In what ways can we partition a partially ordered set (poset) into linearly ordered subsets (chains)? We will report on recent progress made by our Claremont REU team on a thirty year old conjecture.

In particular, two chains $C_1$ and $C_2$ in a finite ranked poset $P$ (a finite poset is ranked if all maximal chains have the same size) are said to be nested if $|C_1| \leq |C_2|$ implies that the levels occurring in $C_1$ are a subset of the levels occurring in $C_2$. A thirty-year old conjecture of Griggs gives a sufficient condition—the so-called normalized matching condition, also known as the LYM property—for guaranteeing a decomposition of a poset into pairwise nested chains.

In this talk, we will present our results in support of the conjecture. As a consequence of our main theorem, the conjecture is true for rank 3 posets of width (size of the largest collection of incomparable elements) less than 12. (Received July 26, 2007)