Plant leaf size varies by more than three orders of magnitude, from a few millimeters to over one meter. Conifer leaves, however, are relatively short and the majority of needles are no longer than 6 cm. The reason for the strong confinement of the trait-space is unknown. We show that sugars produced near the tip of long needles cannot be exported efficiently, because the pressure required to drive vascular flow would exceed the greatest available pressure (the osmotic pressure). This basic constraint leads to the formation of an inactive region of stagnant fluid near the needle tip, which does not contribute to sugar flow. Remarkably, we find that the size of the active part does not scale with needle length. We predict a single maximum needle size of 5 cm, in accord with data from 519 conifer species. This could help rationalize the recent observation that conifers have significantly smaller leaves than angiosperms, and provide a biophysical explanation for this intriguing difference between the two largest groups of plants.