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40506, and **Fabrizio Zanello**. *The shape of a pure O-sequence*. Preliminary report.

Pure O-sequences can be defined as h-vectors of pure order ideals or of level algebras with monomial relations. They arise in various contexts. For example, f-vectors of pure simplicial complexes are pure O-sequences, and an open conjecture of Stanley says that h-vectors of matroid complexes are also pure O-sequences. We construct examples showing that pure O-sequences whose length is at least 5 may not be unimodal and we establish various results on the growth of O-sequences. However, a complete characterization of pure O-sequences remains elusive. We propose a more manageable interval conjecture that gives structural information and that we establish in various cases, most importantly for all pure O-sequences of length 4. (Received February 03, 2009)