

## Ascospore Topographical Pattern as an Analytical Mycological Resource

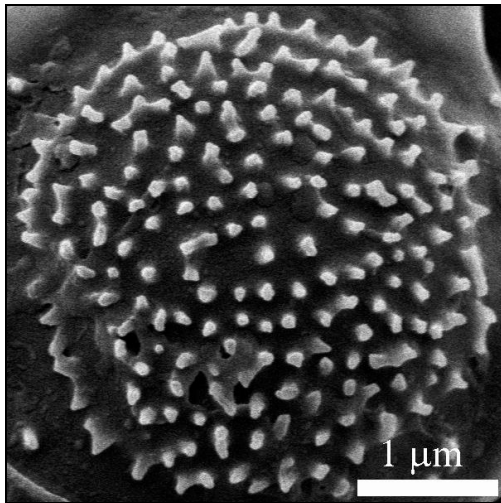
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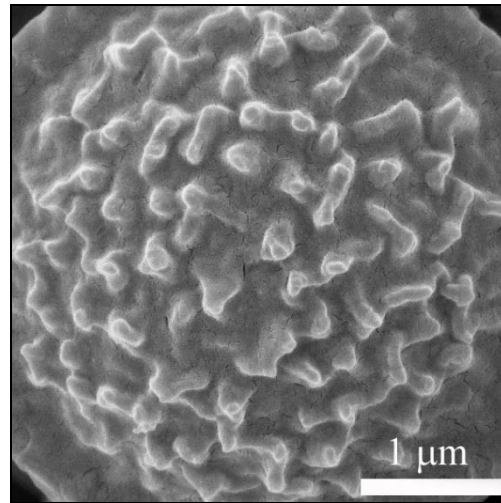
The fungal genus *Aspergillus* (ex *Neosartorya*) usually presents sexual spores (ascospores) ornamented with microtubercules and anastomosing ridges, morphological characteristics with taxonomical utility for biological entities delimitation [1]. For instance, spores of *A. shendawei* and *A. lacinosus* show microtuberculated ornamentation (figures 1 and 2) whereas those of *A. tatenoi* and *A. fischeri* present reticulated anastomosing ridges (figure 3 and 4). RIMAPS technique has previously been used to distinguish whether microtubercules were distributed describing concentric rings or spirals on ascospore surface, unrevealed patterns to the naked eye [2]. RIMAPS consists basically of rotating the image using algorithms of commercial software and calculating the x-step of the two-dimensional Fourier transform for each y-line of the new image obtained after rotation. The maxima of the RIMAPS spectrum indicate main angular directions of the topographical pattern [3]. The present work explores RIMAPS performance as a supplemental mycological technique. Mature cleistothecia of four *Aspergillus* species isolated from soil were crushed and coated with gold. Several images of each species were obtained using a scanning electron microscope Zeiss Supra 40 with field emission gun. RIMAPS analysis was applied to all images. The mean RIMAPS spectrum of each species is displayed in figures 5 and 6. Shapes and integrals of curves were used to describe the ornamentation of ascospores. The RIMAPS spectra of *A. tatenoi* and *A. fischeri* showed similarities regarding its shape, but their integrals were slightly different: 104.1 and 99.9 respectively (figure 5). The main angular directions of the topographical patterns were similar for both species despite the narrowly anastomosing ridges present in *A. tatenoi*. *Aspergillus lacinosus* has, in comparison with *A. fischeri* and *A. tatenoi*, a different curve shape (maximum peaks are more pronounced); however, the integral has almost the same value: 99.2 (figure 5). This was an expected result considering the dissimilarity between tubercules and ridges. A remarkable issue was actually seen in figure 6. In spite of their similar ornamentation, *A. lacinosus* and *A. shendawei* presented RIMAPS spectra with different shape and integral value (76.2 for *A. shendawei*). RIMAPS spectra clearly differentiated both microtuberculated ornamentations. Angular directions of the topographical patterns, as detected by RIMAPS, constituted an intrinsic feature of the analyzed ascospores. In case of *A. tatenoi* and *A. fischeri* patterns were similar, in case of *A. lacinosus* and *A. shendawei* they showed differences, and regarding tuberculated versus net-like ornamentation analyzed they were quite dissimilar. RIMAPS analysis could perform well as an ancillary semi-quantitative analytical resource for mycological studies. [4]

### References:

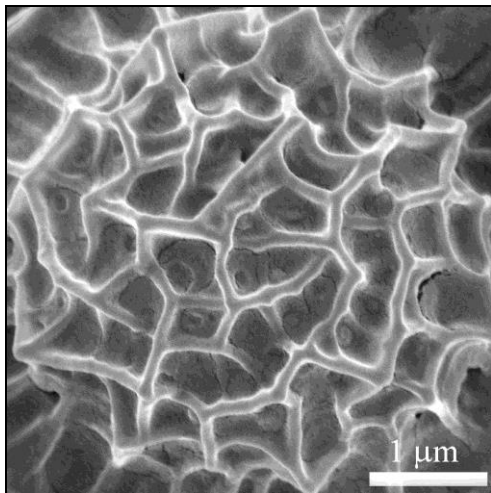
- [1] RA Samson *et al.*, *Studies in Mycology* **59** (2007), p. 147 – 203.
- [2] SM Romero *et al.*, *Microscopy and Microanalysis* **20** (Suppl 3) (2014), p. 1340 - 1341.
- [3] NO Fuentes and EA Favret, *Journal of Microscopy* **206** (2002), p. 72-83.
- [4] Authors acknowledge the staff of “Centro de Microscopías Avanzadas, FCEyN, UBA”, for the micrographs.



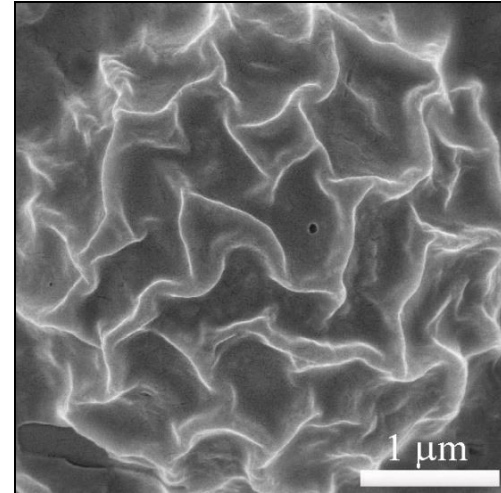
**Figure 1.** SEM micrograph of *Aspergillus shendawei* ascospore.



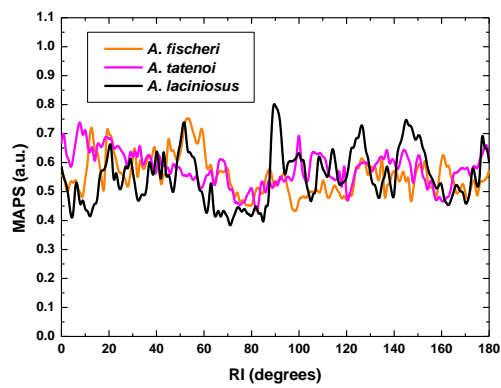
**Figure 2.** SEM micrograph of *Aspergillus lacinosus* ascospore.



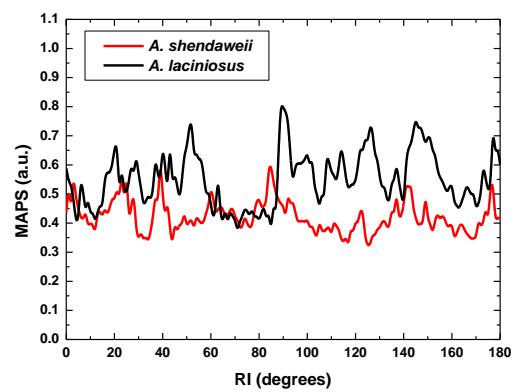
**Figure 3.** SEM micrograph of *Aspergillus tatenoi* ascospore.



**Figure 4.** SEM micrograph of *Aspergillus fischeri* ascospore.



**Figure 5.** RIMAPS spectra of *A. fischeri*, *A. tatenoi* and *A. lacinosus*.



**Figure 6.** RIMAPS spectra of *A. lacinosus* and *A. shendawei*.