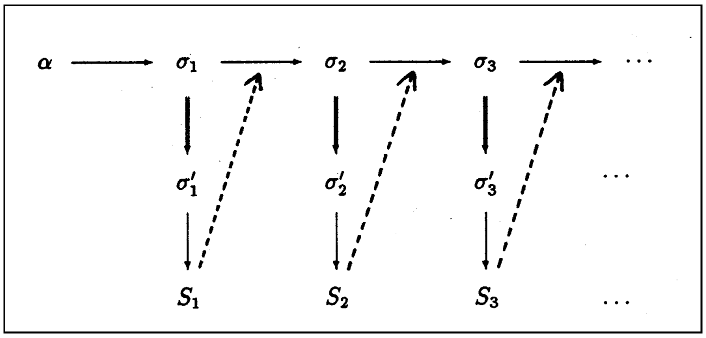


Fig. 1: Structure generation by a sensitive, two-phase growth grammar.

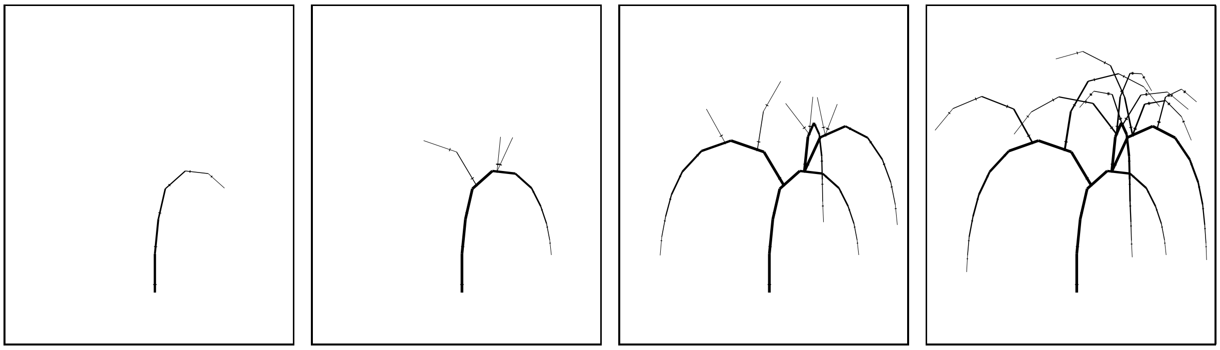


Fig. 2: Plant with epitonic growth habit, produced by GROGRA from the sensitive grammar epiton.ssy (see Table 1).

(More detailed view of the single plates on extra pages at the end)

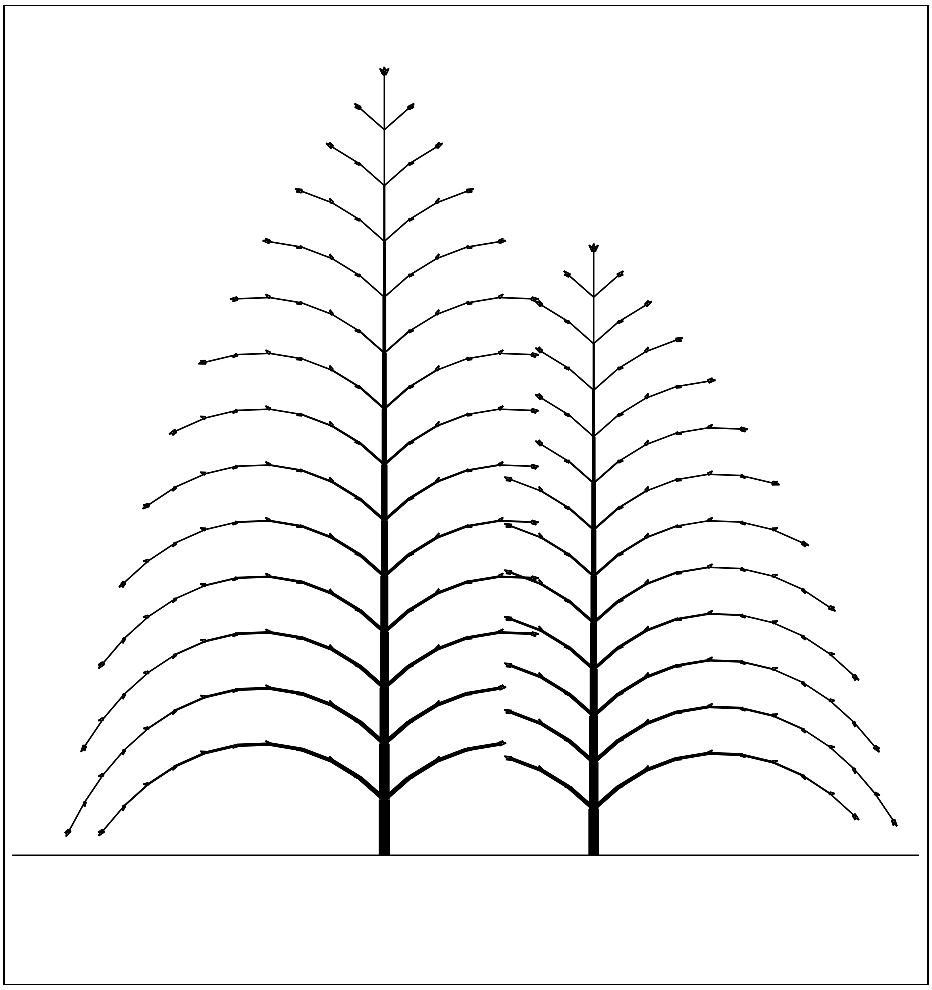


Fig. 3: Two trees with density-dependent shoot growth, produced by GROGRA from the sensitive growth grammar densi2d.ssy (see Table 2) after 15 steps.

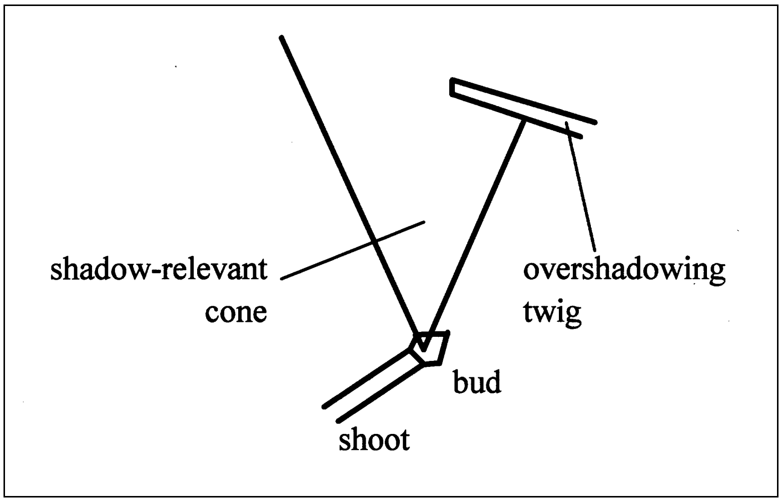


Fig. 4: The shadow-relevant cone of a shoot.

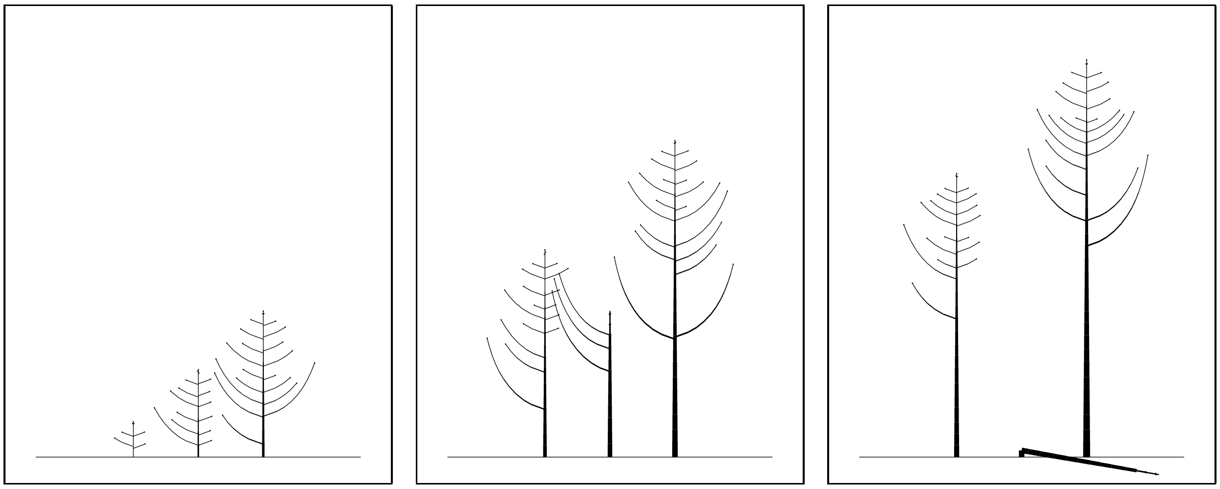


Fig. 5: Competition for light in a simple 2D tree stand, consisting of 3 uneven-aged trees, produced by GROGRA from the sensitive growth grammar light2d.ssy (see Table 3). The steps 12, 25 and 31 are shown.

(More detailed view of the single plates on extra pages at the end)

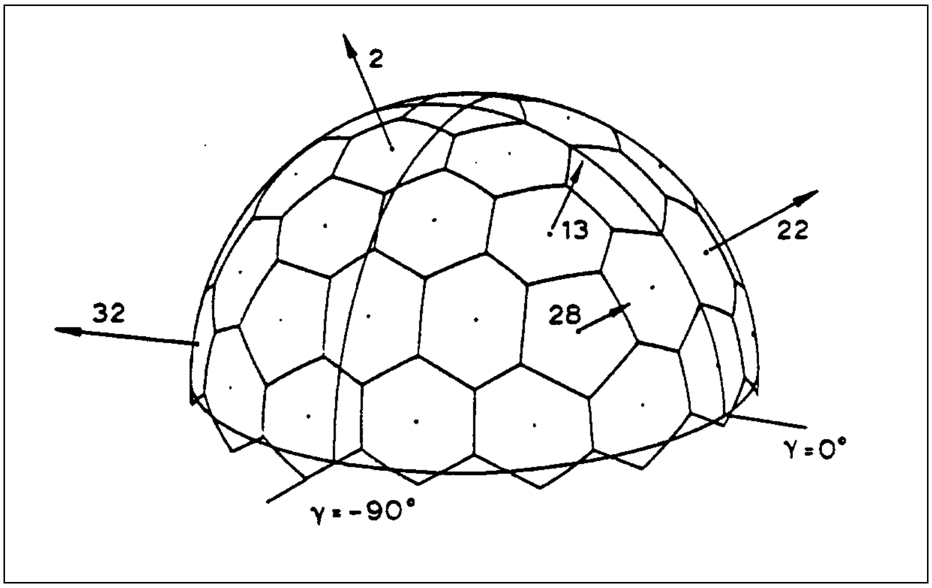


Fig. 6: Subdivision of the celestial hemisphere into 46 regions, each of them being represented by a direction vector towards its midpoint and indexed by an integer from 0 to 45 (taken from Blaise, 1991, according to den Dulk, 1989).

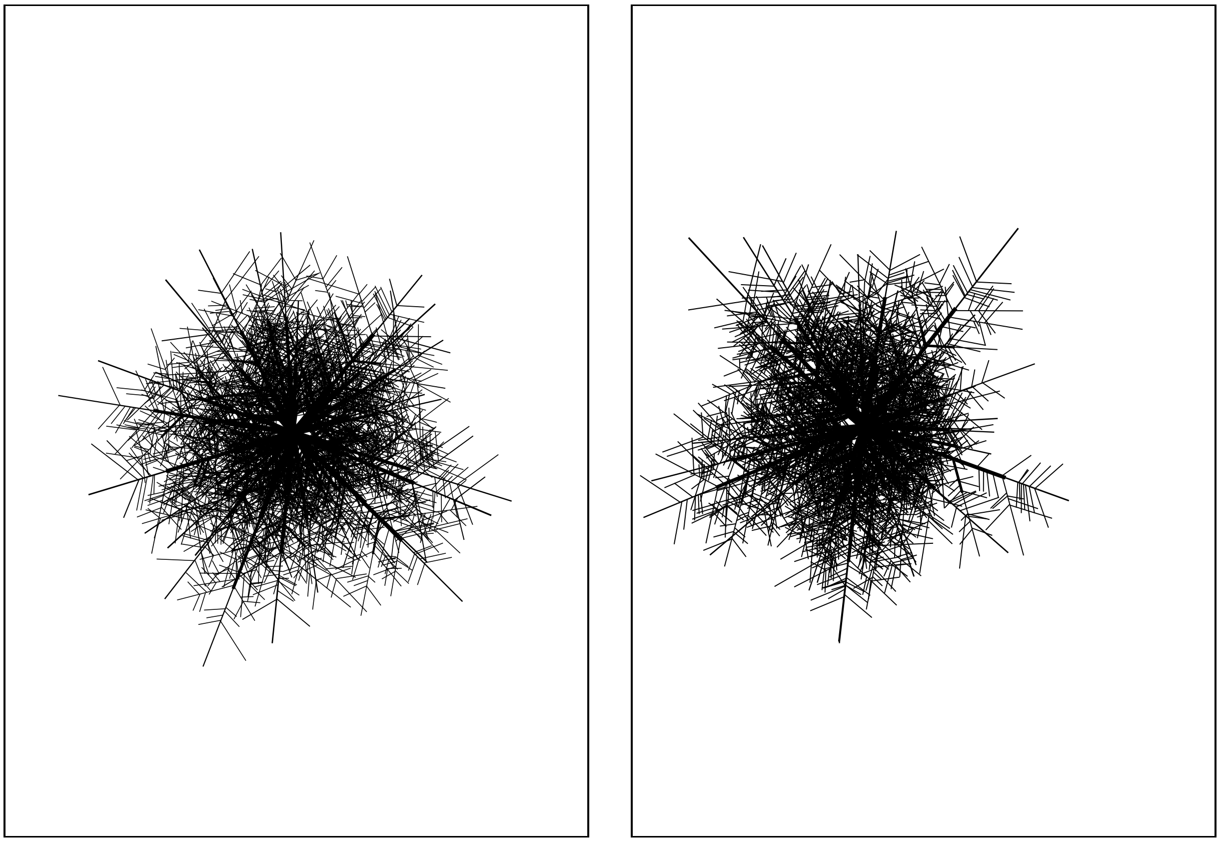


Fig. 7: Simulated spruce trees after 10 steps (each corresponding to a year), viewed from above, generated by GROGRA. A sensitive grammar with the "shadow-relevant cone" function f_c affecting bud mortality was used (threshold of foliage surface in cone $= 0.2\mathrm{m}^2$, cone opening angle $= 30°$). Left: Solitary tree, right: left one of two close neighbours (distance between the stems = 40 cm). The competition effect (asymmetry of crown on the right) is rather weak and hardly visible.

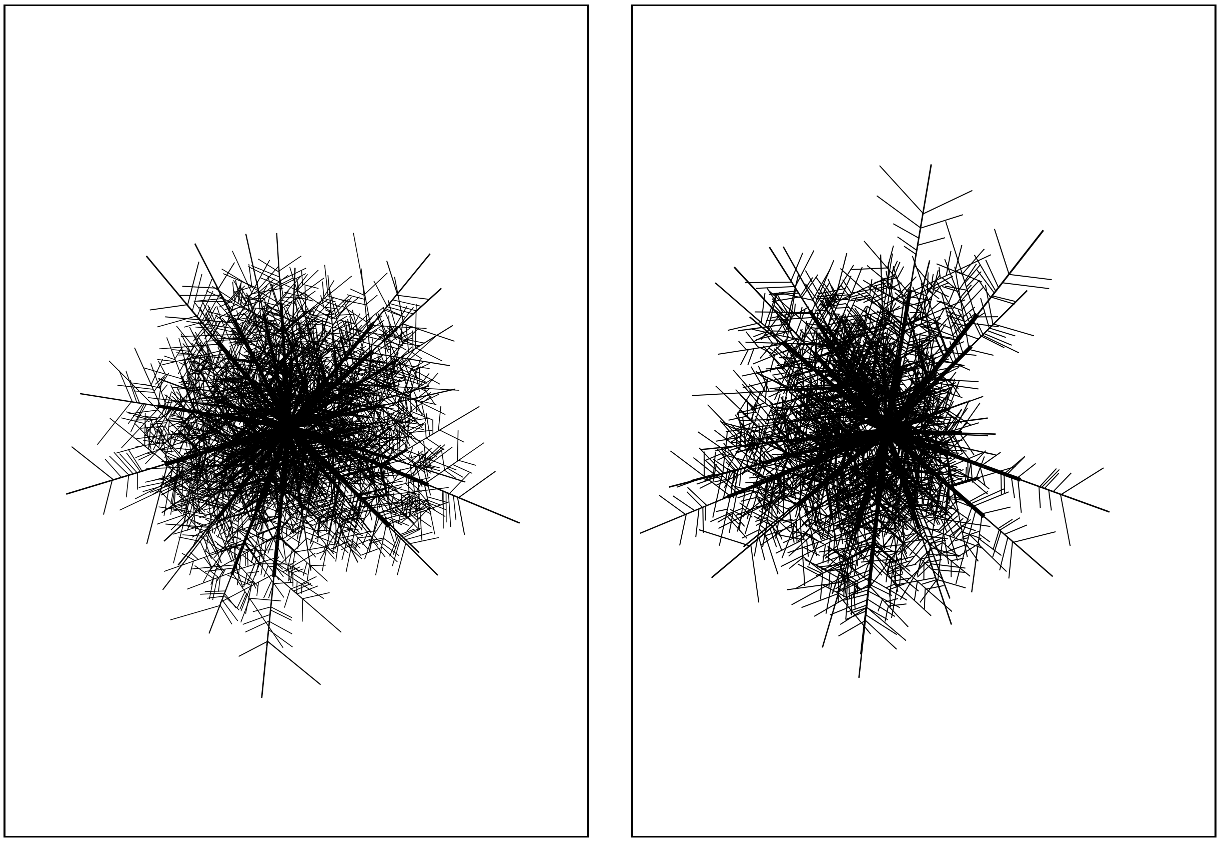
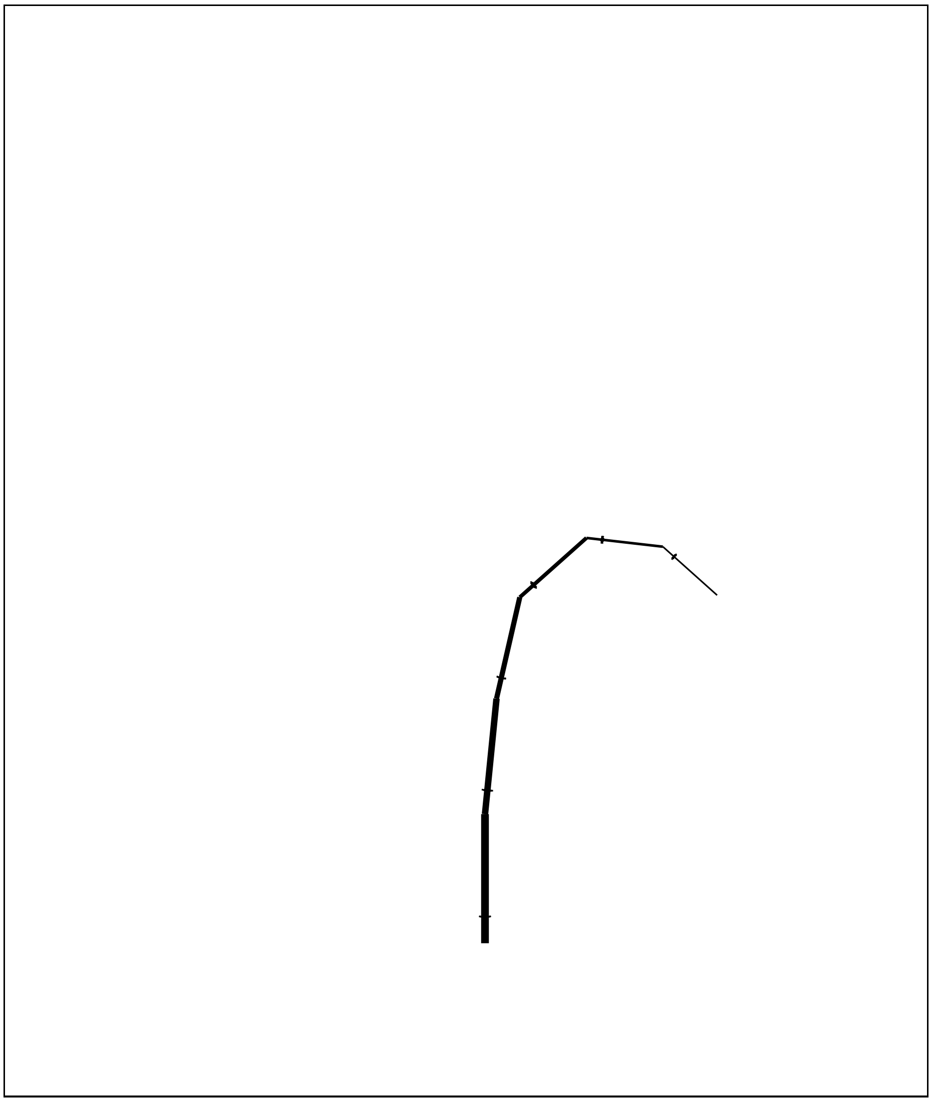
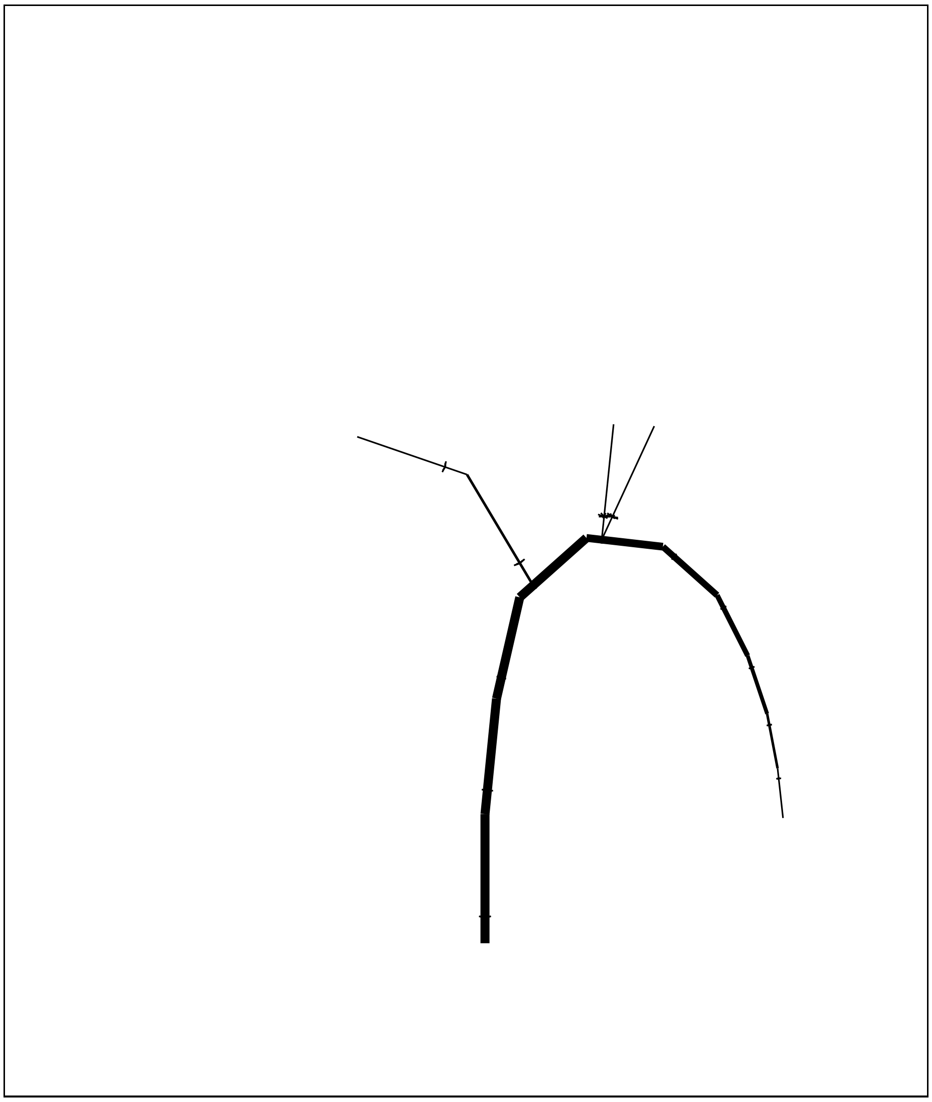


Fig. 8: Simulated spruce trees after 10 steps, viewed from above (generated by GROGRA). A sensitive grammar with the "hemisphere-coverage" function f_h affecting bud mortality was used (threshold of covered sky $= 0.7$). Left: Solitary tree, right: left one of two close neighbours (distance between the stems $= 40$ cm).

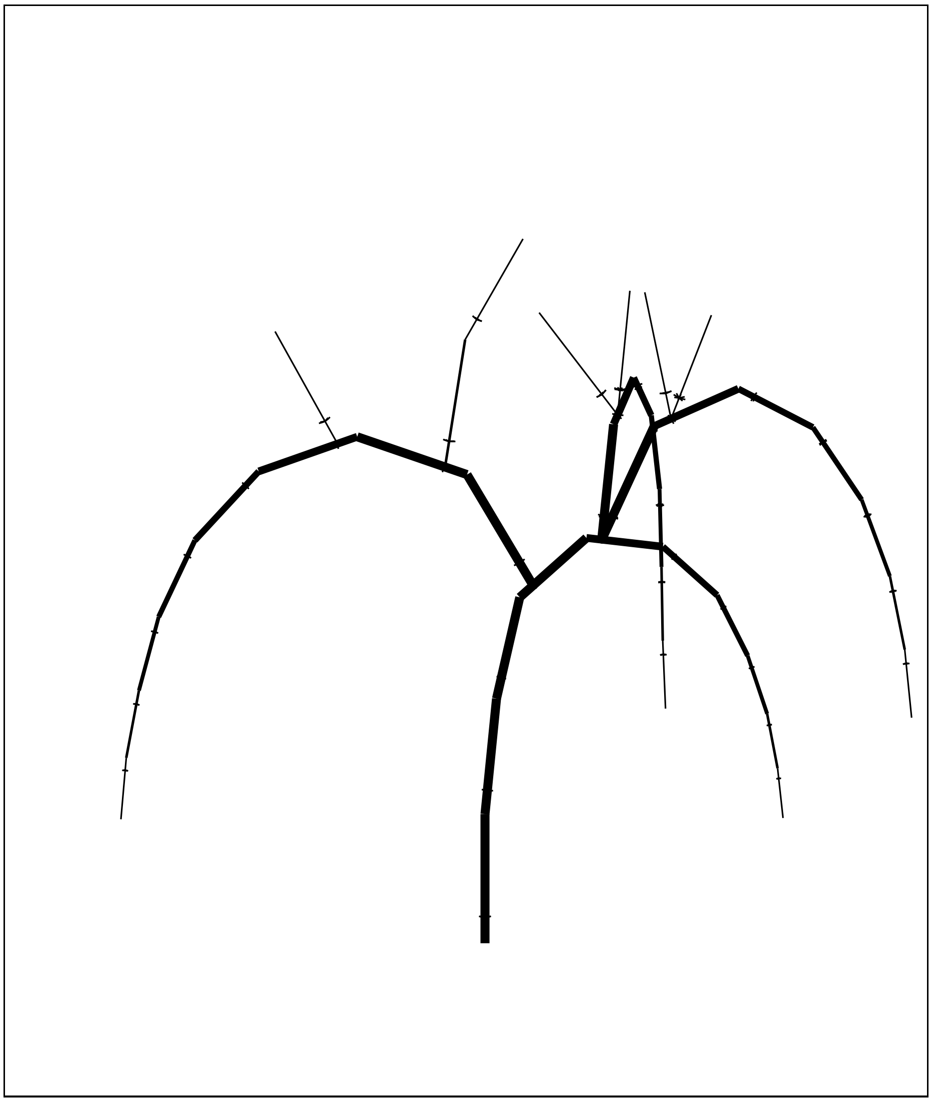
Fig. 9: The same interacting GROGRA-generated trees as in Fig. 8. Left side: the two neighbouring spruce trees grown with the sensitive growth grammar using f_h, seen from the side; right: the same view, but the right of both trees rendered invisible to show crown asymmetry caused by competition for light.



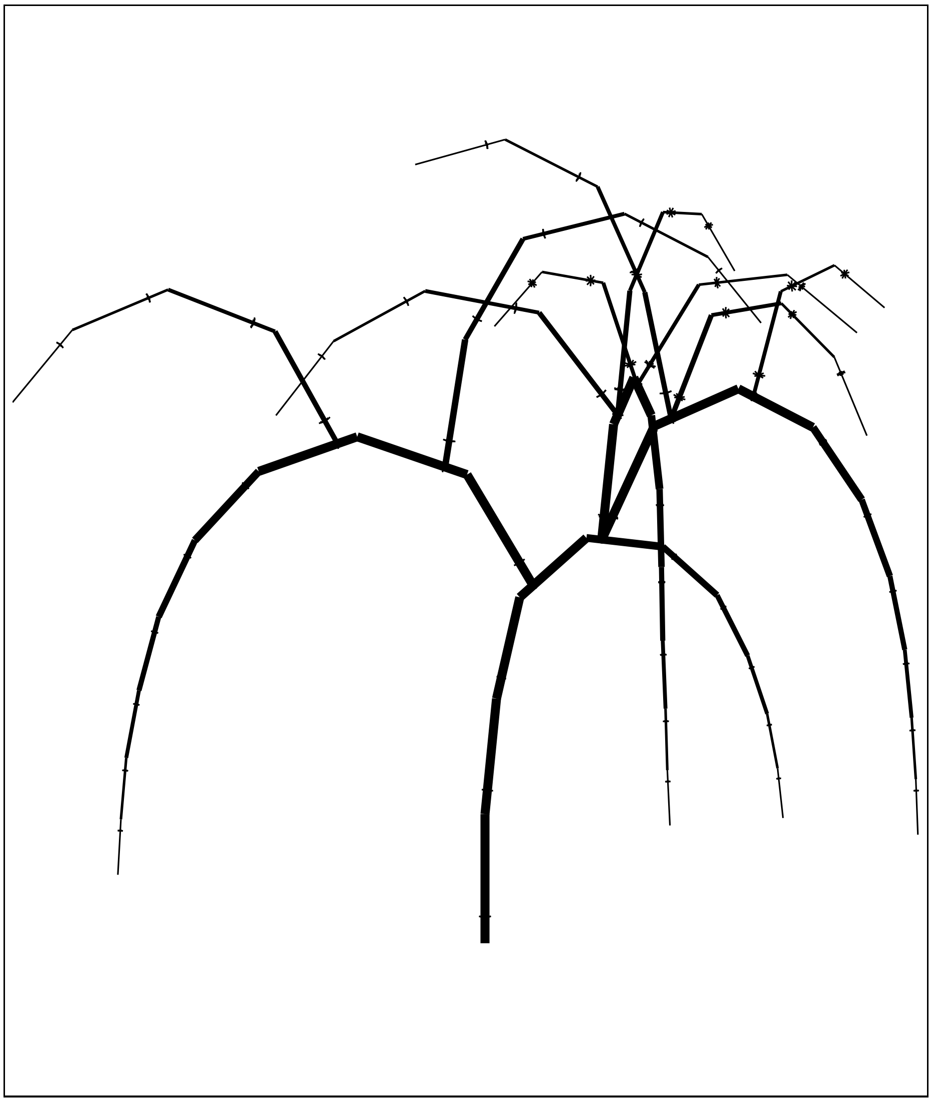
(Part 1 of Figure 2)



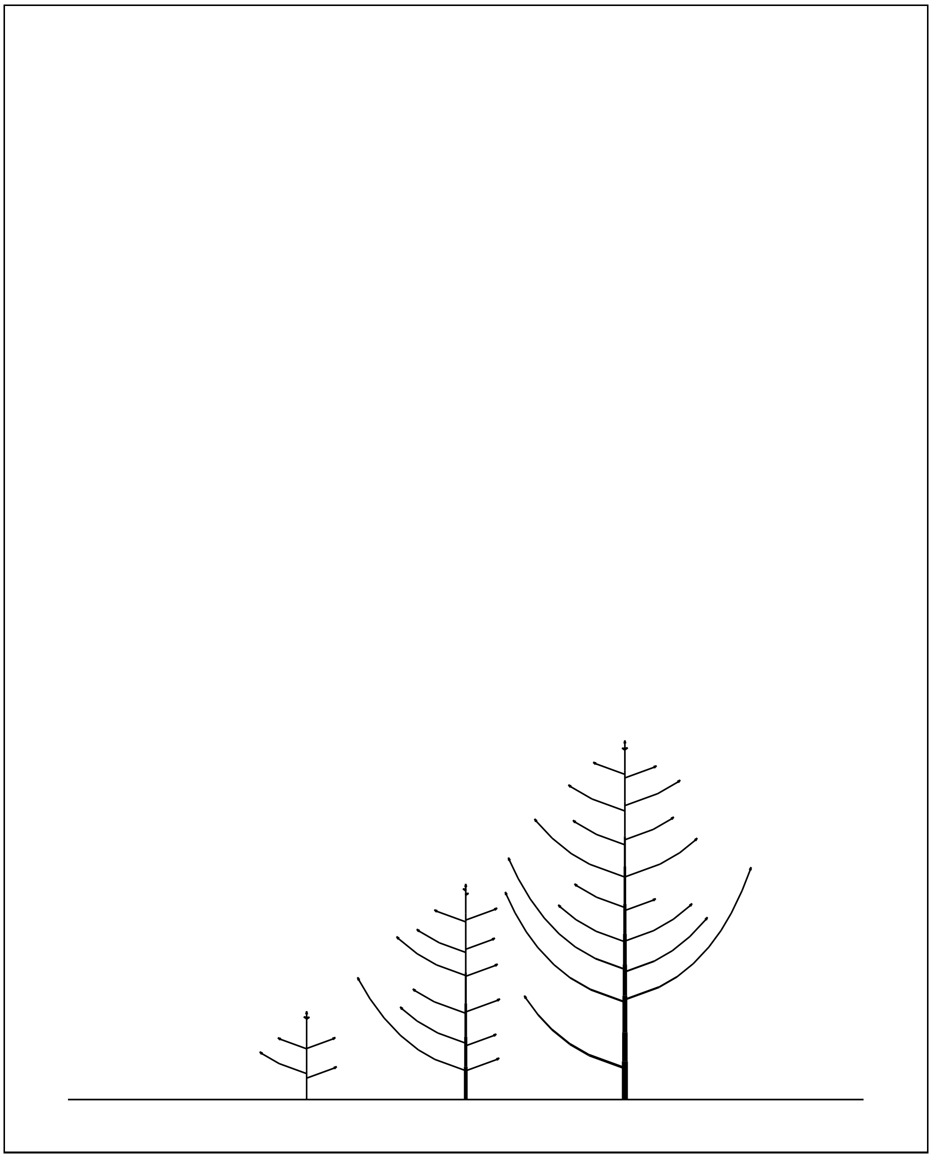
(Part 2 of Figure 2)



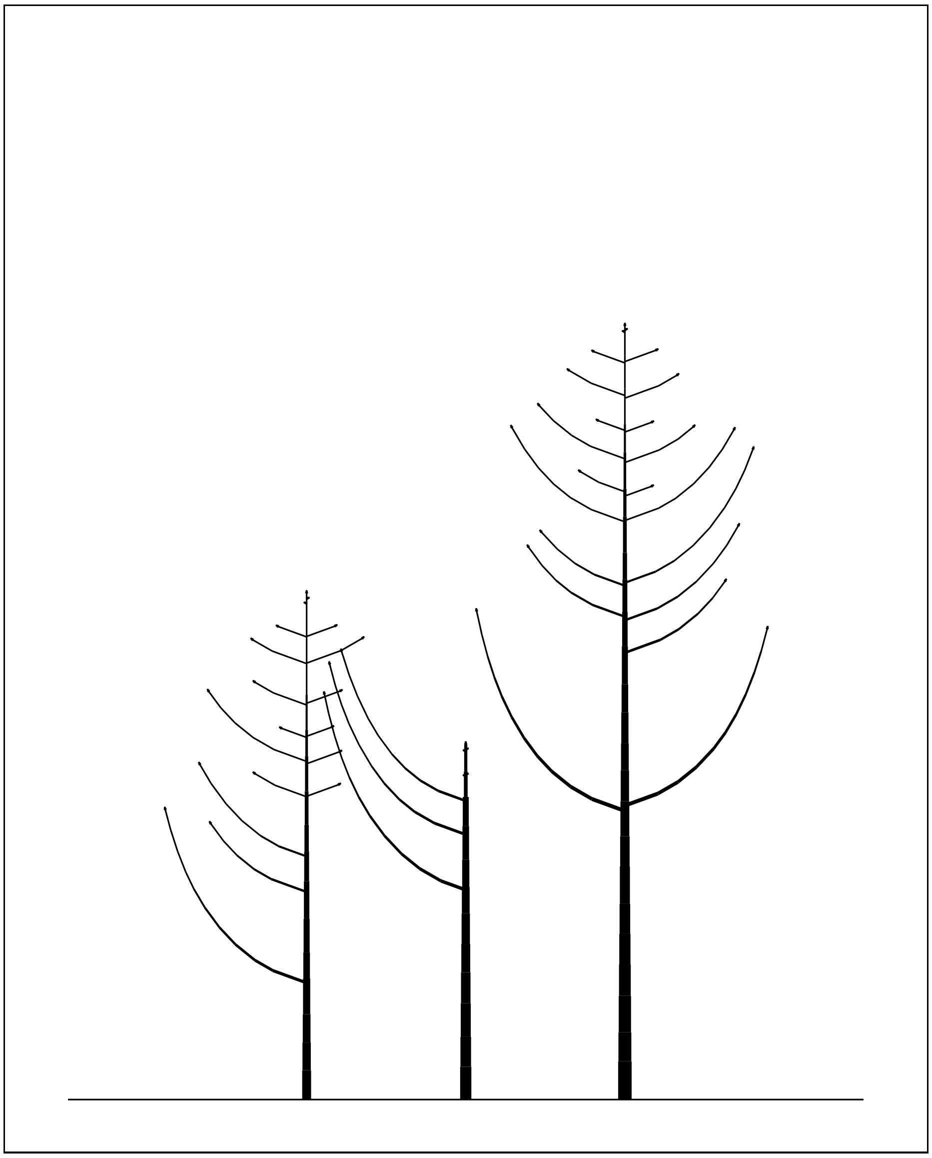
(Part 3 of Figure 2)



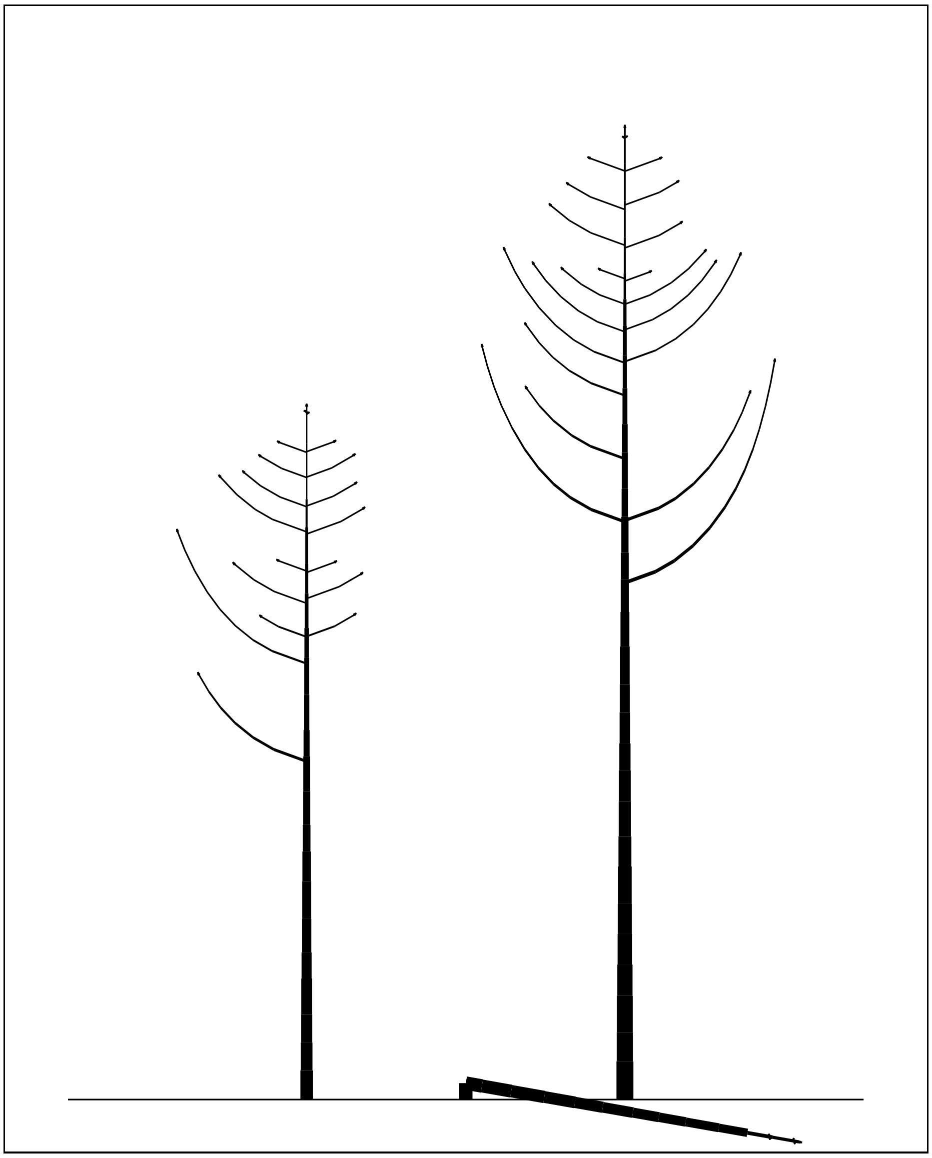
(Part 4 of Figure 2)



(Part 1 of Figure 5)



(Part 2 of Figure 5)



(Part 3 of Figure 5)