

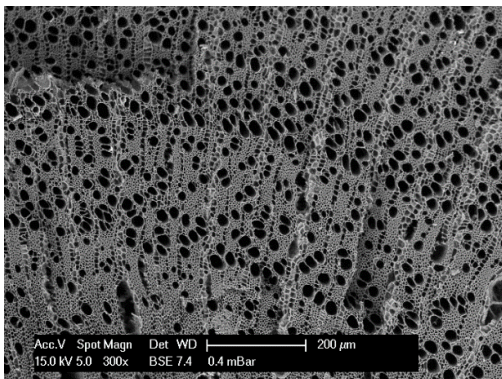
## Artificial intelligence for wood classification based on SEM images of archaeological wood charcoal from South Africa



**Aim:** Based on a database of images, this study intends to distinguish morphologically close wood species based on anatomical sections.

The methods used by archaeobotanists to identify wood species from charcoal recovered from archaeological sites are based on a combination of several anatomical criteria. However, many species have very similar morphological characteristics that limit the identification of wood at the species level, especially when the wood pieces are not well preserved, broken or fragmentary. Thus, this prospective study proposes to develop a new methodological approach based on Machine Learning methods to distinguish morphologically close species.

**The students will dispose of a data set of approximately 4500 SEM 2D images** (archaeological samples and natural samples) from South African wood (with metadata).



*Exemple d'image MEB Prunus spinosa, coupe transversale X 200*

The main steps of the analytical procedure will be the following:

- 1) Explore the dataset to determine the best data format for the analysis and possibly pre-process the data
- 2) Based on this image dataset, the student will investigate supervised and unsupervised Machine Learning (i.e., Support-Vector Machines and Convolutional Neural Network) in order to correctly assign the images to the corresponding species.
- 3) Machine Learning methods for 3D data processing could also be investigated for classification.

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