THE MOLECULAR CONTENT OF PLANETARY NEBULAE: THE DUMBBELL AND THE RED SPIDER

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The molecular content of Planetary Nebulae (PNe) is not well characterized. It is generally thought that as the PN evolves, the ultraviolet radiation from the central star destroys molecular material from the AGB (asymptotic giant branch) shell. Here we present new observations of two interesting nebulae, the Dumbbell (NGC6853) and the Red Spider (NGC6537), carried out with the Sub-Millimeter telescope and the 12-Meter telescope of the Arizona Radio Observatory. The J=1-0 transition of HCO^+ at 89 GHz has been mapped across the face of the Dumbbell Nebula, which is estimated to be about 10,000 years old. HCO^+ appears to be extended by several arcminutes across the Dumbbell, as traced by optical atomic emission, with an abundance relative to H_2 of $f \sim 10^{-7}$. The molecule traces interesting velocity structure apparent in CO as well. In the Red Spider Nebula (age $\sim$ 1,000 years) CS and HCO^+ have been detected with abundances on the order of $f \sim 10^{-6}$ for both. Searches for other molecules are currently being conducted. Most current results will be presented.