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Carbon Atom Insertion: An Efficient Synthesis of Ishwarane
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## Total Synthesis of ( $\pm$ )-Ishwarane



F

Grignard addition elimination

E

## Category

Synthesis of Natural Products and Potential Drugs

## Key words

( $\pm$ )-ishwarane
Robinson annulation
conjugate addition
Grignard addition
cyclopropanation
carbene C-H
insertion


( $\pm$ )-Ishwarane

Significance: Ishwarane is a sesquiterpene featuring a carbon skeleton with an intriguing tricyclo[3.2.1.0 ${ }^{2,7}$ ]octane core. After the first total synthesis of ishwarane reported by Kelly and co-workers in 1970/1971 (J. Chem. Soc. D 1970, 1102; J. Chem. Soc. D 1971, 479), Cory and co-workers present a highly efficient six-step sequence to the natural product exploiting carbon atom insertion.

Comment: Previously reported octalone $\mathbf{D}$ is rapidly elaborated into cis-decaline $\mathbf{F}$ through conjugate addition, Grignard addition, and dehydration. A cyclopropanation and $\mathrm{C}-\mathrm{H}$ insertion cascade via putative carbene intermediate $\mathbf{G}$ yields ( $\pm$ )-ishwarane.

