Complete membership studies of open stellar clusters reveal that 25% of the evolved stars follow alternative pathways in stellar evolution, meaning some physical process in the past changed the stars’ composition or masses (or both). In order to draw a complete picture of stellar evolution we must include these canonically "strange" stars in our definition of standard stellar populations. The formation mechanism of blue straggler stars, traditionally defined to be brighter and bluer than the main sequence turnoff in a star cluster, has been an outstanding question for almost six decades. Hubble Space Telescope (HST) far-ultraviolet (far-UV) observations directly reveal, for the first time, the formation histories for blue straggler stars in the old (7 Gyr) open cluster NGC 188. The majority of NGC 188 blue stragglers exist in binaries with a prevalence of 1000-day periods and a statistical secondary mass distribution that peaks at 0.5 Msolar, suggestive of Carbon/Oxygen white dwarf companions. Using HST far-UV photometry I will present direct observational detections of young (<300 Myr), hot white dwarf companions to four blue stragglers. These blue stragglers all formed through recent mass transfer. The existence of these binaries in a well-studied cluster environment provides an unprecedented opportunity to observationally constrain mass transfer models, including constraints on the progenitor binary system.