# SEEING IS BELIEVING?

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## ABSTRACT:

When we see something, something is definitely seen. However, (i) it may be a dream or hallucination that does not exist, or a visual illusion that is wrongly perceived. (ii) It may be an artifact artificially produced. Microscopic structures we see on sections are, in a sense, all artifacts of the original living structures because of changes, e.g. tissue shrinkage, during processing of the biological sample. (iii) Something may not necessarily look like what we see it looks like. A 3-dimensional object is seen, for example, as 2-dimensional profiles on sections. In addition, variation of the structure in terms of its shape and distribution, and even subjectivity or preconception, may affect the morphological, morphometric or stereological features we see and measure. (iv) What we do not see are not necessarily inexistent. Structures may not been seen, for instance, due to limitation of staining, magnification or resolution. Moreover, morphological characteristics may be overlooked due to lack of carefulness, experience or expertise. (v) Normally we can only see a tiny part ("tree") of the huge microscopic world ("forest") no matter how big or bright our eyes are. Thus we can not estimate the total amount (volume, area, length, number, and so on) of the "tree" in the "forest" without knowing the size of the "forest" (reference space), unless we sample the "tree" from the whole "forest" in a random manner with known sampling fraction. (vi) That something we see is here does not necessarily mean it was (not) or will (not) be here or there. So, without observing it at different locations and phases, we can hardly study its dynamic change. These are common problems with morphology, morphometry or stereology, which will be shown in the presentation with our experience. In a word, seeing is not necessarily believing - seeing with proper measuring is more convincing.

## KEYWORDS:

morphology; morphometry; stereology