Neglected Cellular Organelles

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Virtually all animal cells contain organelles called glycosomes which until now have been neglected in cell biology. This author recently published a comprehensive review article entitled "Glycosomes - the organelles of glycogen metabolism", Tissue & Cell 28 (3) 253-265, 1996. The review, based on biochemical and microscopy data, includes a complete history of glycogen research and the current status of knowledge

Biochemical studies on glycogen metabolism demonstrate the existence of a complex enzymatic machinery involved in glycogen synthesis and degradation, which constantly accumulates glycogen and releases glucose. Such types of cellular machineries represent cell organelles and these were already called glycosomes. There is, however, a confusion in the morphological data concerning glycosomes since early electron microscopic research incorrectly identified the protein component of glycosomes as particles of glycogen. This interpretation, accepted in textbooks and diagnostic pathology, needs an urgent revision.

The protein component in glycosomes is fixed by osmium, and stained by uranium and lead. Glycogen accumulated in glycosomes is neither fixed per sec nor stained by heavy metals. Glycogen can be visualized by special techniques such as histochemistry or negative staining. The differences in size and in the electron density of glycosomal protein stained by uranium and lead (commonly called 'glycogen particles') indicates the metabolic state of glycosomes rather then the amount of glycogen. Several data suggest that the large, electron dense particles may appear when phosphorylase is present (or active) in the organelle, whereas the small and poorly contrasted protein particles would imply the activity of glycogen synthase.

Furthermore, there is an intimate association between glycosomes and numerous other cellular organelles including the intermediate filaments and the membranes of endoplasmic reticulum. The association may be related to the energy release by glycosomes, as well as to the transport of glycosomes within the cell, similar to the well recognized transport of ribosomes. The understanding of the structure of glycoscmes opens a vast field for the application of modern molecular and cellular biology techniques in order to study cellular metabolism of glycosomes and the rote of these ubiquitous organelles in the cell.

I would be very happy to receive some feedback on the ideas I outlined in my review article and to continue discussion with anyone interested in glycogen research and in the integrated research on the cell. I will be at the MSA Conference in Cleveland or may be contacted by eMail:
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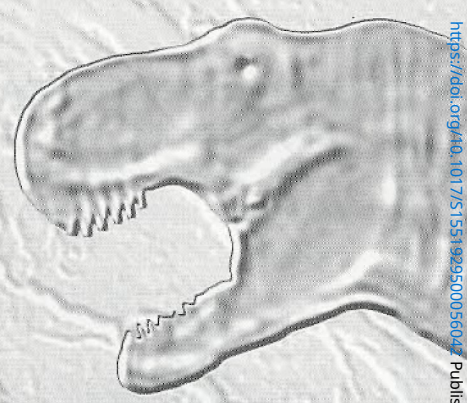

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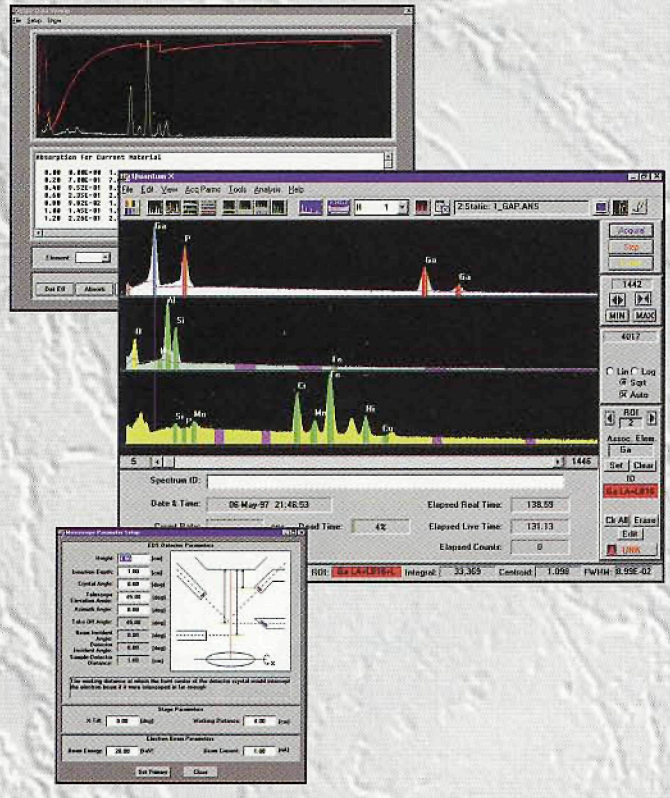

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