Cyclobutadienes via an Organocascade

**Significance:** The Wang group reports an organocatalytic [2+2] cycloaddition between α,β-unsaturated aldehydes and ynals. This reaction is catalyzed by secondary amines and generates cyclobutadienes in high yields under mild conditions.

**Comment:** The authors suggest that the reaction follows a dienamine–iminium–allenamine cascade sequence furnishing cyclobutadienes as products. Typically high temperatures are required for the synthesis of cyclobutadienes. This method requires only room temperature, hence overcoming a limitation of previous methods.

**Proposed mechanism:**

- **Catalyst:** (20 mol%) K₂CO₃ (20 mol%)
- **PhMe**
- **r.t., 72 h**
- **18 examples**
- **78–93% yield**

Selected examples:

- **R = Ar, c-Pr, MeBn, SiMe₂Ph**
  - 87% yield
  - 84% yield
  - 83% yield
  - 82% yield
  - 83% yield
  - 78% yield

**Key words:**
- cyclobutadienes
- ynals
- α,β-unsaturated aldehydes
- [2+2] cycloaddition

**Synfacts Contributors:** Benjamin List, Oleg Grossmann