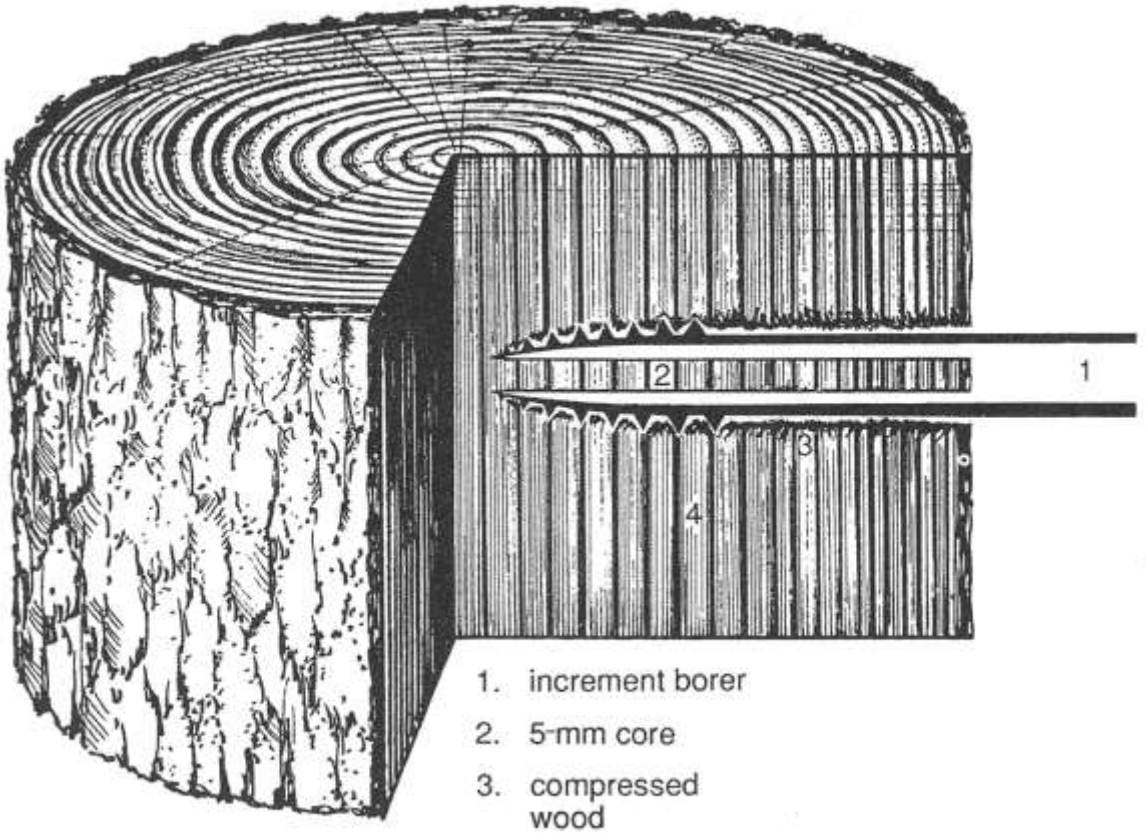


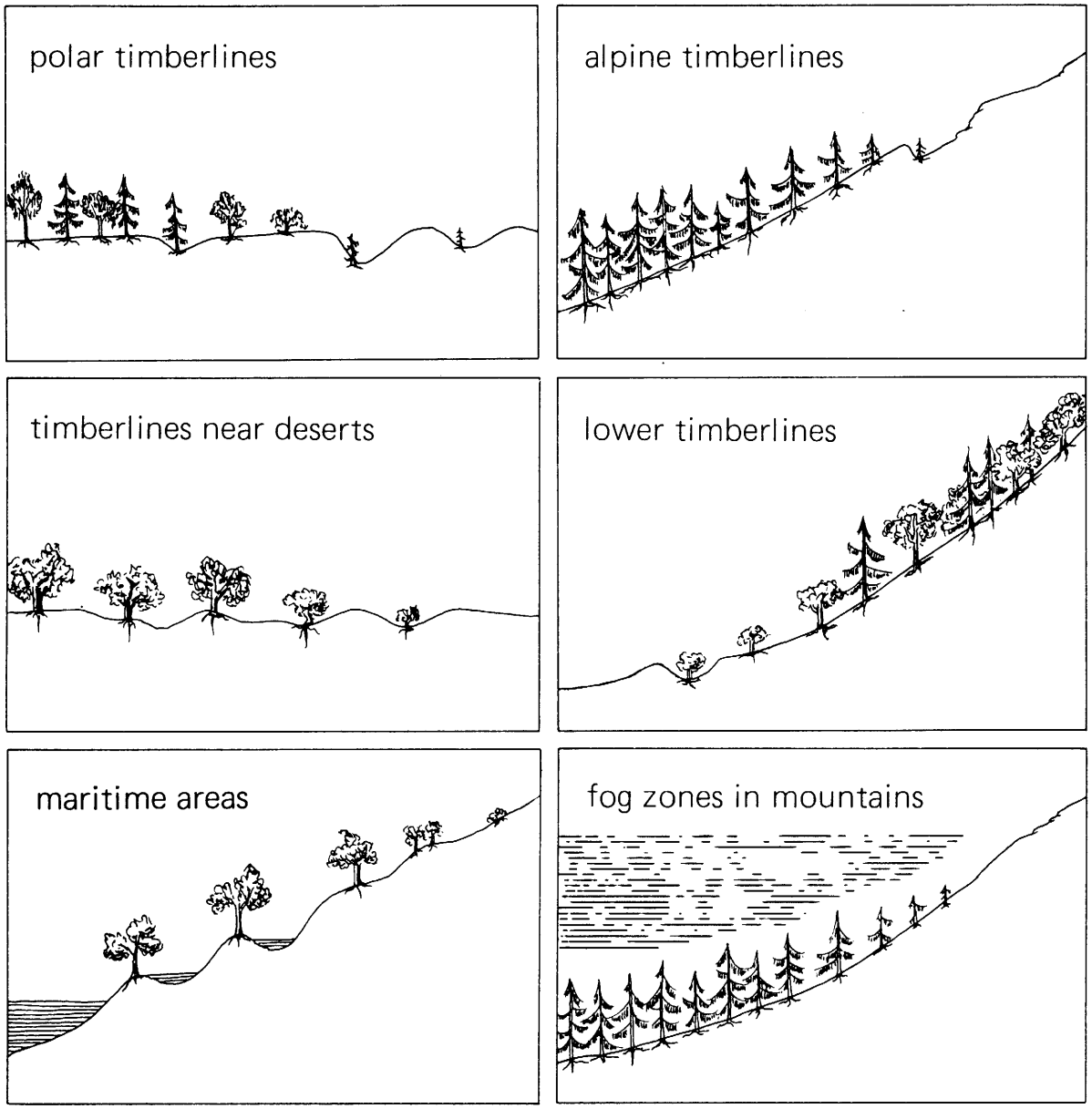
1. increment borer
2. 5-mm core
3. compressed wood
4. vertical grain orientation

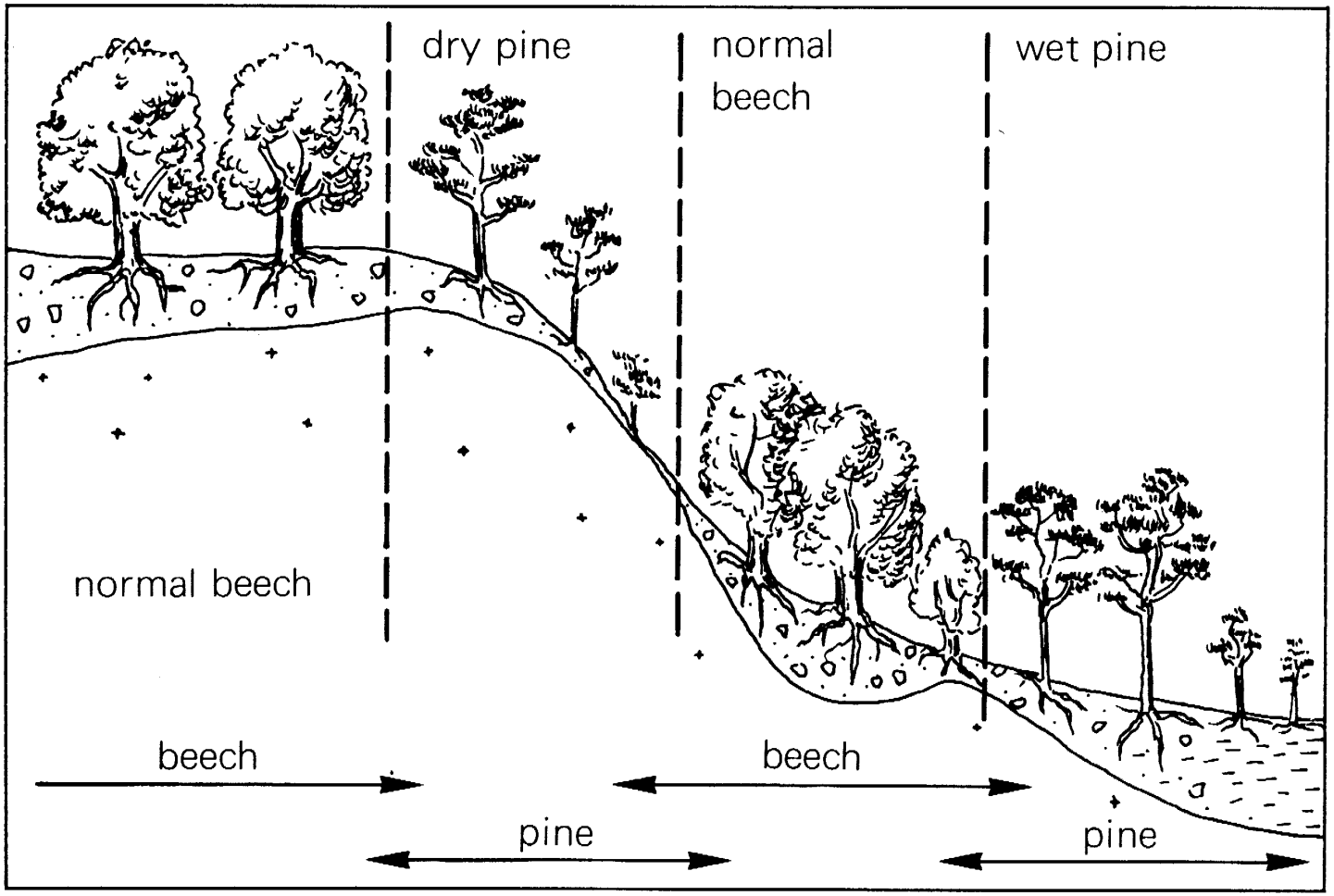
Trees growth limited by:

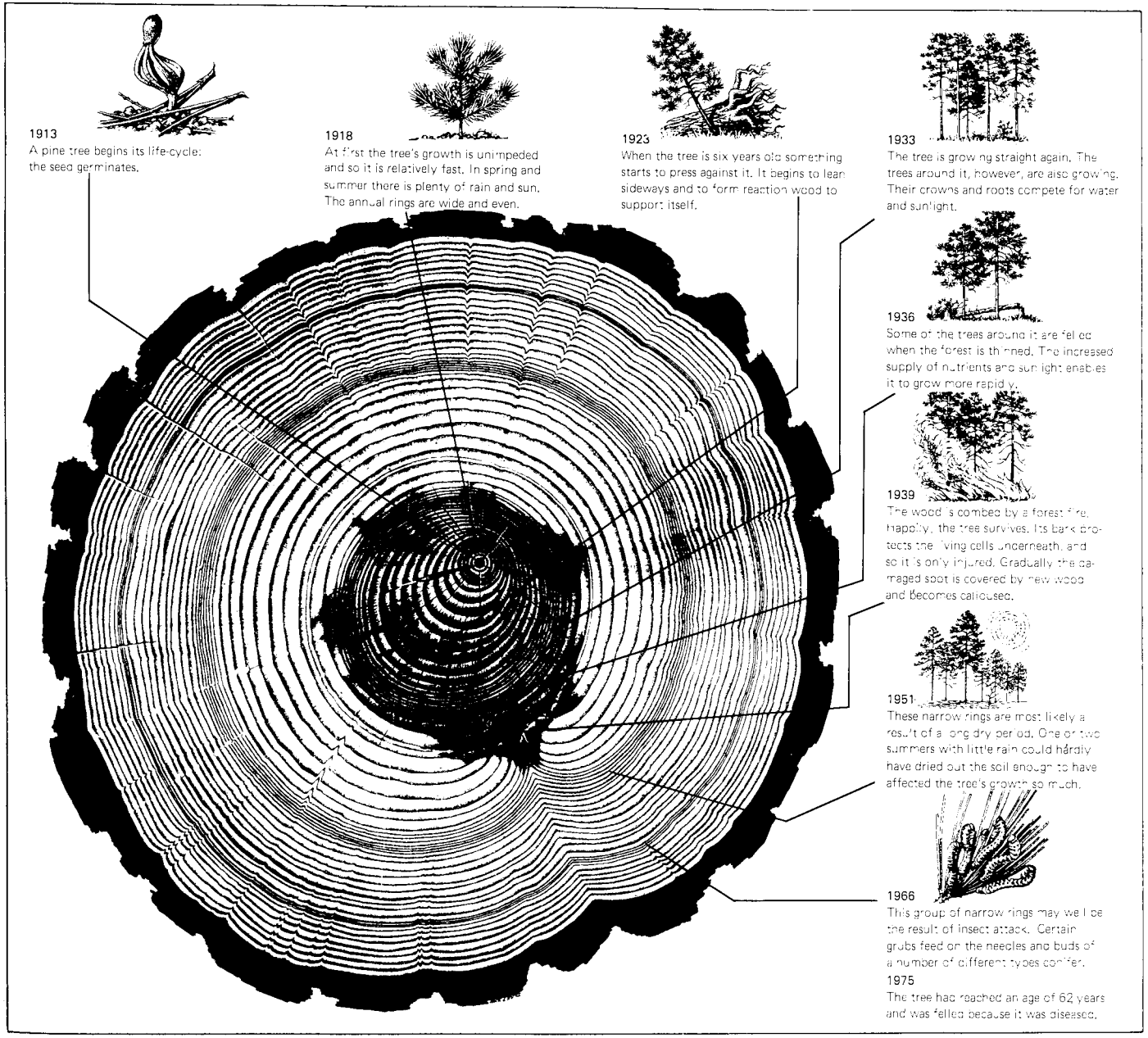
Temperature

Drought

Too much moisture




dry pine
normal beech
wet pine
normal beech
beech
beech
pine
pine



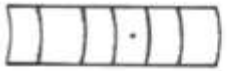
The reaction of an individual tree to different environmental factors (Wald and Umwelt).


This one's got no rings, just a Facebook profile. Apparently it's 45 year old, likes Korean food and watching reality shows ...

Skeleton plotting

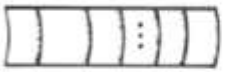
Schweingruber, F. H., Eckstein, D., Serre-Bachet, F. and Bräker, O. U. 1990. Identification, presentation and interpretation of event years and pointer years in dendrochronology. *Dendrochronologia* 8, 9-38.

Dating marks



One pinprick indicates the DECADE.

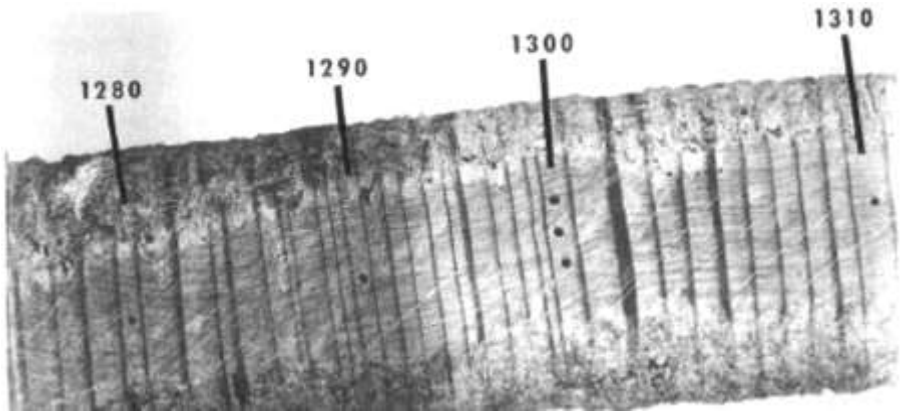
Two pinpricks in a vertical alignment indicate the 50th YEAR.



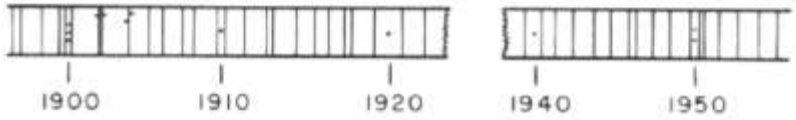
Three pinpricks in a vertical alignment indicate the CENTURY YEAR.

Two pinpricks, horizontally aligned, indicate the presence of a "MICRO" RING.

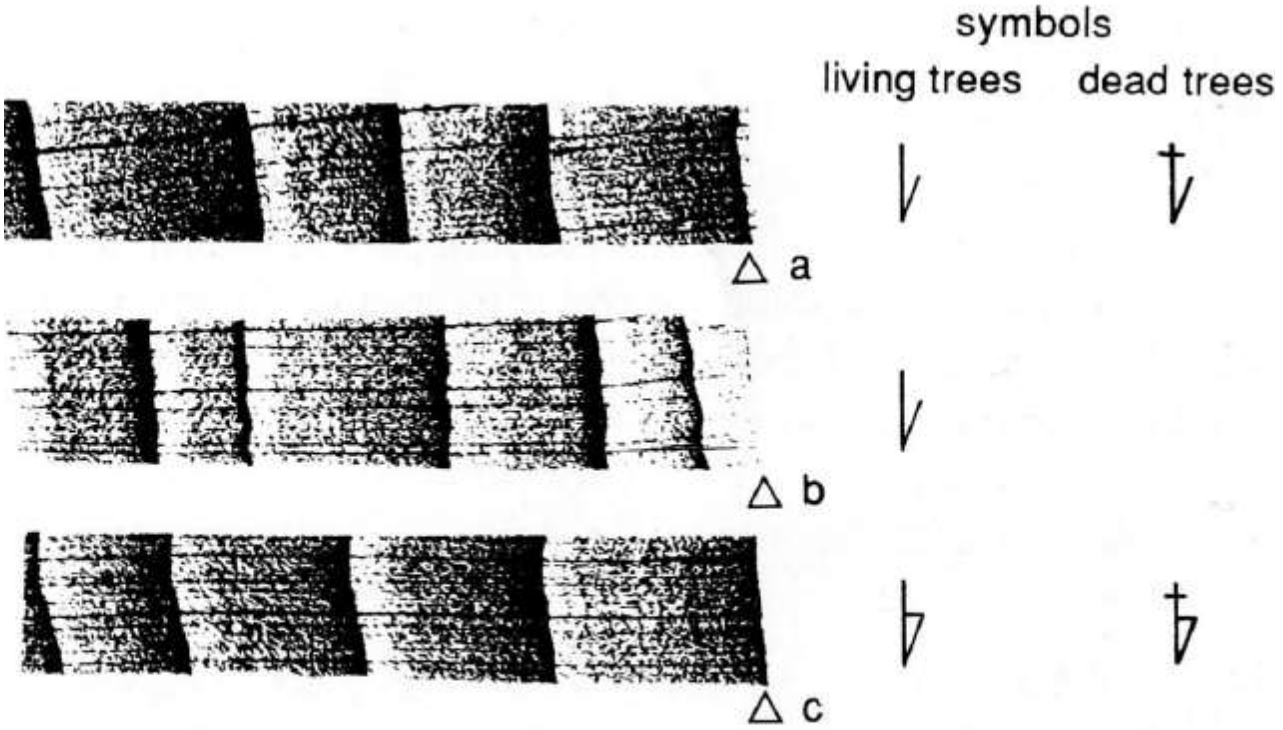
Two pinpricks aligned at an angle across a latewood band indicate that a ring is MISSING from the sequence.



A SCHEMATIC RING SEQUENCE



Symbols: The outermost rings



Growth stopped at:

- Budbreak

- Full leaf

- After growing season

Symbols: position of innermost rings

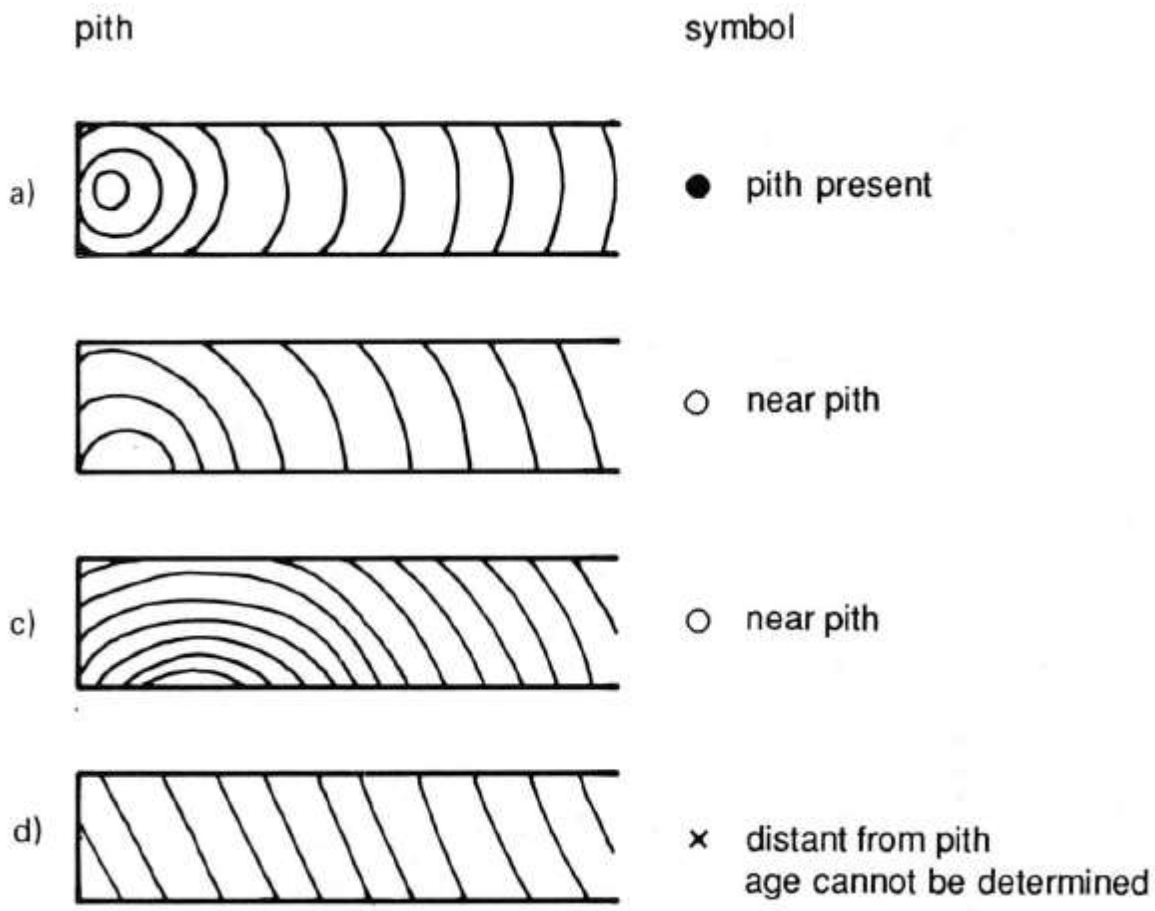
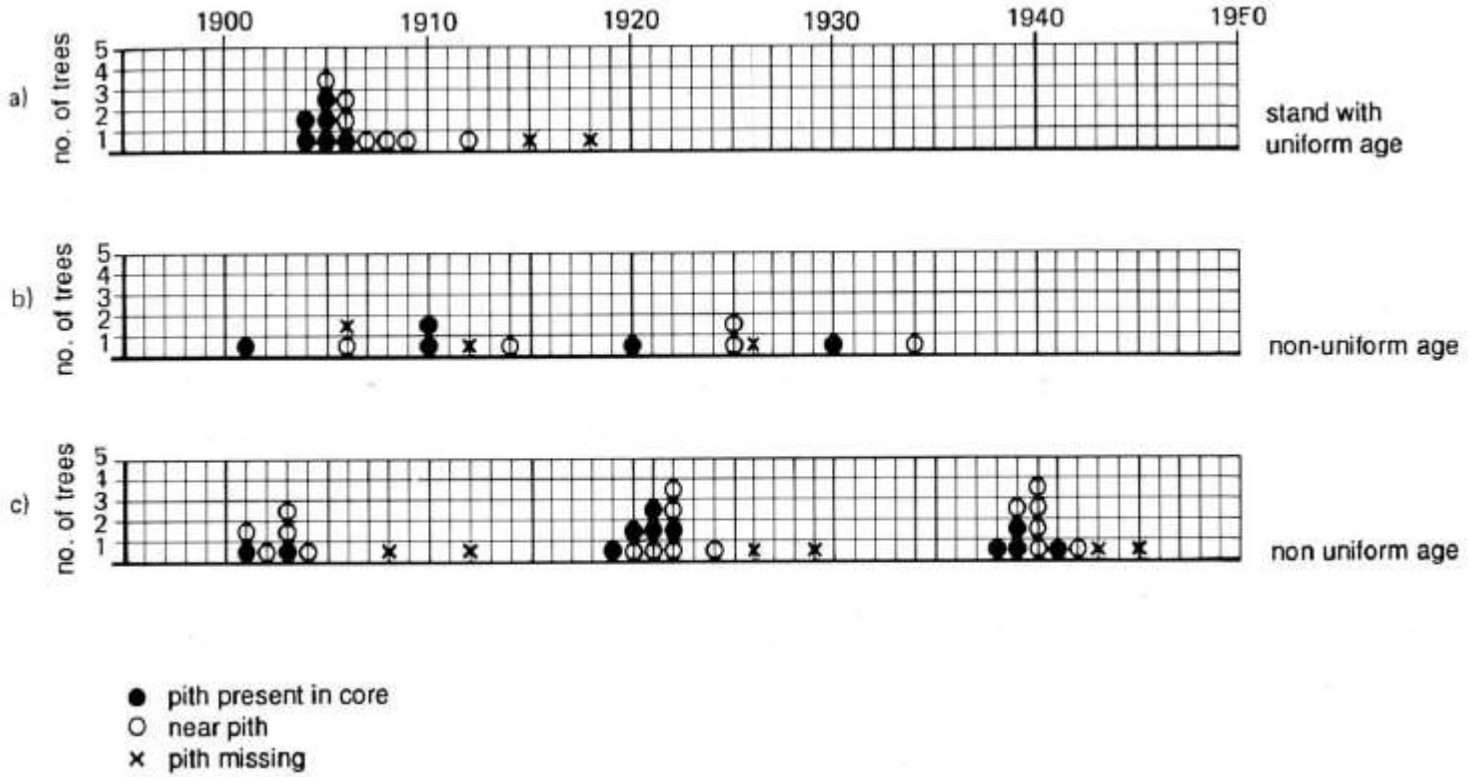
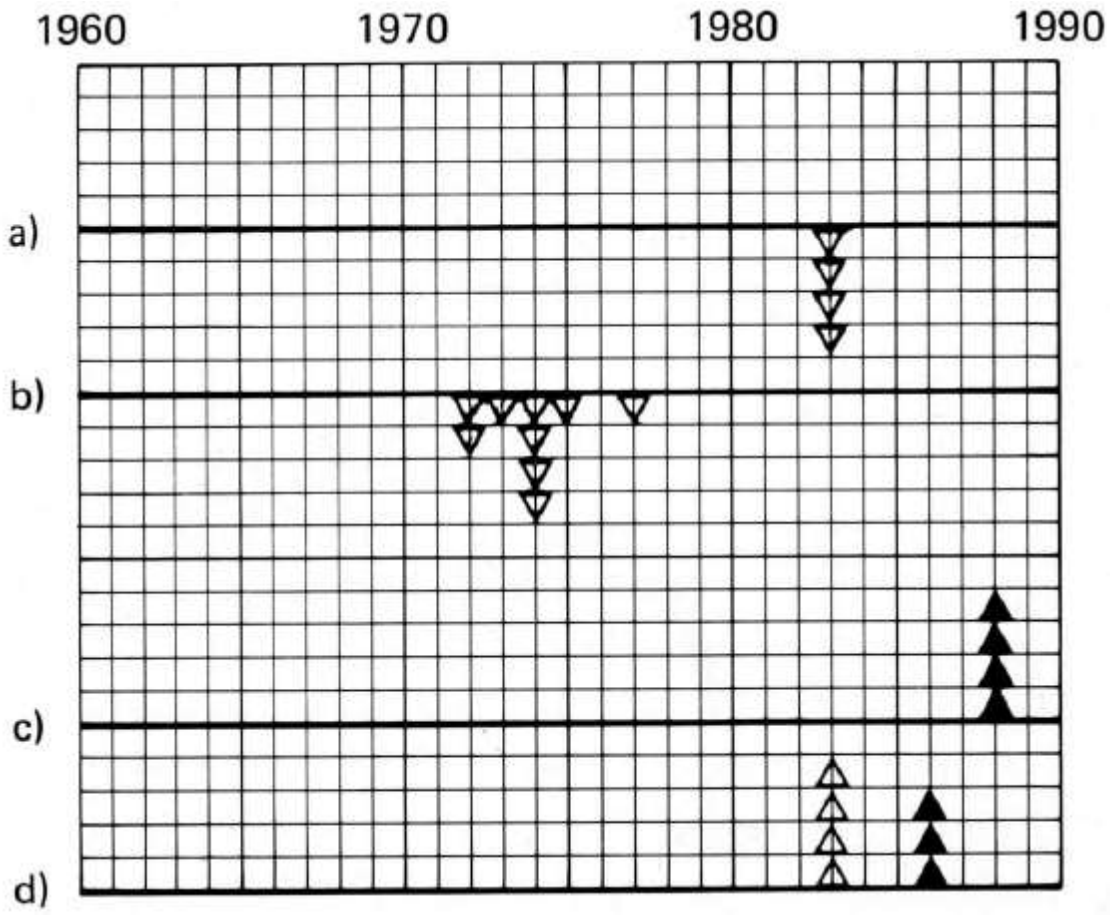


Figure 9 - Position of the innermost rings in cores and suggested symbols.

Histogram of innermost rings



Histogram of outermost rings



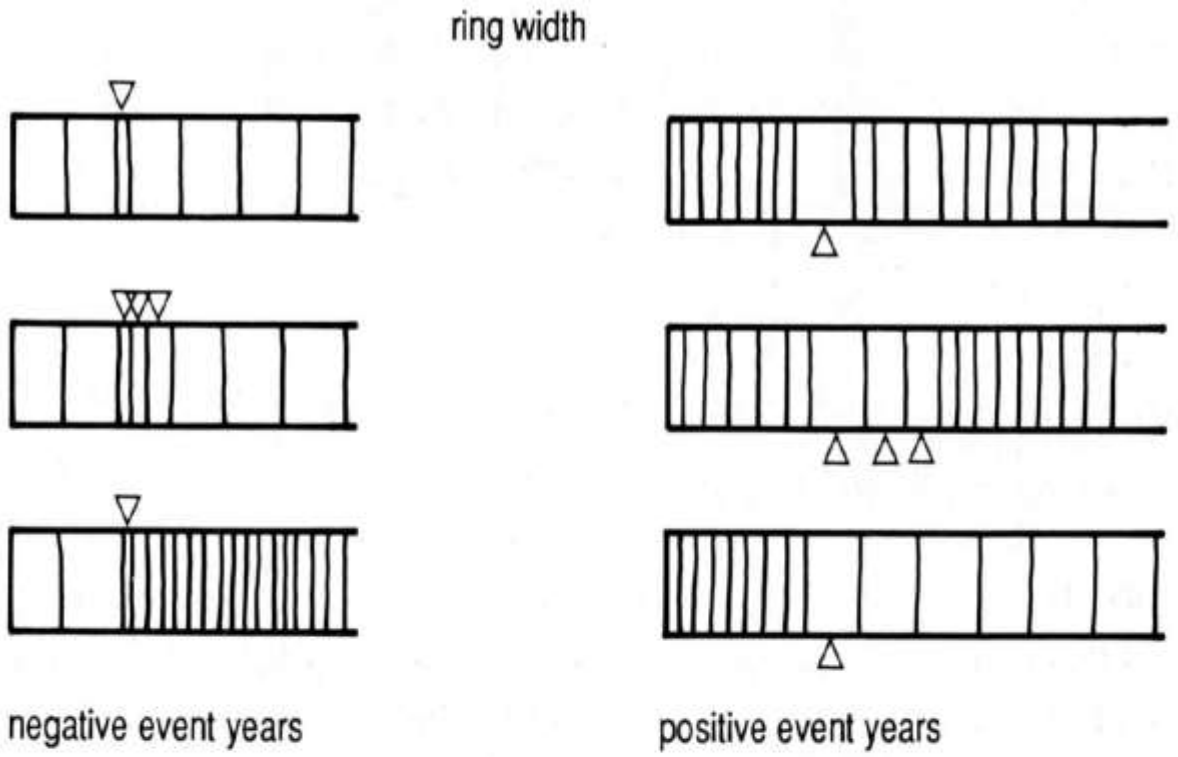
Terms

Relating to observations and measurements of...

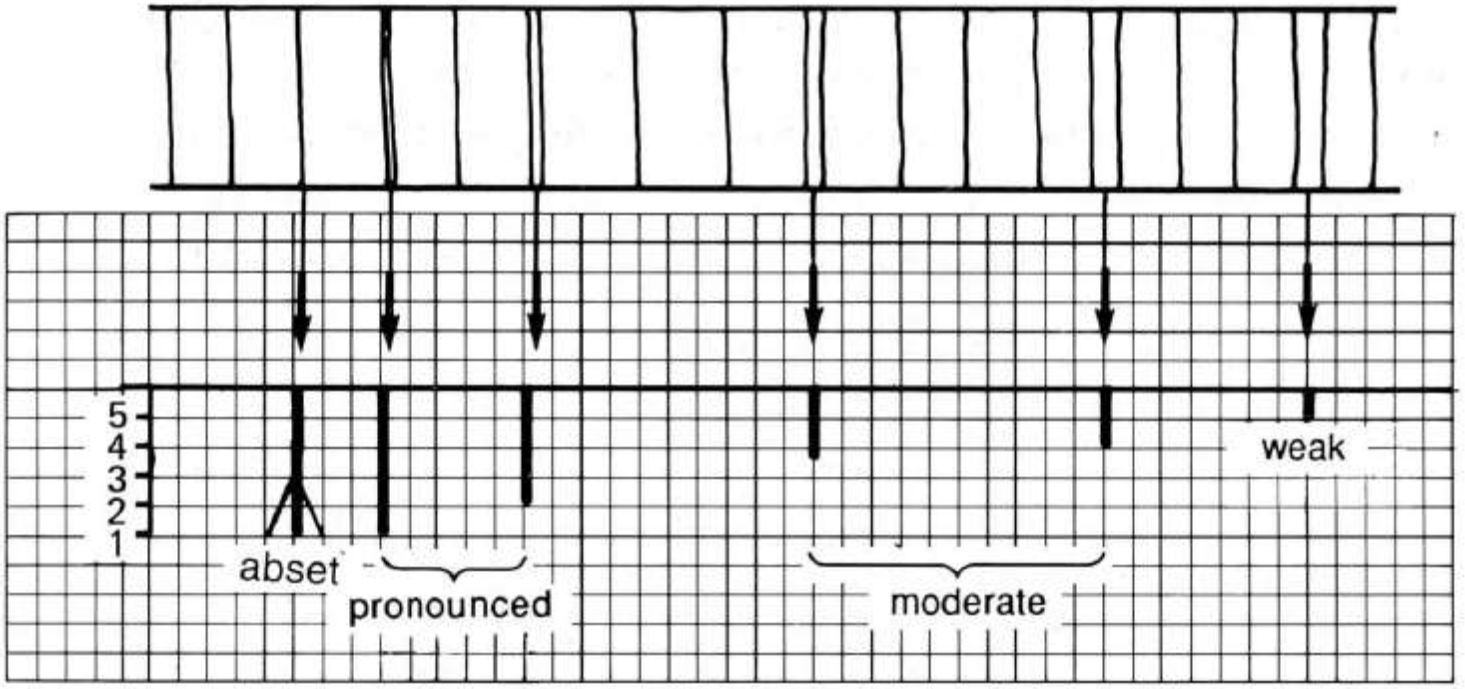
- single tree-ring samples:
  - Event year
  - Abrupt growth change

- groups of cross-dated ring sequences:
  - Pointer year
  - Pointer value (measurements: extreme values)
  - Pointer interval (up-/downward trend; Gleichläufigkeit)
  - Period frequency (ref. reduction/release phase)

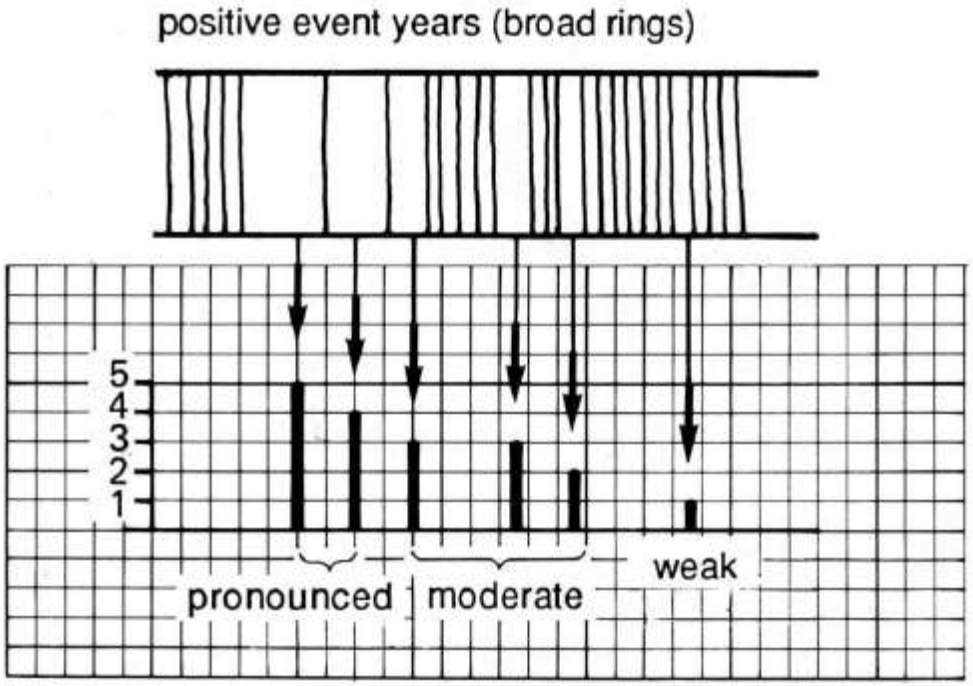
Event years


ring width
negative event years
positive event years
latewood width
negative event years
positive event years

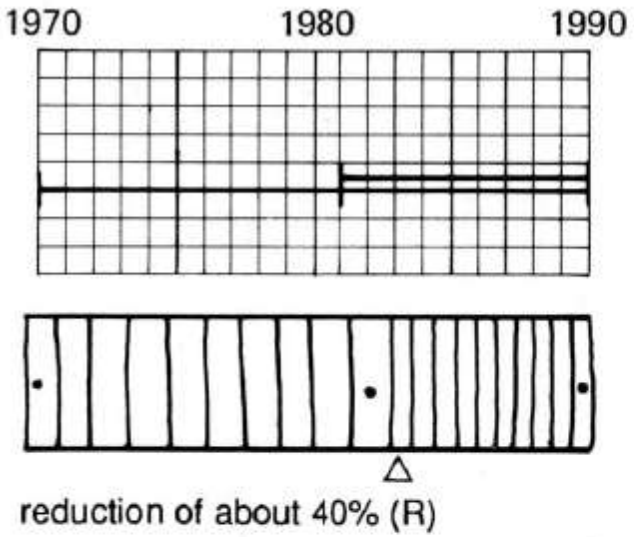
Negative event years (narrow rings)



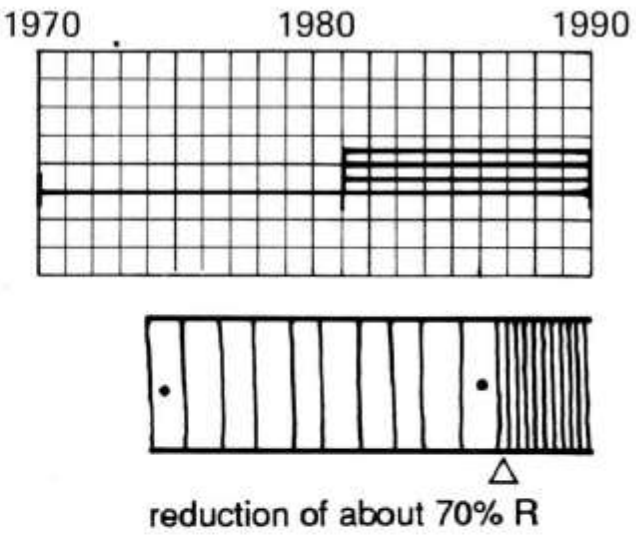
Positive event years (broad rings)



Periods with growth reduction



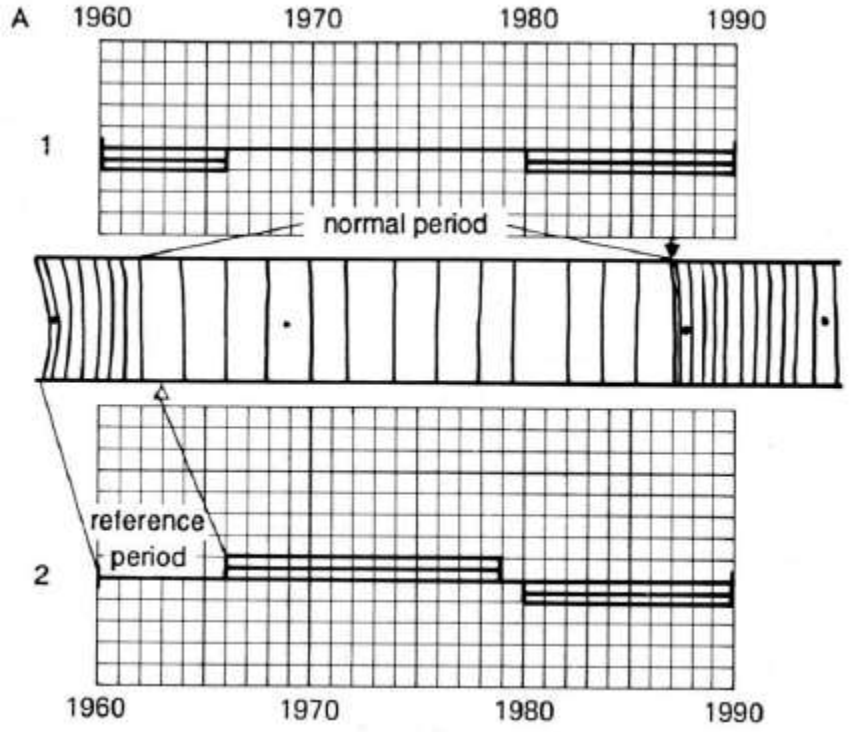
reduction of about 40% (R)



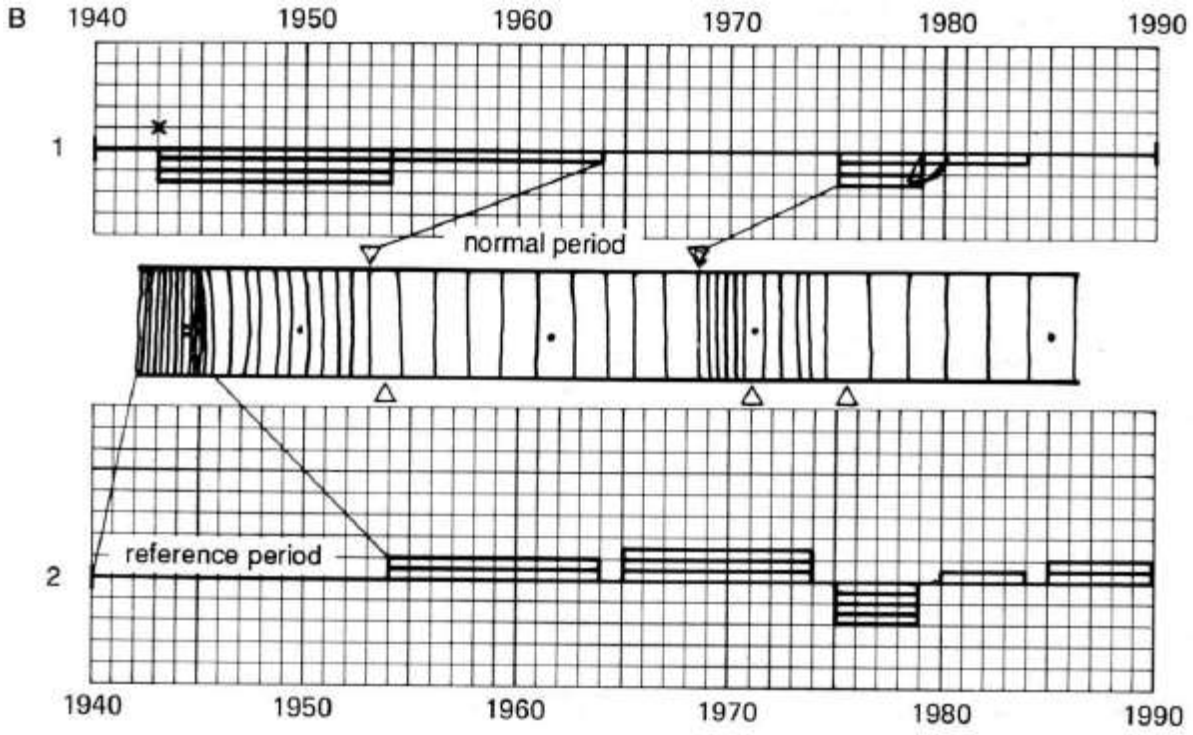
reduction of about 70% R

reduction	40-55%		(R)
reduction	56-70%		R
reduction	>70%		R

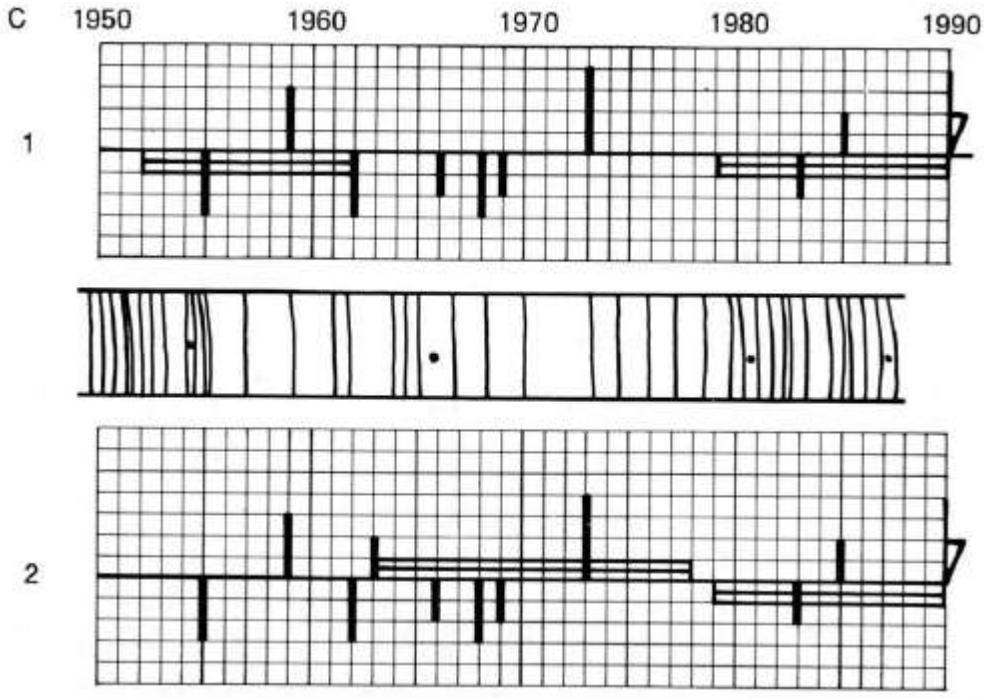
Abrupt growth changes



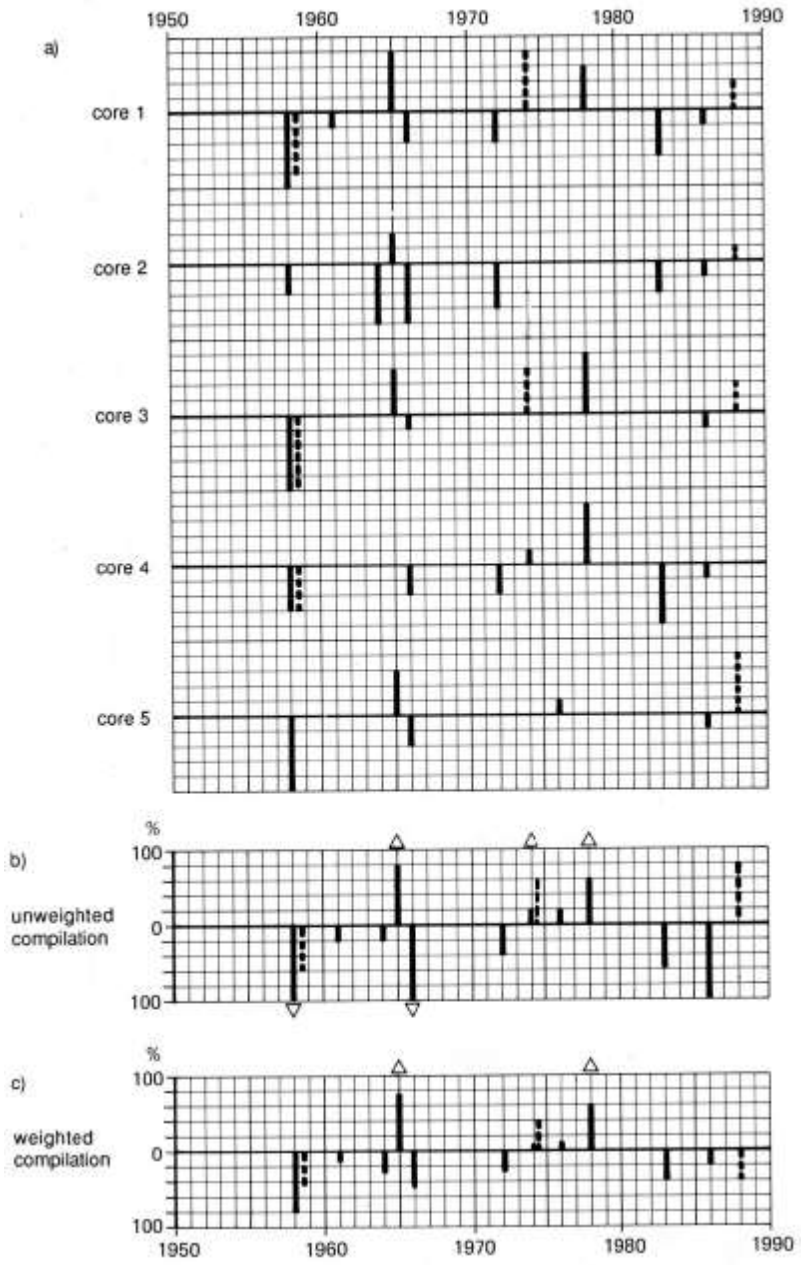
Abrupt growth changes (2)



Abrupt growth changes and event years



Summation of event years



Summation of event years (2)

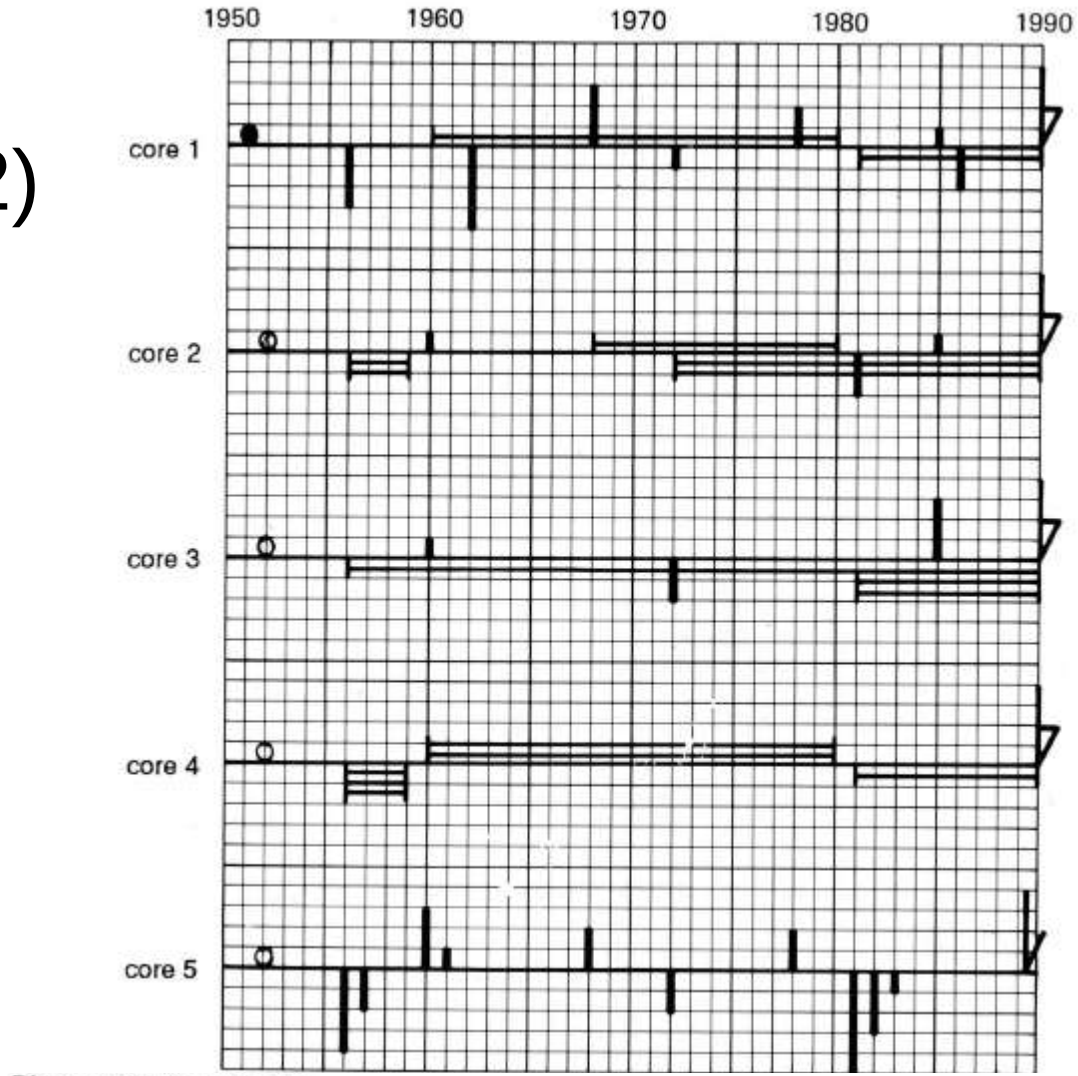
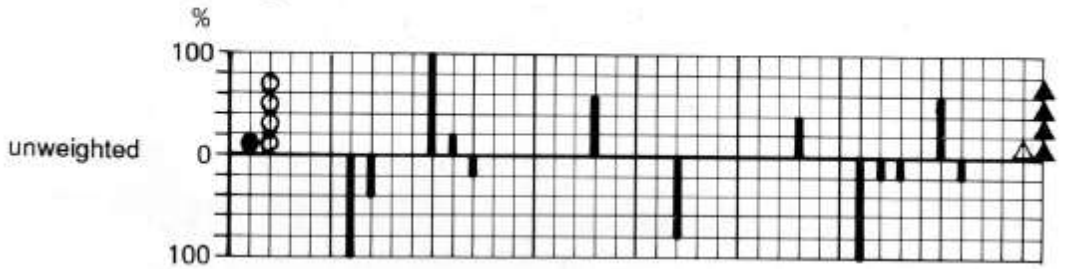
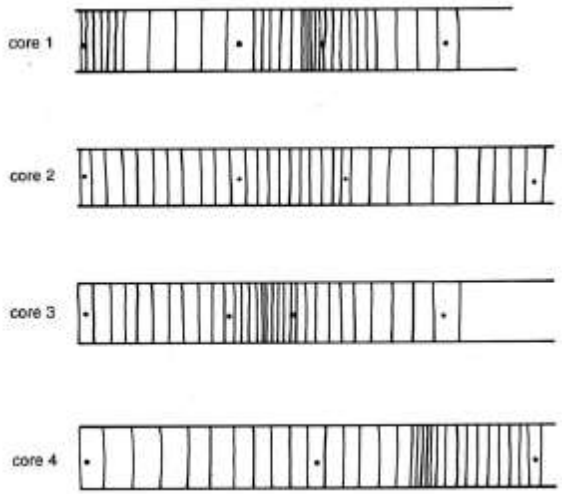
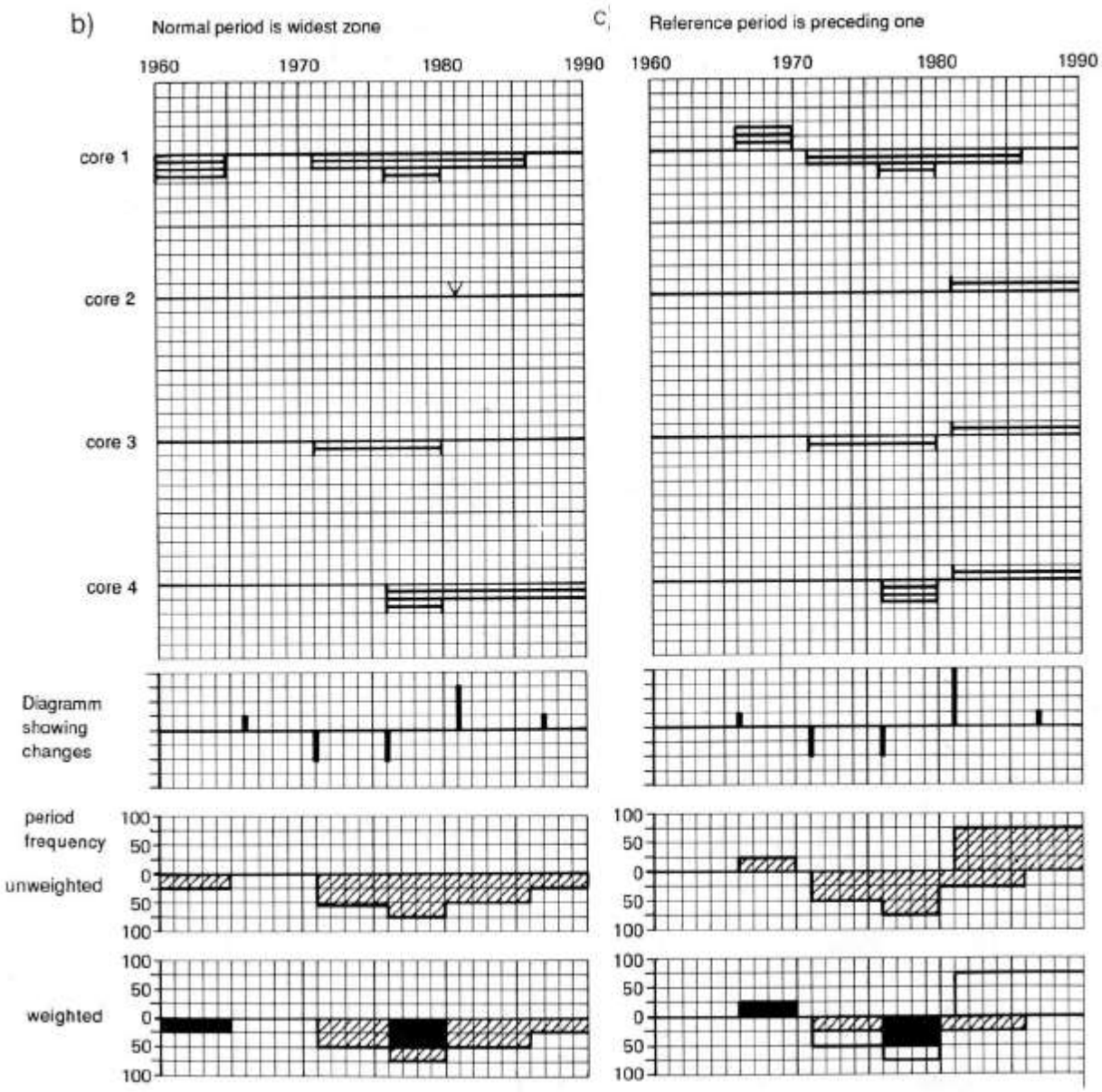


Diagram showing changes







Determination of period frequency

Density fluctuations

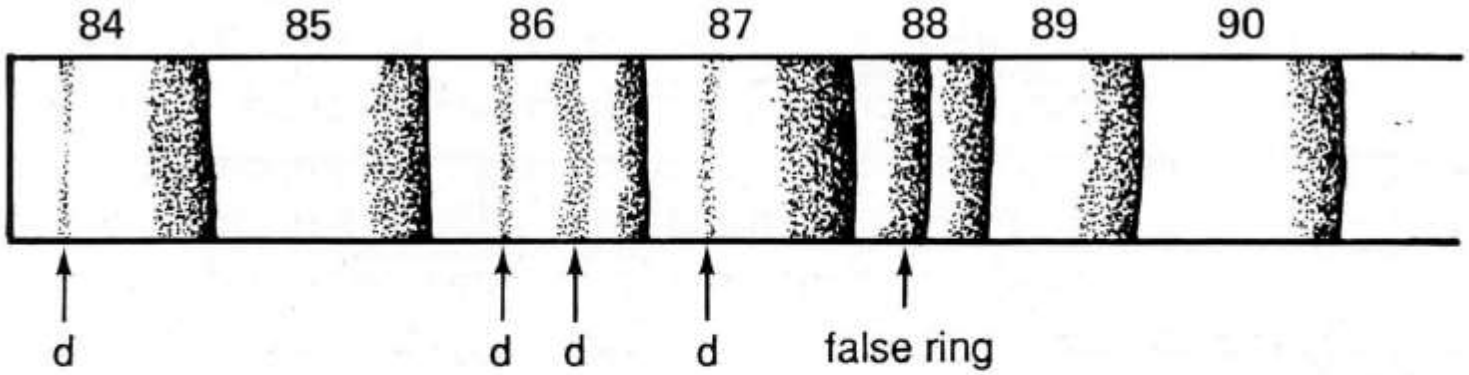


Figure 2 - Density fluctuations (d) and one false growth ring in a ring sequence. In 1984, d occurs in the earlywood, in 1986 two fluctuations are evident. d of 1988 is morphologically not distinguishable from a true annual ring.

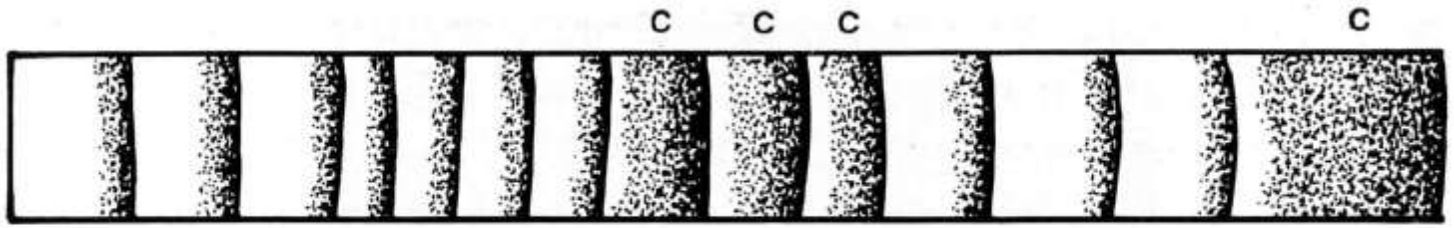


Figure 3 - Growth rings with compression wood (c) in a ring sequence.

’Bua’ in Ballangen

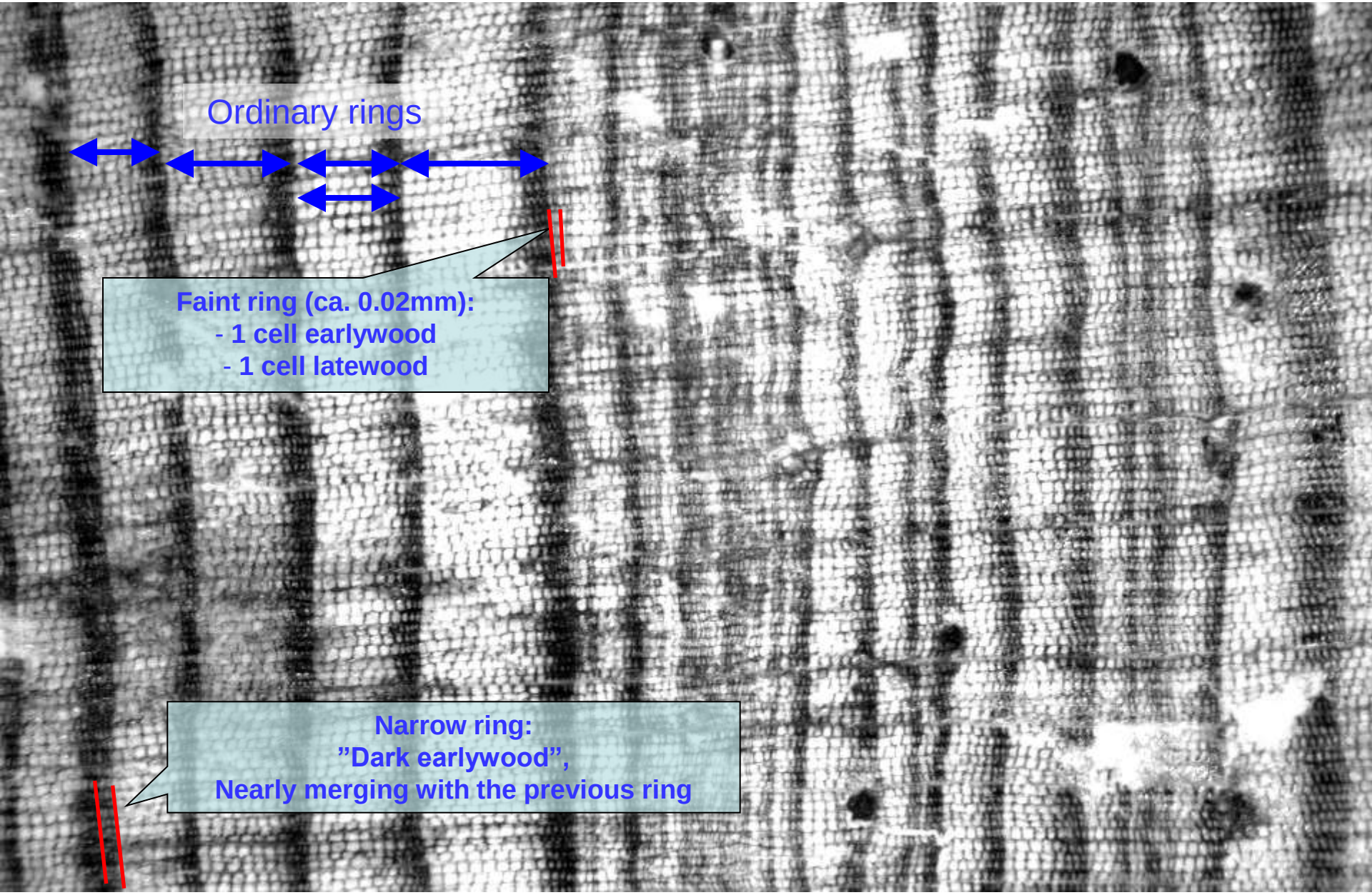
details from radius C

Partial ring

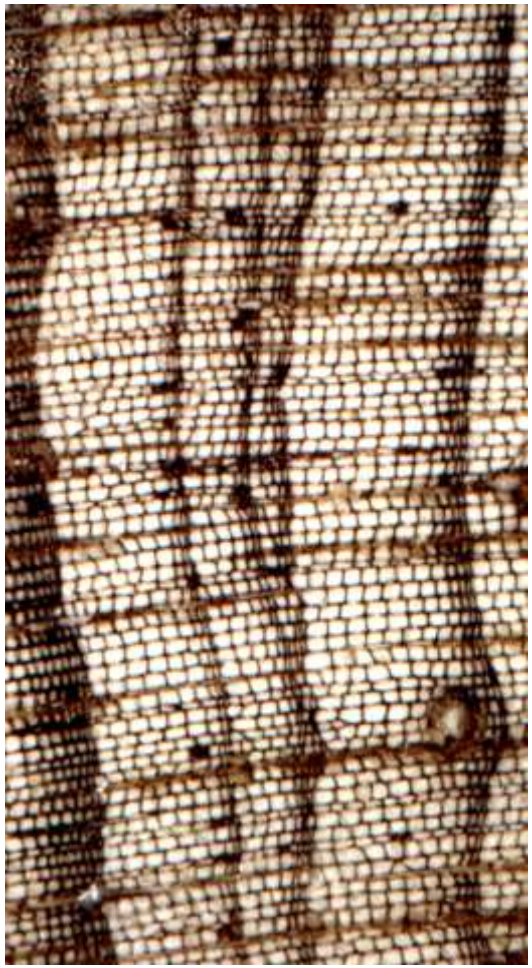
False ring / density fluctuation

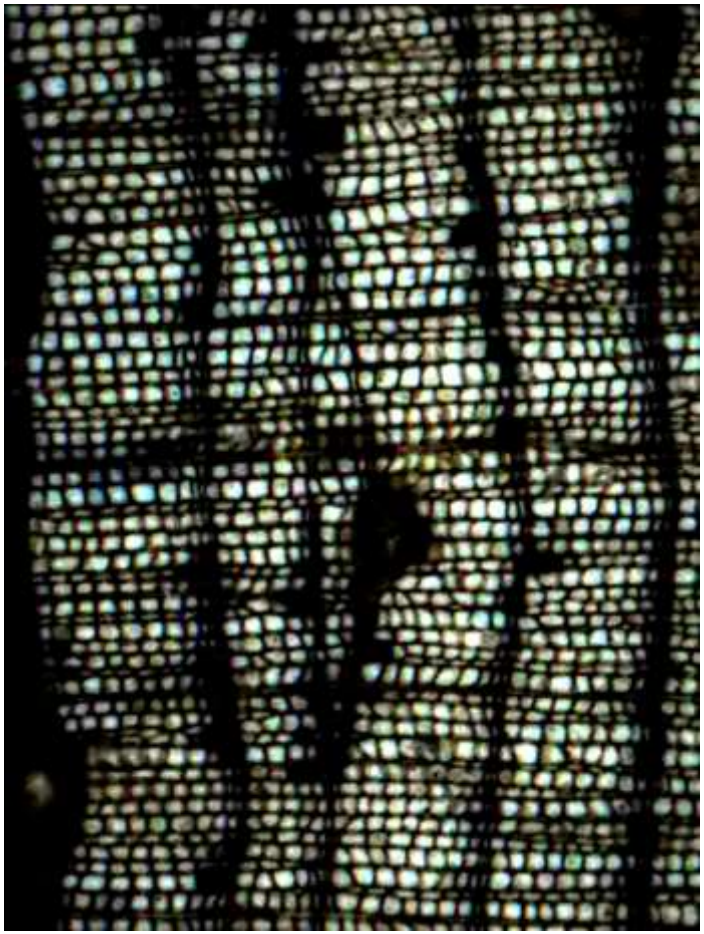
’Bua’ in Ballangen

details from radius D



Wedges / partial missing rings





Wounds

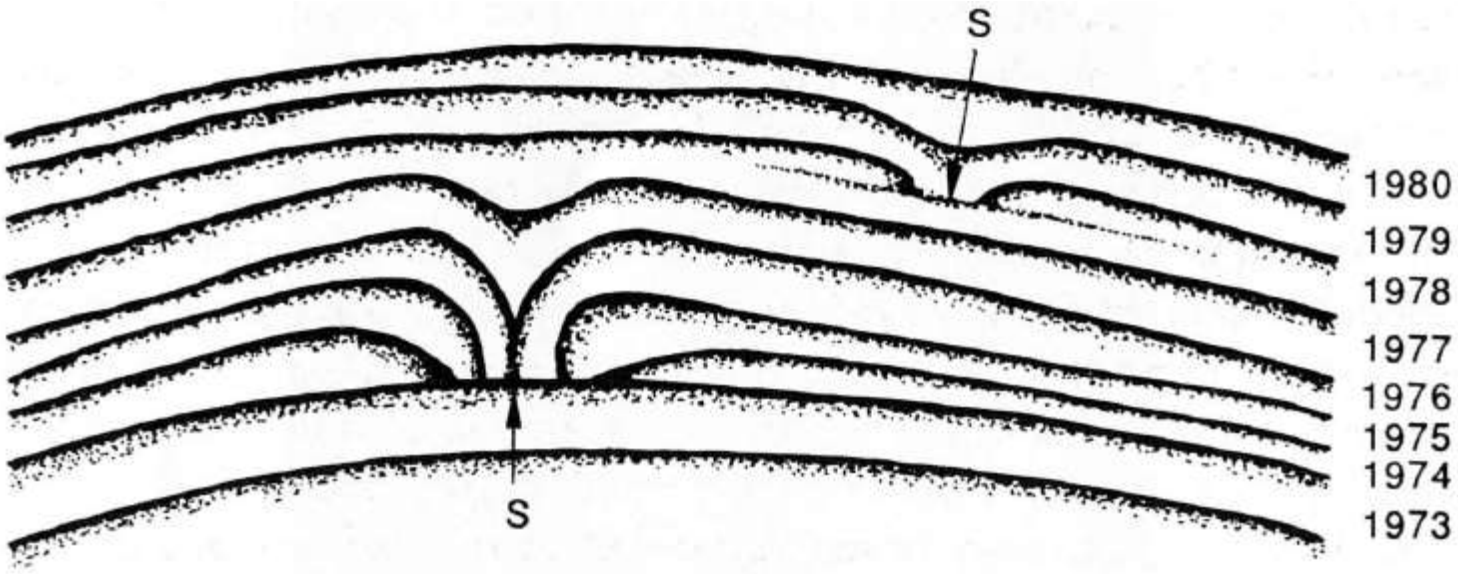


Figure 4 - Wounds in earlywood and latewood overgrown by callus tissue (s = scar). In 1974, the formation of callus began in spring, so that the wound must have been inflicted during the preceding dormant period in 1973/1974. In 1978, the formation of callus tissue began in the earlywood of the ring formed in that year, so that the wound must have been inflicted in the first weeks of the vegetation period of 1978.

Resin ducts

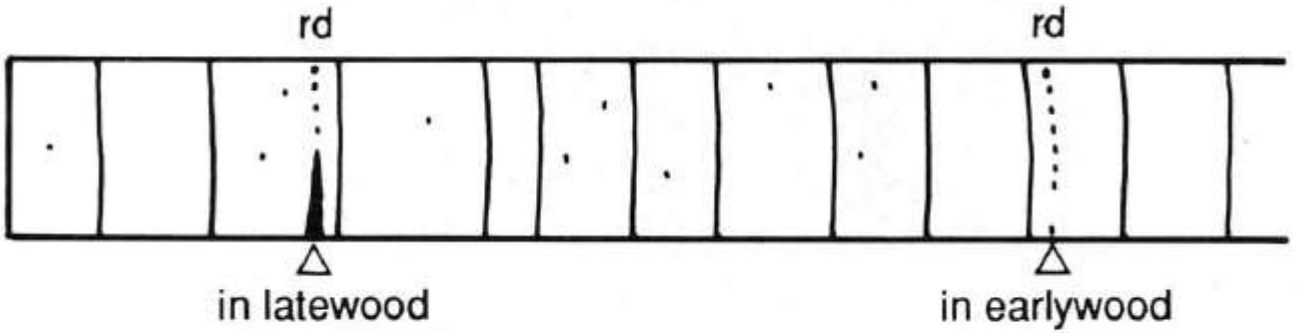


Figure 6 - Resin ducts (rd) and a resin cavity in a ring sequence.

Frost rings

Pores in a broadleave tree

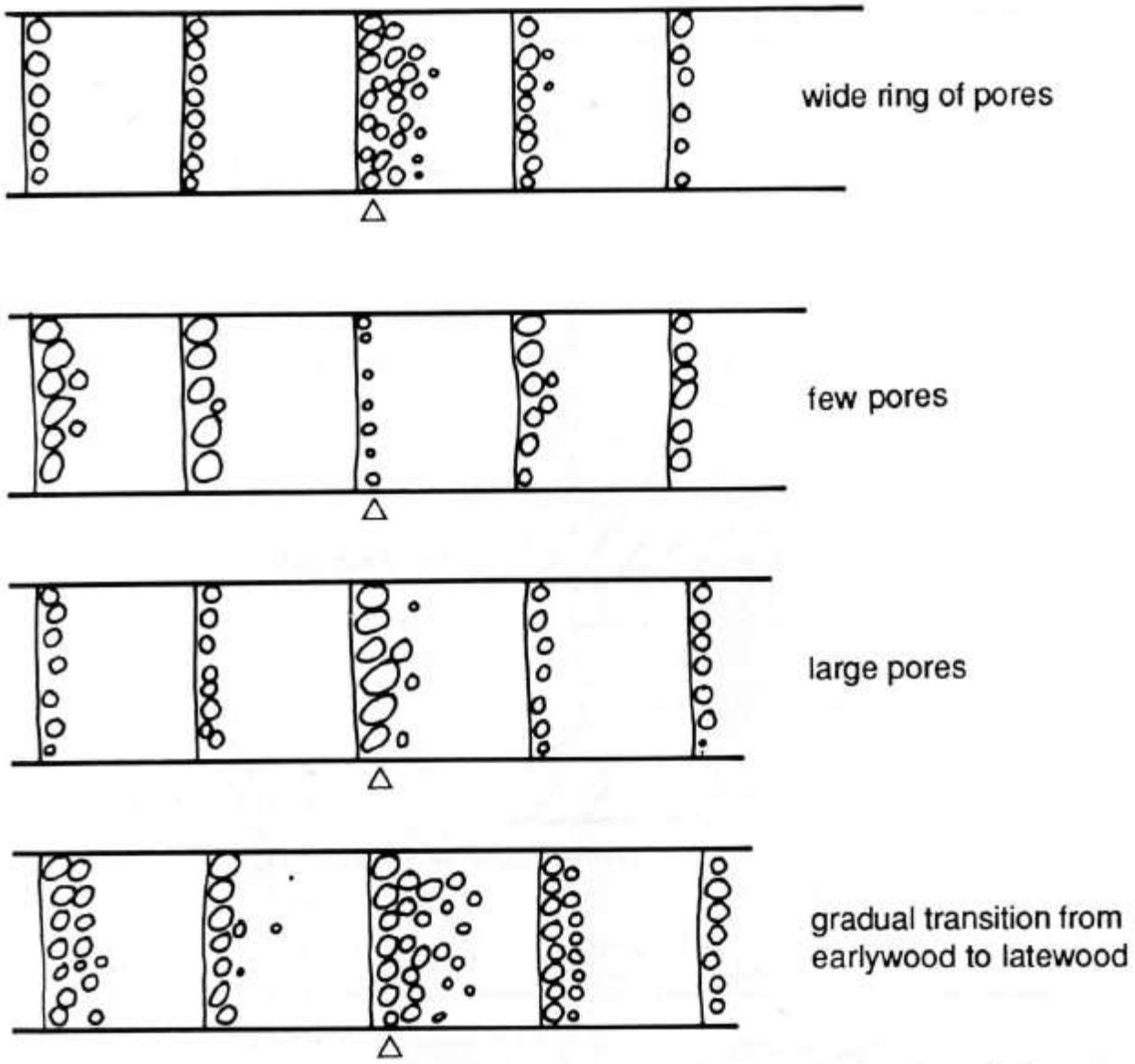
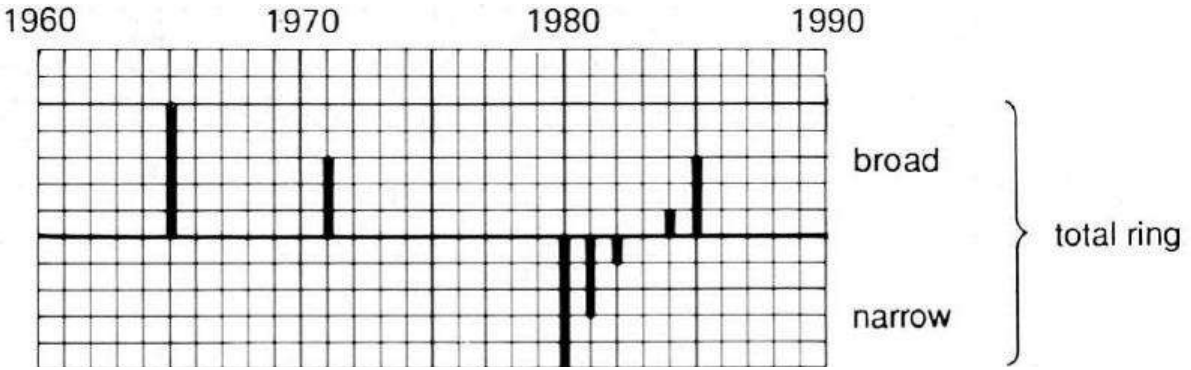
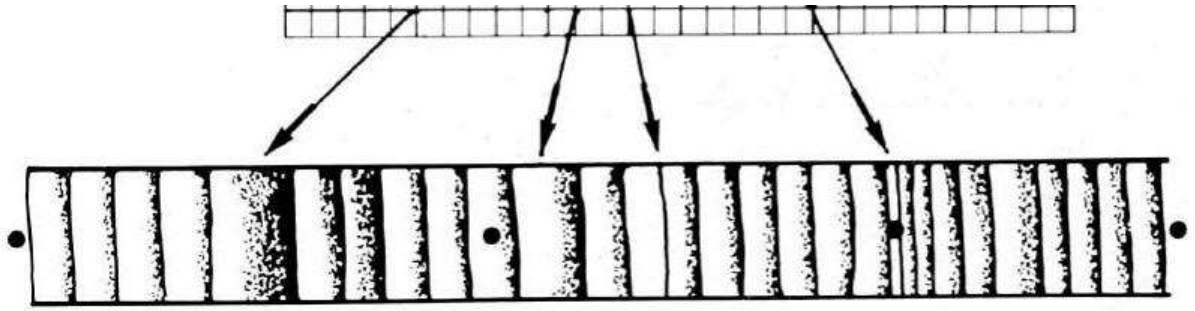


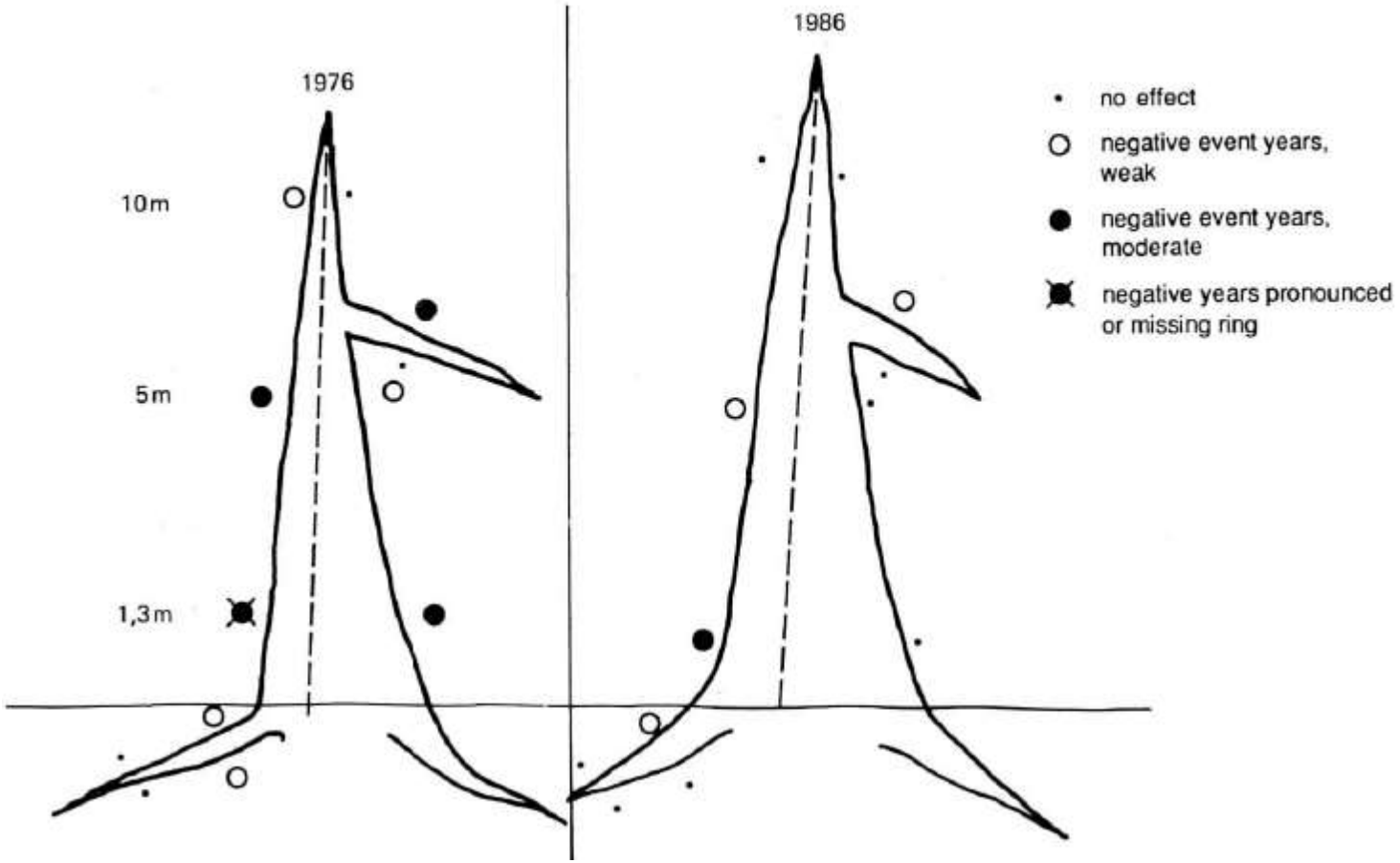
Figure 7 - Variation in number, size, and distribution of pores in the earlywood of a ring-porous broadleave tree (*Quercus robur, Q. alba*).

Ring width and latewood width as event years

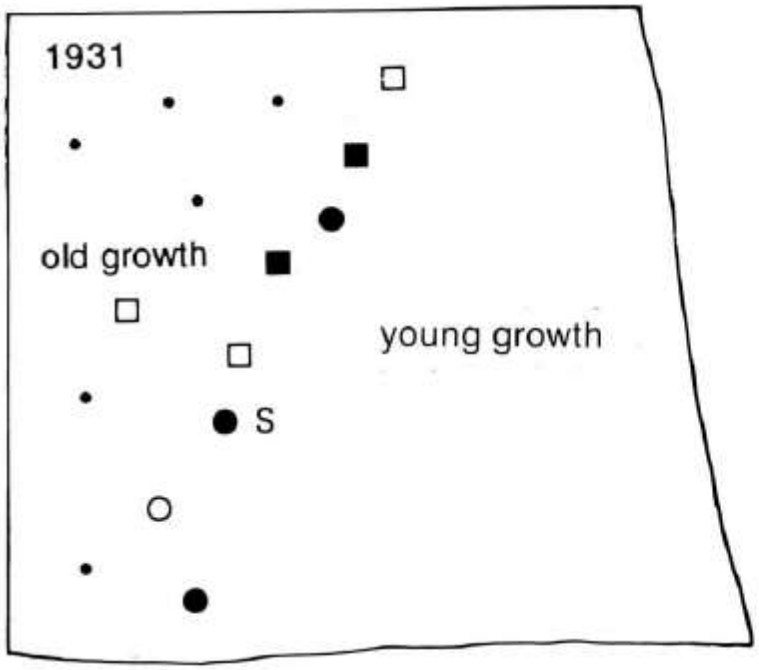




Location of negative event years in a tree in two different years

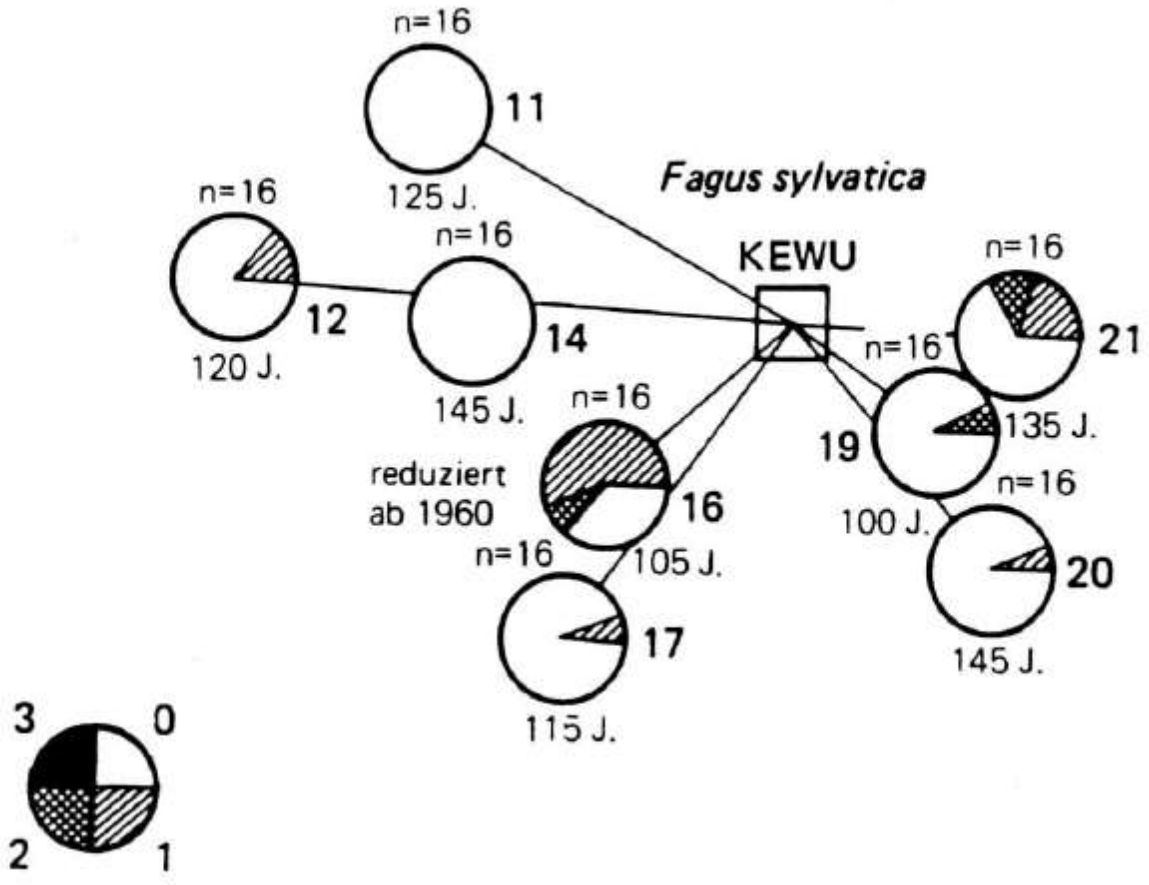


Mapping trees and events within a stand

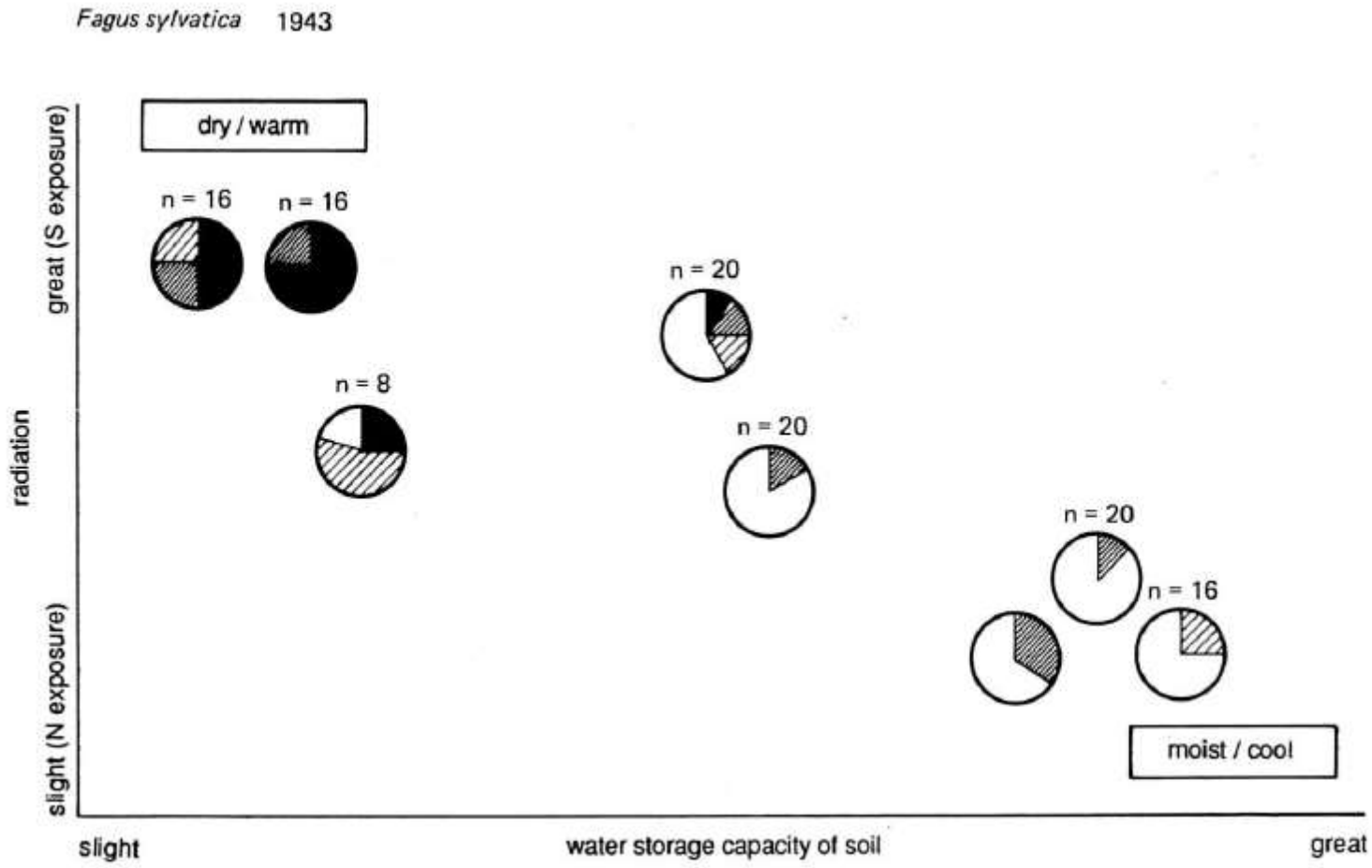


- • location of core / trees event year
- □ positive event year, weak
- ■ positive event year, clear
- ○ negative event year, weak
- ● negative event year, clear
- S wound

Period frequency histogram:
growth reductions around a garbage incinerator in 1987



An event year ecogram for 1943
(hatched and black areas: event years)



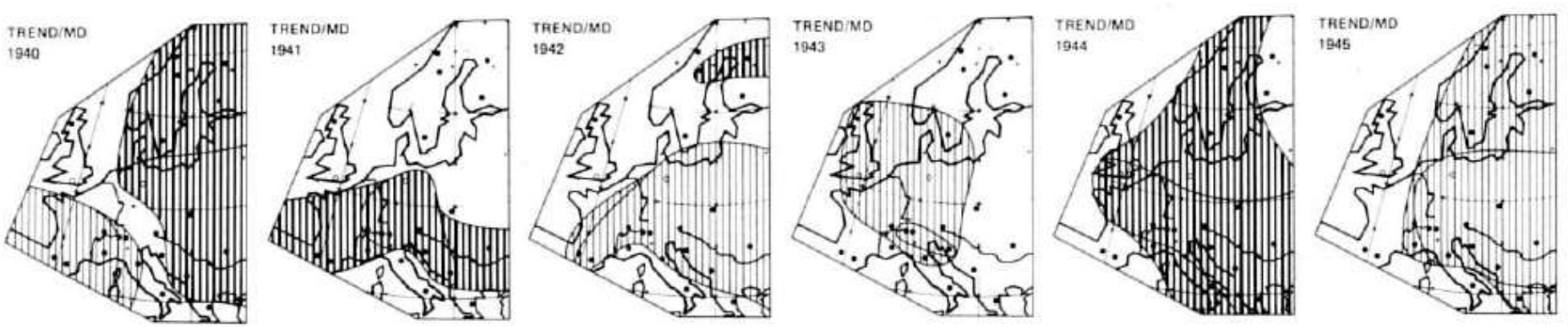
Negative pointer years: species and years

	fir	spruce	pine	beech	ash	possible explantaion
1934	○	○	●	●	●	dry and warm April/May
1948	●	●	○	●	●	influence of preceding year
1951		●				year with great seed production
1956	●					temperature drop in February
1957				○	○	late frost on 8 May
1986	●	○				February cold

● clear pointer year

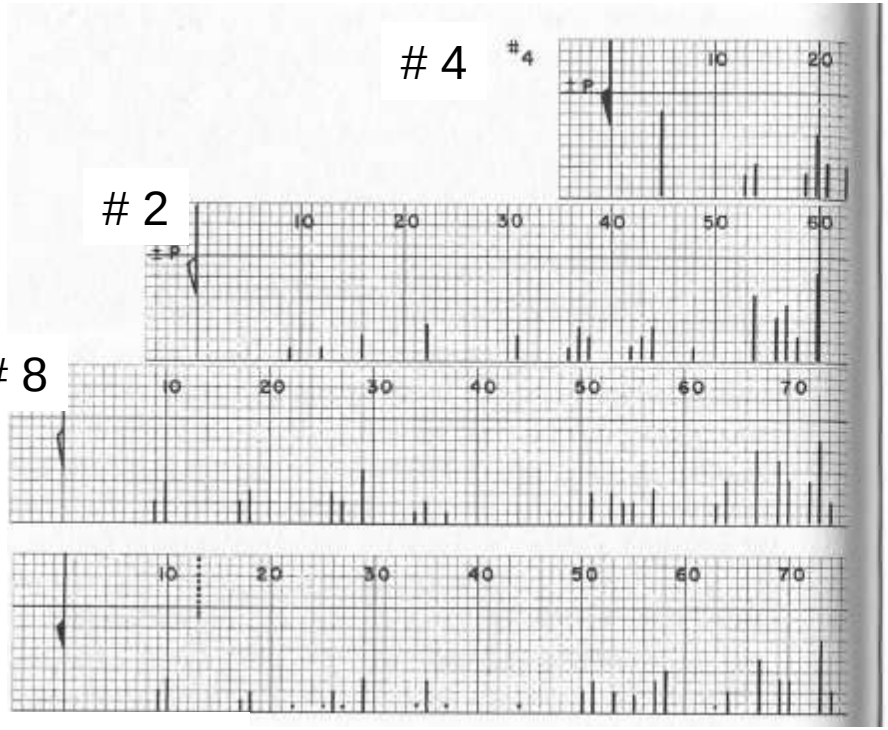
○ weak pointer year

Mapping pointer intervals

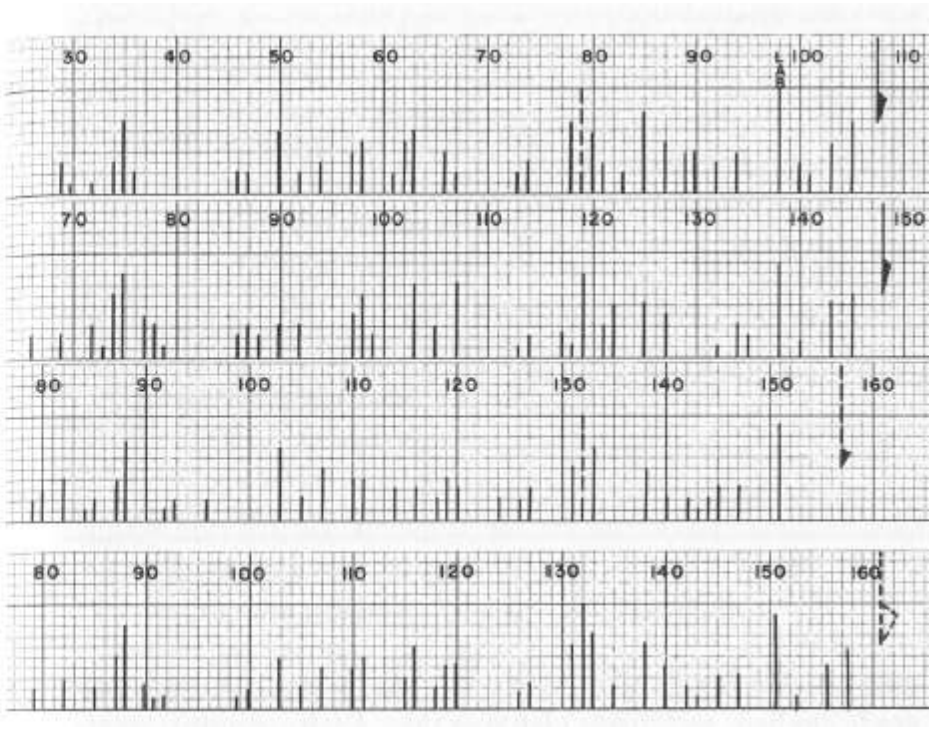


Maximum densities in conifers, 100 chronologies.
Positive (dark) and negative (light hatched)

Skeleton plotting (2)



composite

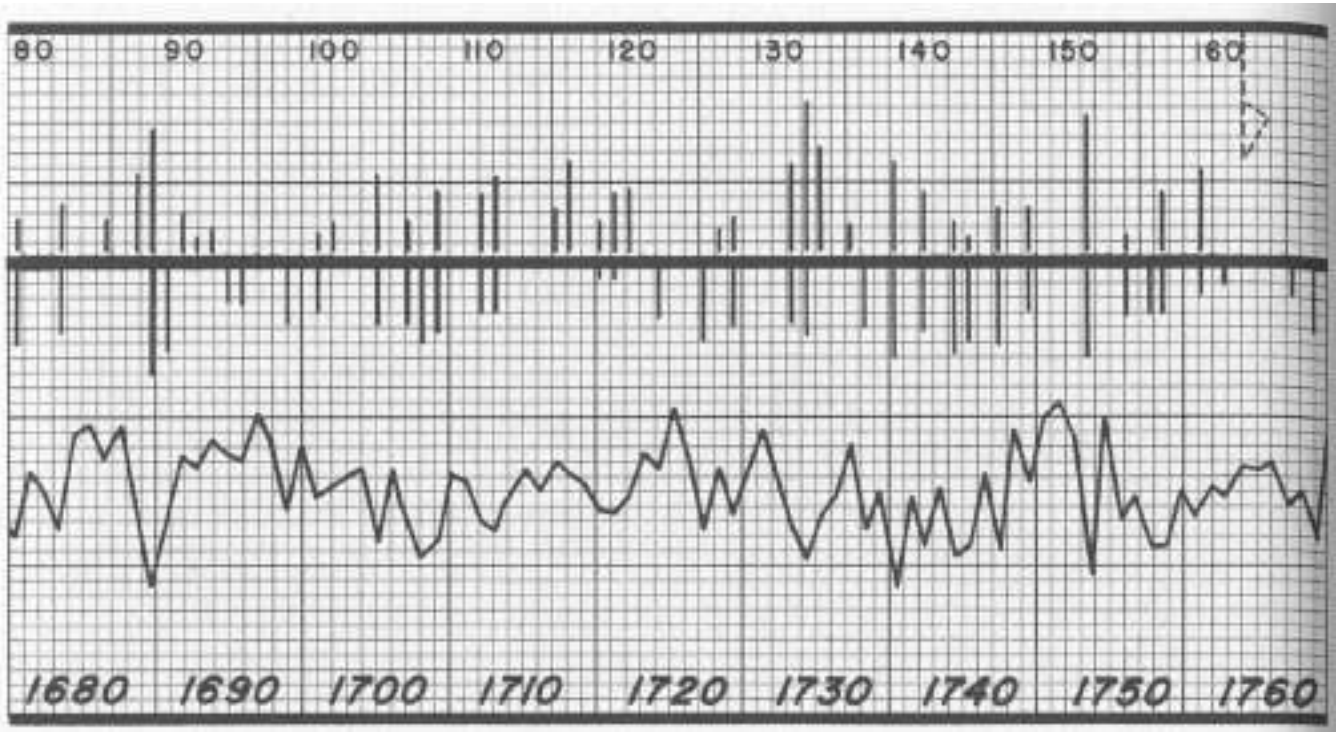


Skeleton plotting (3)

Skeleton plot

Master plot

Mean chronology



Measuring ring widths