

Basic rules for polarised cell growth

ABSTRACT

Growth by cell elongation is a morphological process that transcends taxonomic kingdoms. Examples of this polarised growth form include hyphal tip growth in actinobacteria and filamentous fungi and pollen tube development. The biological processes required to produce polarisation in each of these examples are very different. However, commonality of the polarised growth habit suggests that certain “basic physical rules” of development are being followed. In this paper we are concerned with trying to further elucidate some of these basic rules. To this end, we focus on a simple and hence ubiquitous description of the polarised cell, its geometry, and using a mathematical model investigate how geometry and the deposition of new wall material could be related. We show that this simple model predicts both cell geometry and the location of maximal wall-deposition in a range of examples.

Keyword: Curvature; Mathematical model; Tip growth.