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Editorial Open Access

Proteins at Interfaces are Universal, but still Poorly Understood: A Challenge

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Editorial

Volume 2, Issue 1 of Biodiversity, Bioprospecting and Development carried a very important article on Protein-Protein interactions (Hooi Ling Ho, Plant Protein Kinase and Protein-Protein Interaction, http://dx.doi.10.4172/2376-0214.1000142) that reminds us of the ubiquity of proteins throughout Nature's domain. It is long overdue to resolve some fundamental issues of the appearance and organization of such important molecules that underlie all natural cellular attachments and biological interactions with increasingly diverse synthetics/prosthetics.

It is generally held that different specific proteins are adsorbed to inserted materials, when it is demonstrably more correct to report that –in any given biological phase—it is the same (usually not the most abundant) protein that deposits (entropically displacing water) at all material surfaces. Still in dispute, across diverse fields, is the architecture of such Nature-deposited critical films, as illustrated in the adjacent Diagram of possible Paths A & B to the same equilibrium thickness in the same time but with dramatically different consequences.

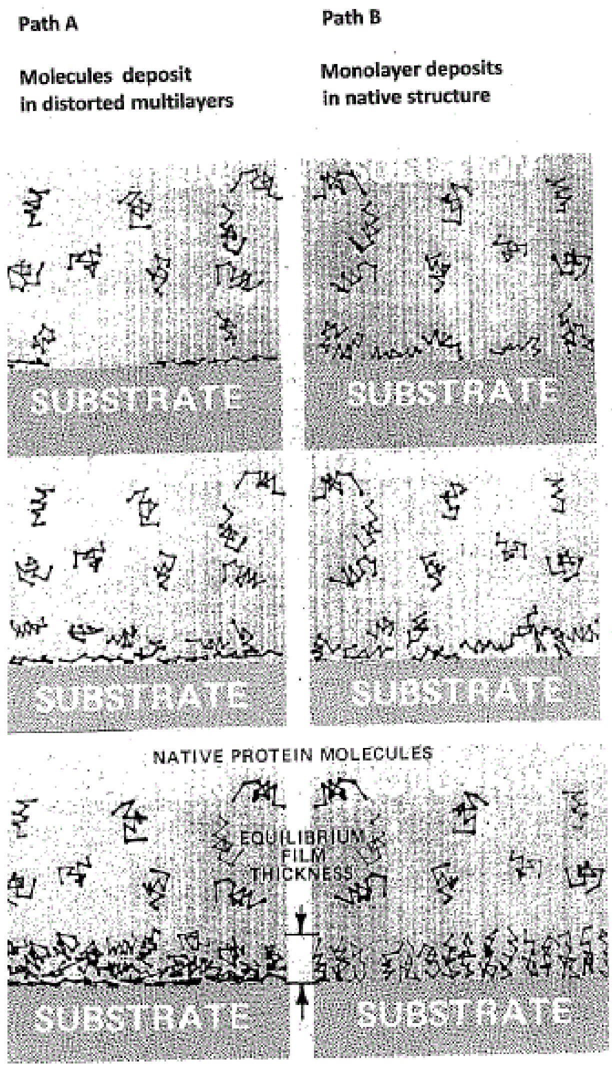

Figure 1: Proteins at Interfaces.

In Path A, long favored by many biologists, multi-layers of decreasingly denatured (flattened in the illustration shown) molecules deposit until a deposition vs re-entrainment equilibrium is reached; in Path B, today more conventionally cited, continuously deposited molecules force the earlier arrivals to become more erect and solution-phase-like until a true closely packed monolayer of essentially native molecules is present. Of enormous significance are the alternative predictions of each model, when it is realized that cell-surface interactions generally take place before the equilibrium states are obtained. In Path A, such interactions are with partially denatured molecules whose distortions can trigger similar anomalies in arriving cell behavior. In Path B, no such reactions to distorted protein molecules are anticipated, and explanations for differential cellular behavior are sought in (unlikely) different proteins being present or the consensus proteins deposited expressing only invariant native molecular aspects.

This may seem a bit like medieval "How many Angels can dance on the head of a pin?" philosophizing, but the implications for bioprospecting of new prosthetic implant materials or materials to be used in the sea— as just two of many examples—now prompt us to be more diligent in resolving the issues of proteins at interfaces: which are they?, have they displaced the boundary water?, are they denatured at the time of cellular arrival?, can we control those events by wiser material choices? Let us see your data, please!