Significance: In 1966, Barborak, Watts, and Pettit reported the total synthesis of cubane, a highly symmetrical hydrocarbon. This synthesis appeared two years after Eaton’s and Cole’s seminal publication, which was also highlighted in Synfacts (Synfacts 2019, 15, 613). Pettit’s insight into the chemistry of organometallic complexes and their application to the synthesis of complex targets make this work another true classic in that area.

Comment: The authors’ route exploits the unique reactivity of cyclobutadiene–iron tricarbonyl A. Upon oxidation, this complex acts as a cyclobutadiene precursor. Indeed, exposure to CeIV ions triggers release of cyclobutadiene and reaction with quinone B to give rise to Diels–Alder adduct C. Irradiation of C enables a [2+2] photocycloaddition to yield polycyclic compound D. Two successive Favoriskii rearrangements form the last two four-membered rings. Decarboxylation via the tert-butyl perester leads to the target compound.