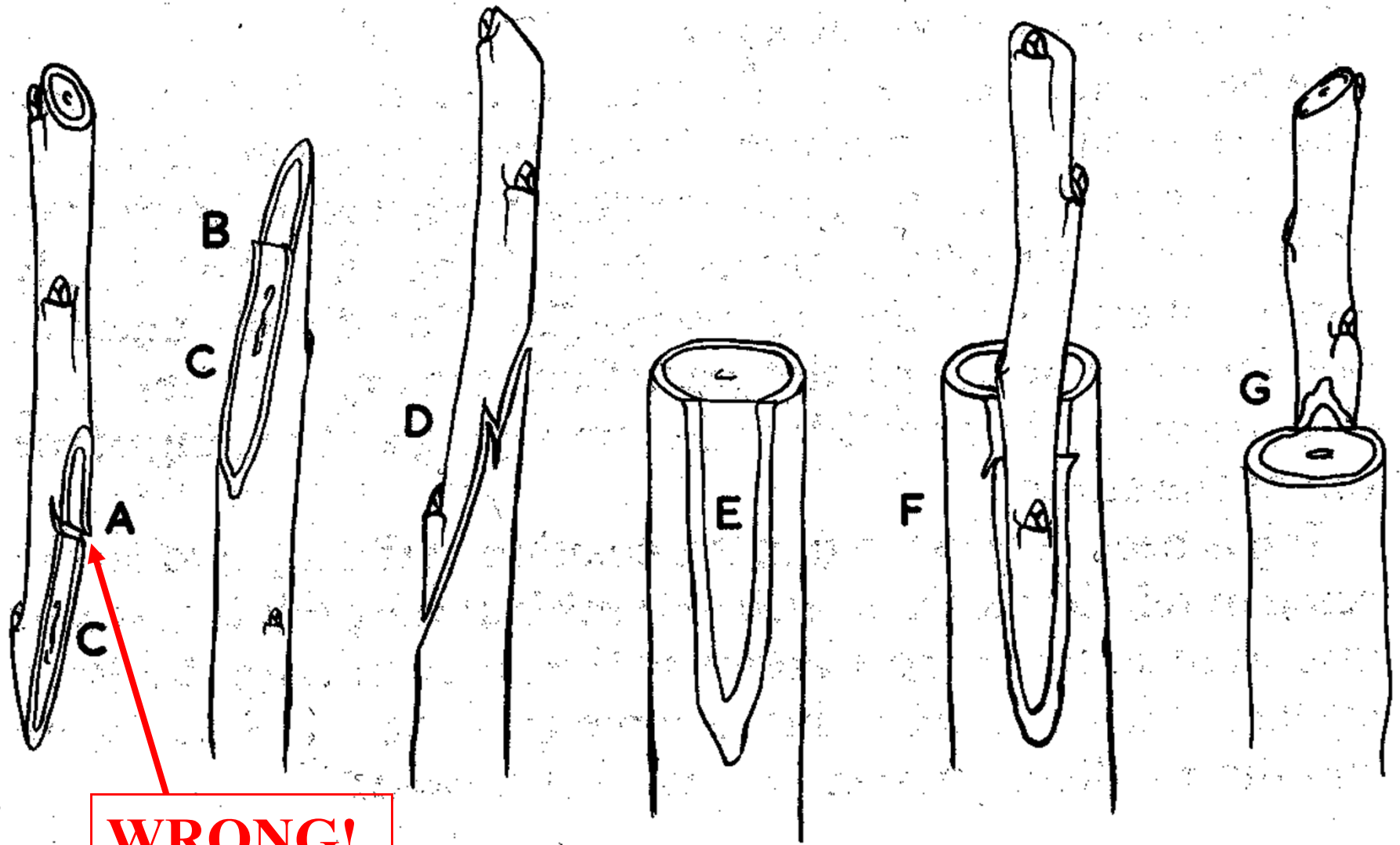


Whip Graft



Whip Grafting

- Removal of 1-yr.-old branch of desired variety, insertion in stock (tongue in groove)
- Done before bud swell
- 1-year-old wood – match size
- Angled cut 1-1½ in. long in stock, scion
- Vertical cut 1/3 the distance from cut tip



WRONG!

Fig. 57 Whip-and-tongue graft

Whip Graft

Choose stock & scion of similar caliper

Make 1" to 1 ½" angled cuts in stock & scion



Whip Graft

Slice off
“tail”

Top of
stock

Equal
cuts in
stock &
scion

**Bottom
of scion**



Whip Graft

$\frac{1}{4}$ " vertical cut
starting $\frac{1}{3}$ the
distance from the tip



Twist the knife
outward to make
insertion easier

Whip Graft

Scion
inserted
into stock

Parafilm
tape
wrapped



Whip Graft

3 weeks later



Remove competing shoots



Whip Grafting on an Older Branch or Trunk



Whip Grafting on an Older Branch or Trunk



Whip Grafting on an Older Branch or Trunk



Whip Grafting on an Older Branch or Trunk



Popular Grafting Methods

Budding

- T-budding
- Chip budding



Grafting

- Whip graft
- Bark graft
- Cleft graft



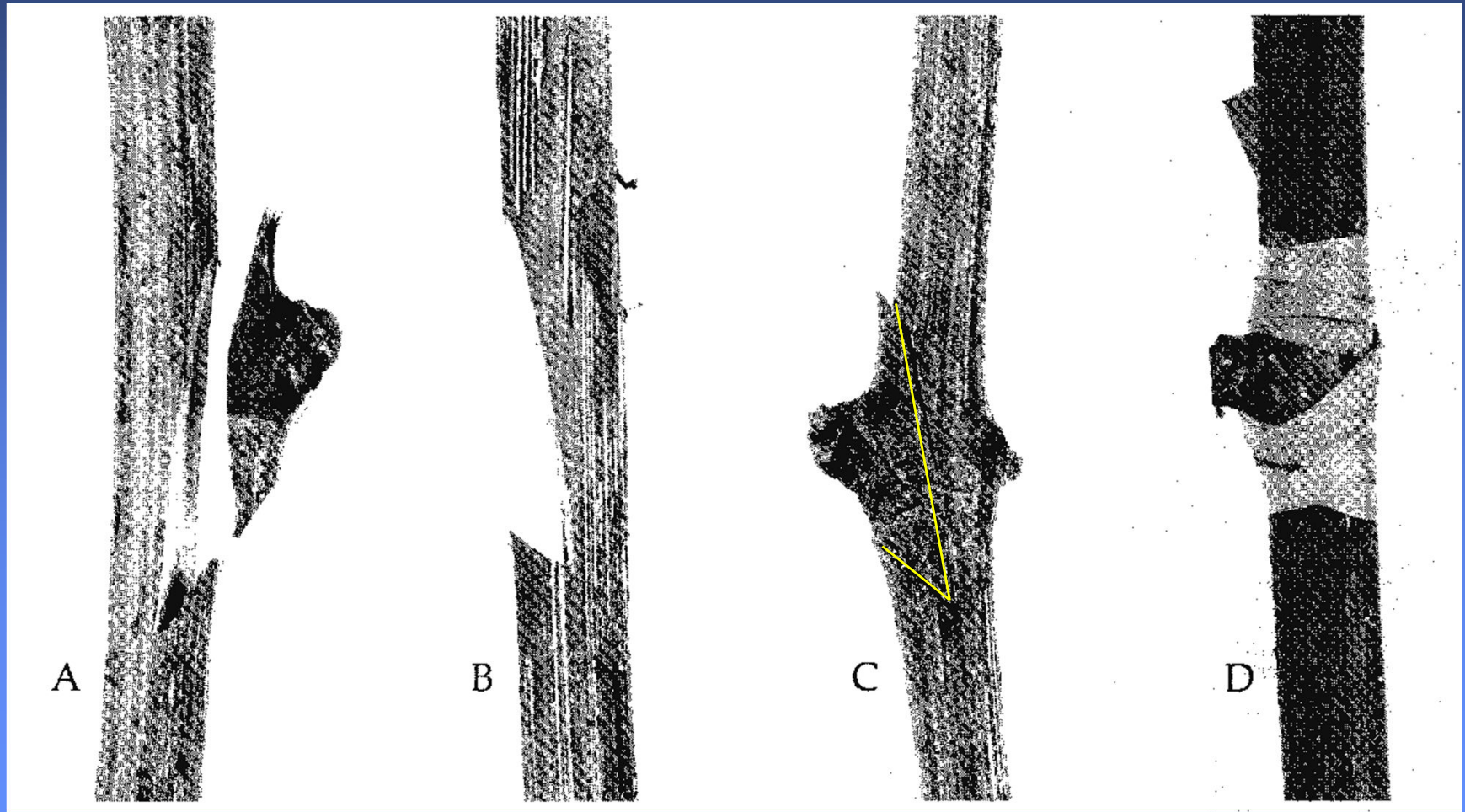
Chip Budding

- Removal of bud of desired variety (with wood), insertion in stock
- Bark doesn't need to be "slipping"
- Done in dormant season, early spring (budwood stored in fridge), or late summer
- Use vigorous 1-year-old branches $> \frac{1}{4}$ in.
- Cut branch $\frac{1}{2}$ in. above top of bud to force growth

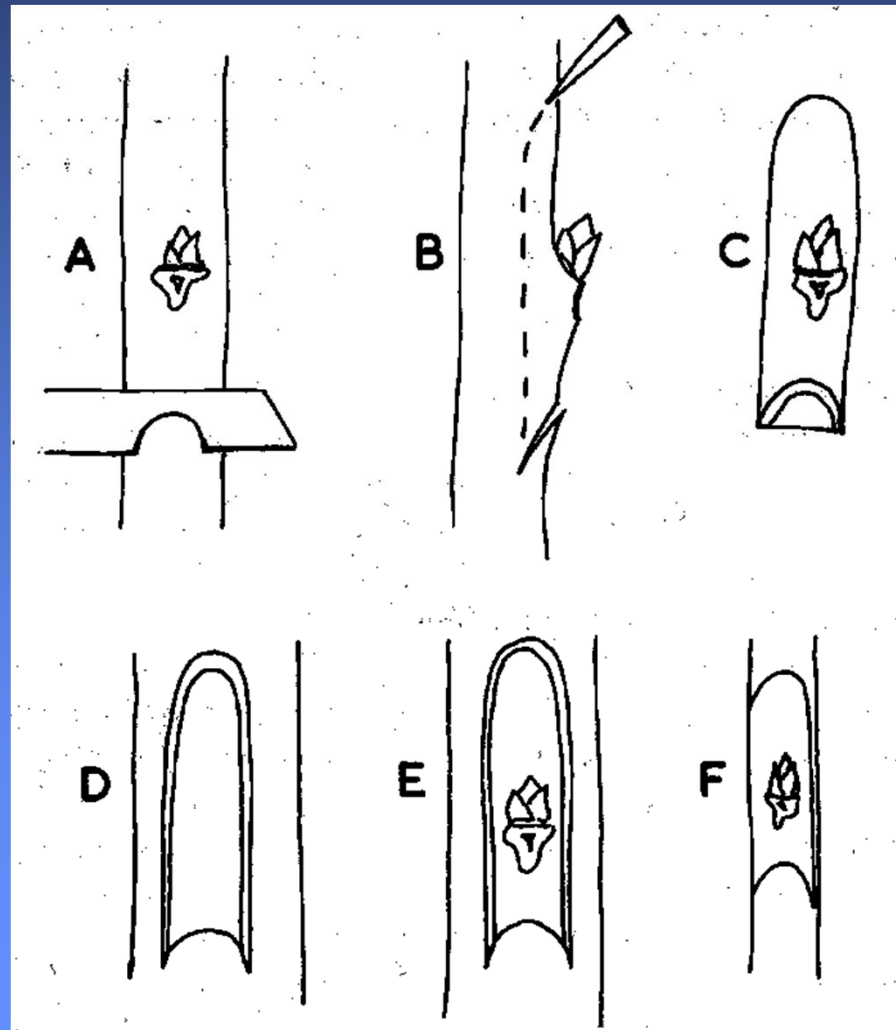
Budwood for Chip Budding

- Collect just before budding
- Base of current-season, fast-growing shoot (late summer) OR 1-year-old dormant “whip” (late winter / early spring)
- Buds that are mature, leaves removed
- Refrigerate immediately if needed, store in plastic bag with moist paper towel or newspaper

Chip Budding



Chip Budding





Chip Budding

Remove leaves from
scion, leave petiole

Chip Budding

SCION



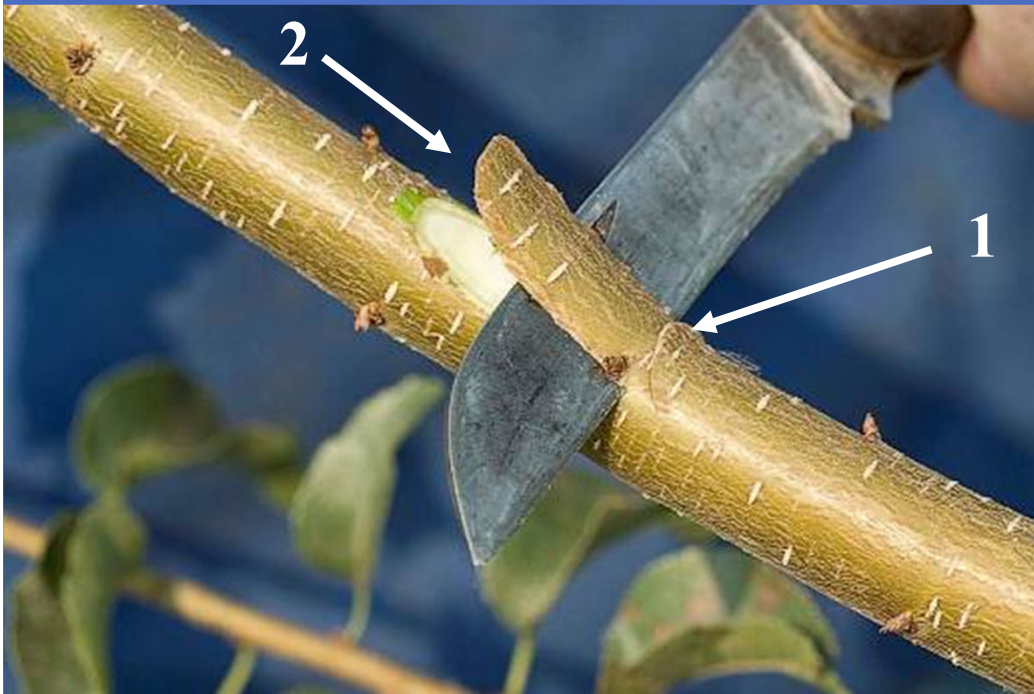
Angled cut $\frac{1}{2}$ "
below bud



Cut under bud to
first angled cut

Chip Budding

Chip (inverted) with
angled cut $\frac{1}{2}$ " below
bud



STOCK

Make the same two
cuts in the stock

Chip Budding



Chip inserted into
stock



Smaller chip inserted
on one side

Chip Budding

Parafilm wrapped (single wrap over bud)



Popular Grafting Methods

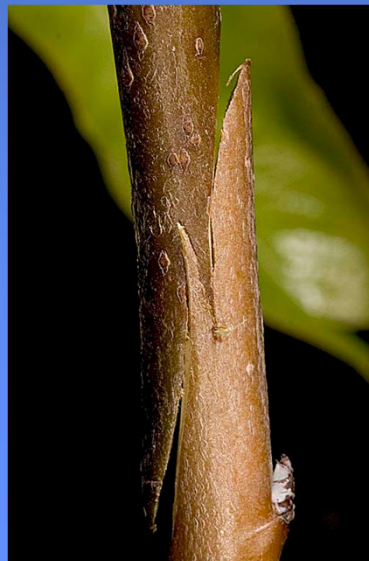
Budding

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Grafting

- Whip graft
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- Cleft graft



Bark Graft

In spring:
Cut off limb, scrape bark

In winter:
Choose scion wood with
plump buds



Bark Graft

Choose 1-yr.old
scion below bend



Make long
sloping cut



Make small
sloping cut
on back side



Bark Graft

Make 2 cuts through bark the width of the scion



Bark Graft

Peel back bark
between cuts



Cut bark flap,
insert scion



Bark Graft

Inserted scion,
nail in flap & scion



Wax over all cuts



Alternative Bark Graft Method

Dual sloping cuts



Use single cut in bark,
push knife laterally



Alternative Bark Graft Method

Insert scion



Inserted scion (no nail)



Alternative Bark Graft Method

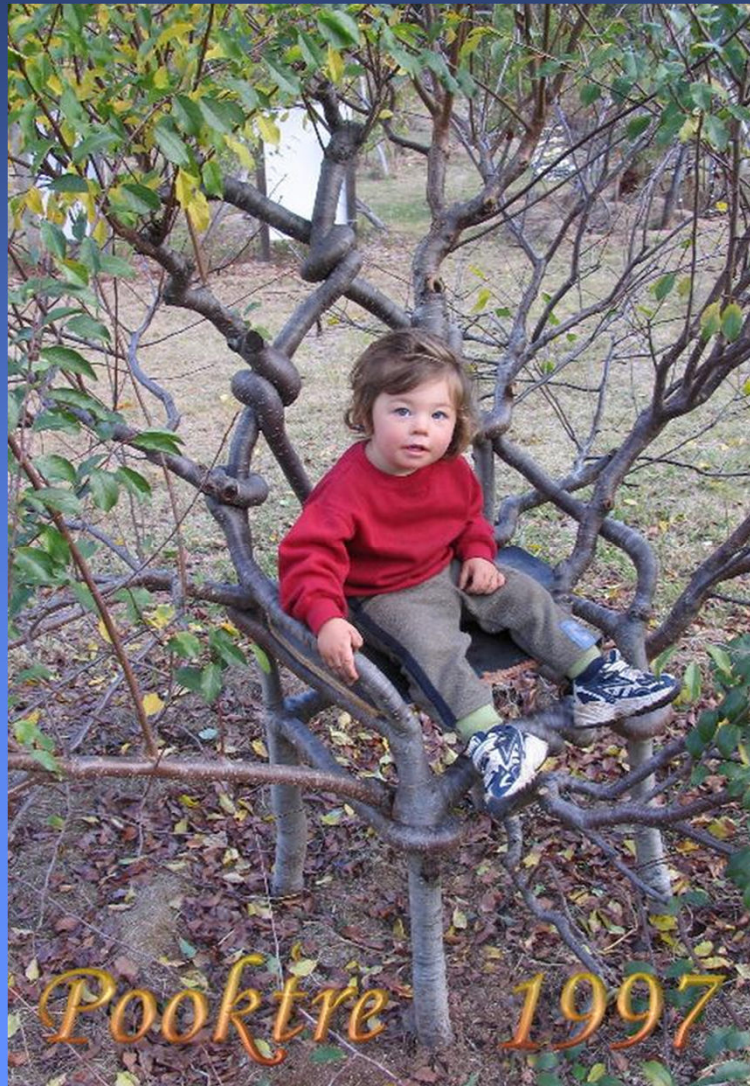
Wrap tightly with
plastic tape



Wax over tape &
all cuts



Questions?



Pooktre 1997