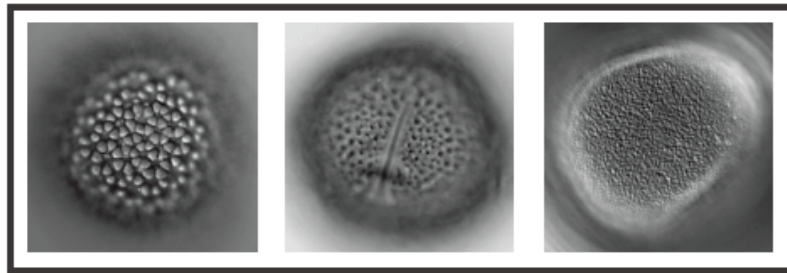


## Quantifying Pollen Texture

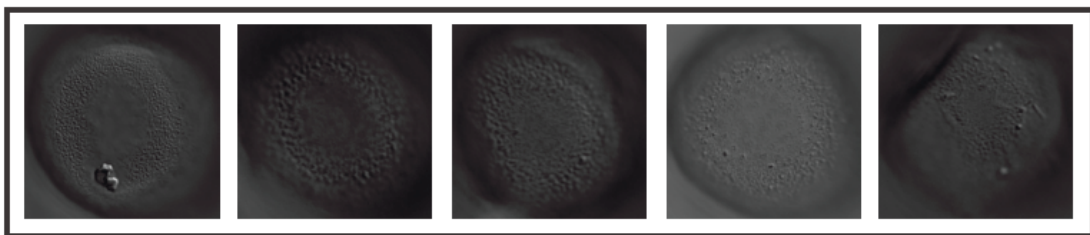
*Mander, Punyasena and Fowlkes*

Different pollen grains are often classified on the basis of their surface texture. Some pollen types have very different surface textures (e.g. Figure 1) and in such cases classification is an easy task.



**Figure 1.** Three pollen grains with different surface textures. Images taken with differential interference contrast microscopy.

However, some pollen types have very similar surface textures and in such cases classification is extremely difficult (e.g. Figure 2). We have found that quantifying differences is particularly difficult. Consequently we do not have complete confidence in our ability to distinguish certain species of pollen from each other. This is hampering our efforts to reconstruct changes in the diversity of plants through evolutionary time.



**Figure 2.** The pollen of five pollen types that have similar surface textures. Images taken with differential interference contrast microscopy.

***Given the prime importance of texture in pollen identification, we would like to initiate an in-depth study to quantify the texture of pollen grains.***

In the first instance we would be interested in quantifying the textural differences between pollen types that are clearly distinguishable (see Figure 1), before moving on to quantify textural differences between pollen types that are much harder to tell apart (Figure 2). A selection of images for analysis has been uploaded to bioshapes.org.

Our initial efforts have involved using line profiles of variations in pixel intensity across an image and Fast Fourier Transform analyses. However, we have found that line profiles are somewhat arbitrary and dependent on the position of the transect used to generate the line profile. Fast Fourier Transform analyses have been useful in determining whether or not a particular technique is able to record any texture at all, but we have yet to find a way to use this technique to quantitatively compare the texture of different pollen types. Other workers have used Gabor transforms to characterise the surface texture of pollen grains (Zhang et al. 2004) and this may represent a useful starting point for this present study.

### **References**

Zhang, Y., Fountain, D.W., Hodgson, R.M., Flenley, J.R. and Gunetileke, S. 2004. Towards automation of palynology 3: pollen pattern recognition using Gabor transforms and digital moments. *Journal of Quaternary Science*, 19, 763–768.