These images show bovine capillary endothelial cells growing on square areas of fibronectin (Figs 1 and 2). These squares were generated using a novel process made possible by recent advances in microfabrication technology, which were originally developed for building electronic microchips. Each island of fibronectin is surrounded by a nonadhesive barrier region, so the cell spreads until it reaches the edges of the island and alters its shape to fit the area available. Experiments using squares of different size showed that the degree to which cells are able to spread can have functional consequences, with cells proliferating on larger islands (see Fig. 3) and dying by apoptosis on the very small islands. A subsequent study of soluble growth factors and insoluble extracellular matrix molecules is optimal and associated growth signalling cascades (e.g. mitogen-activated protein kinase) are fully activated inside the cell. These studies suggested that cell shape and mechanical forces play a role in cell growth and developmental control. Investigation of the role of cell shape and mechanics is therefore an important aspect of improving our understanding of tissue remodelling and morphogenetic patterning.

References