Hydrogen-Bonding Phase-Transfer Catalyst Enabled Asymmetric Fluorination

**Significance:** Gouverneur and co-workers merge two fundamental strategies of modern catalyst design, hydrogen-bonding interactions and phase-transfer catalysis, to report a chiral bis-urea catalyzed asymmetric nucleophilic fluorination of episulfonium salts formed in situ. The fluorinated products are formed in good to excellent yields and moderate to good enantioselectivities by using CsF.

**Comment:** Hydrogen-bonding phase-transfer catalysis (HB PTC) has been previously reported in highly enantioselective nitro-Mannich reactions (B. Wang, Y. Liu, C. Sun, Z. Wei, J. Cao, D. Liang, Y. Lin, H. Duan Org. Lett. 2014, 16, 6432). Gouverneur and co-workers develop such catalysts to solve a synthetic challenge; namely, to enable an asymmetric fluorination reaction using a safe and readily accessible inorganic fluorine source. Henceforth, the expansion of HB PTC to other systems is expected.

**Selected examples:**
- **(rac)-1**
  - $R_1 = (CH_2)_2Ph$ or Me
  - $R_2 = $ halide, Me, OMe
  - 62% yield, er = 94:6 (gram scale)
- **(S,S)-2**
  - 12 examples
  - 53–98% yield
  - er from 91.9 to 97.3
- **(S)-1**
  - 53% yield, er = 93:7
- **(S)-1**
  - 72% yield, er = 95:5:4:5
- **(S)-1**
  - 87% yield, er = 91:9

**Proposed mechanism:**

(See figure for detailed mechanism)

**SYNFACTS Contributors:** Benjamin List, Jennifer L. Kennemur

**DOI:** 10.1055/s-0037-1609893; **Reg-No.: B05418SF**