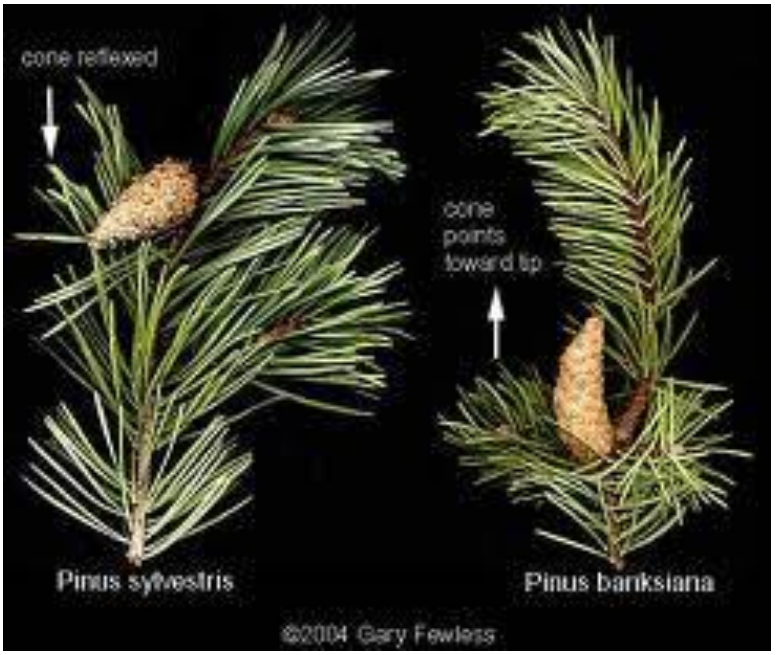

# The Tree Ring Project

## Common tasks

**Tree species**
Pine, preferably Scots pine (*Pinus sylvestris* L.)




**Site selection**: Open-canopy forests with little influence of forestry, where available.

**Site conditions depend on the question asked:**

- *Temperature signal:*
  cool-moist sites (upper tree-line, north-facing slopes, wet soils).
  In the north avoid bogs and mires, though.

- *Precipitation signal:*
  dry sites (shallow, well-drained soils, hill tops).
  Unfortunately, trees on extremely dry sites can be difficult dealing with due to narrow and, particularly in south, false rings.

**Tree sampling:**

- ***Minimum 20 trees***, at least 1 core each.

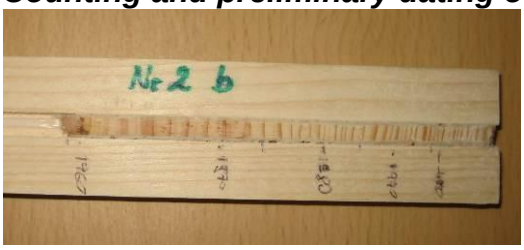
- ***Dominant, solitary trees***, ideally without a history of suppression and competition. Tree height will vary regionally

- ***Tree ages***: As high as possible, ideally back to the 19th century. However, avoid trees in the senescence phase or which appear not healthy (few needles, tiny rings in recent years). If you have old trees, sample also trees from younger generations.

**Preparation:** Core mounting on laths, sanding down to 600 grit.

**Tree-ring analysis:**

- ***Counting and preliminary dating of the rings (sharp pencil!):***




Starting with the outermost ring (probably 2011), mark decades (e.g., 2010, one dot), half centuries (e.g., 1950, two dots) and centuries (e.g., 2000, three dots).

- ***List method:***
  - Each student observes particularly broad and narrow rings (suspiciously different from the neighboring rings) and makes a simple list of those years.

  - Together, make a table with one column per tree.
    Highlight the years appearing in all/most of the trees.
    Example from Speer (2010, Fundamentals of Tree-Ring Research):

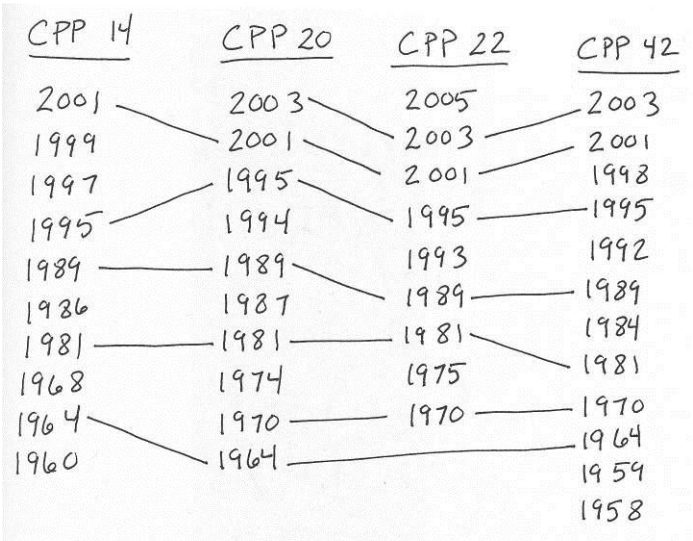
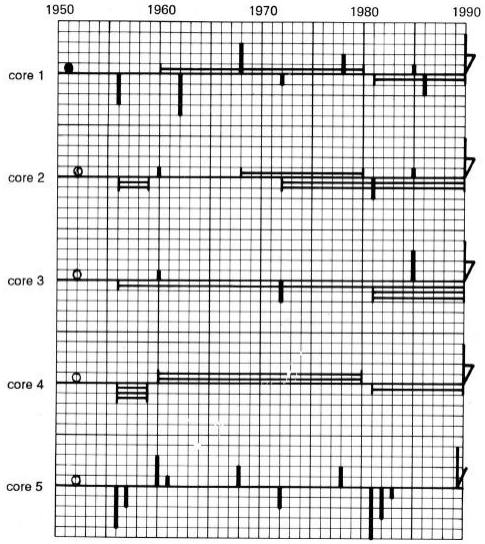



**Figure 2.3** Marker rings recorded using the list method. Five rings (2001, 1995, 1989, 1981, and 1964) all appear as important marker rings that occur between all of the samples that are recording growth at the time. Note that the marker rings from sample CCP22 stop at 1970 because this core does not extend earlier than this time. One can list the inside ring date in a box at the beginning of the list to indicate when the sample started recording.

**Skeleton-plotting:**

- ***For each tree, make a skeleton plot for tree-ring width following Schweingruber et al.*** 1990 (Identification, presentation and interpretation of event years and pointer years in dendrochronology).




- ***Both the list- and skeleton method can be used as a dating control:*** Trees with a consistent off-set in the event years compared to the other trees should be re-inspected for counting errors or missing/false rings.

**First results:**

- ***How old are our trees?***

- ***Growth rates:***
  Measure the length of the radii (pith to bark). How big is the average growth rate?

- **Biological age trends:**
  How is the growth rate of the innermost compared to the outermost rings (e.g., 30-year means)?

**Climate-growth comparison:**

- ***Collect instrumental climate data:***

  - *Monthly mean temperatures and monthly precipitation sums from*

    A) nearby climate stations which are representative for your forest site. Local climate stations most probably are not providing long climate series.

    B) Long climate records from the wider region (Norway since ca. 1870).

- ***Discuss (previous knowledge):***
  - What is the vegetation period for pine?
  - Which climate parameter do we expect to influence the tree-rings in our trees - temperature or precipitation, or both?
  - In which month(s)?
- ***Climate in, and prior to, individual pointer years:***
  - Inspect the climate data of the current vegetation period and back through the previous vegetation period (e.g., May previous year through August current year).
- ***Compare the results for the pointer years:***
  - Is there a common pattern (e.g., very high or low July temperatures)?
- ***A common period*** for climate-growth comparisons can be determined when we have got an overview over climate data available for the majority of schools.

**Ring-width measurements – feed-back from the schools desired**:

- ***Can we measure individual ring widths?*** Maybe we can measure blocks of 5 or 10 years (though means can be mis-leading)? *
- ***If we have continuous time-series (ring-width series),*** students can produce tree-ring graphs and apply statistical methods like regression (for studying/removing the biological age-trends) and correlation (incl. scatter plots, simple climate analyses).