Osman studied O2 sensing in the slug form of the soil amoeba, *Dictyostelium*. When nutrients are exhausted, the slug moves to the surface where a prolyl hydroxylase uses O2 to convert a proline to hydroxyproline on a conserved cytosolic protein, Skp1. Other enzymes attach five additional sugars to the hydroxyproline. Circular dichroism spectroscopy, small-angle X-ray scattering, and solution nuclear magnetic resonance spectroscopy indicated structural changes in Skp1 due to the glycosylation. Co-immunoprecipitation of cytosolic extracts from *Dictyostelium* strains indicated that glycosylated Skp1 bound to F-box and other proteins. Proteomic analysis of the immunoprecipitates suggested that the glycosylated Skp1 associates with certain F-box proteins to assemble an E3 ubiquitin ligase complex which prepares unknown target proteins for proteasomal destruction via ubiquitination. Osman proposed that the E3 ubiquitin ligase assembly likely regulates key proteins involved in O2-dependent developmental progression from the slug to a fruiting body which releases spores into the air to proliferate in a more nutritious environment.