

**Figure 1. Tip-growing cells that develop from the epidermis.** Root hairs of vascular plants and rhizoids of bryophytes (liverworts, mosses and hornworts) are filamentous tip-growing extensions that develop from swellings on the outer surface of epidermal cells. A) Root hairs developing on root epidermal cells of rice (*Oryza sativa*). Scale bar 50  $\mu\text{m}$ . B) Rhizoids developing on epidermal cells of the liverwort *M. polymorpha*. Scale bar 50  $\mu\text{m}$ .

**Figure 2. Simplified schematic summary of the regulation of root hair differentiation.** *RSL* genes encode basic helix-loop-helix transcription factors that promote root hair initiation and control elongation in Arabidopsis. Class I *RSL* genes *RHD6* and *RSL1* control root hair positioning and are required for root hair outgrowth. Positioning of root hairs is also regulated by auxin and involves formation of a specialised sterol-enriched membrane domain that contains the small GTPases ROP2 and ROP3, the AGC VIII kinase D6PK, dynamin-related proteins DRP1A and DRP2B and PIP5K3 producing phosphatidylinositol-4,5-bisphosphate (PtdIns-4,5-P<sub>2</sub>). Class II *RSL* gene *RSL4* is a direct downstream target of class I *RSL* genes and modulates root hair elongation. Low phosphate and auxin promote root hair elongation in an *RSL4*-dependent manner.