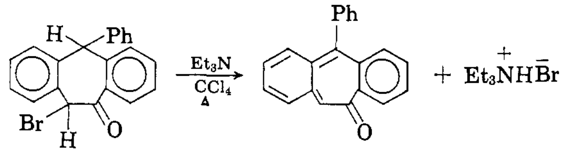
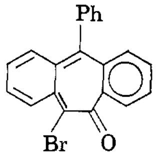
system is the dimer **8** ($\nu_{C=O}$ 1670 cm^{-1}; mp 350° dec; *m/e* 412).[5,6] The dimer is obtained directly by warming the hydroxy ketone in 50% aqueous fluoroboric acid. The conjugate acid of [*b*,*e*] can be regenerated by warming the dimer in concentrated sulfuric acid (60°, 15 min). Refluxing the dimer in decalin with maleic anhydride gives the Diels–Alder adduct **9** in good yield. Thus, at elevated temperatures the dimer is in equilibrium with the monomeric [*b*,*e*].

Substituted tropone **10** was sought in an effort to obtain a stable neutral derivative of [*b*,*e*], as shown in (1). The reaction mixtures exhibited the expected low-frequency carbonyl absorption in the infrared (1623 cm^{-1}) and gave a Diels–Alder adduct with dimethyl acetylenedicarboxylate. However, all attempts to isolate **10** gave only intractable mixtures, presumably resulting from air oxidation. Tropone **11** behaved similarly ($\nu_{C=O}$ 1645 cm^{-1}).



10 (1)



11

Acknowledgment. We wish to thank the Welch Foundation for support of this research.

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[5] The stereochemistry of the dimer has not been investigated.

[6] Elemental analyses of the dimer have the correct carbon : hydrogen ratio, but the percentages of each were consistently low, presumably because of the difficulty in achieving complete combustion of the dimer.

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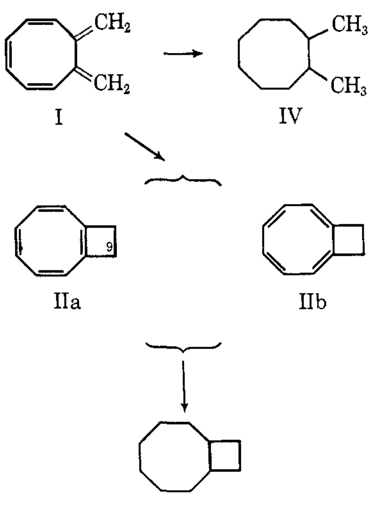
Bicyclo[6.2.0]deca-1,3,5,7-tetraene

Sir:

We describe the synthesis of bicyclo[6.2.0]deca-1,3,5,7-tetraene (II), a substance containing fused cyclooctatetraene and cyclobutene rings.

7,8-Dimethylenecycloocta-1,3,5-triene (I)[1] was irradiated in methanol with a medium-pressure Hanovia mercury vapor lamp (2 amp, 125 w) for 2 hr at room temperature. Chromatography on silicic acid gave II as a yellow liquid in *ca.* 10% yield as sole product isolated. Substance II was relatively stable in solution, but decomposed rapidly in the neat state at room temperature.

The structural assignment II was based on the spectral properties. The mass spectrum had a molecular ion at *m/e* 130 and a base peak at *m/e* 129. The ultraviolet spectrum (EtOH) showed end absorption only (no λ_{max} >215 mμ), like cyclooctatetraene itself.[2]

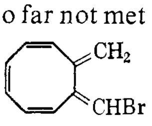


III

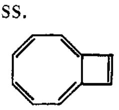
The infrared spectrum (neat) exhibited mxaima at 3010 (s), 2920 (s), 2870 (s), 1635 (m), 1620 (m), 1445 (m), 1430 (m), 795 (s), 785 (s), 760 (vs), and 685 (s) cm^{-1}. The nmr spectrum (CCl_4, 100 Mc/sec) showed a complex multiplet (6 H) at τ 4.38–4.72 assigned to the olefinic protons and a singlet (4 H) at τ 7.62 assigned to the allylic protons.

The structure of II was confirmed by hydrogenation in methanol over platinum, whereby 3.9 molar equiv of hydrogen was absorbed. The resulting bicyclo[6.2.0]decane (III) (presumably the *cis* isomer) was a colorless liquid, homogeneous by glpc; mass spectrum, molecular ion peak at *m/e* 138; nmr spectrum, broad band at τ 7.7–8.7, no olefinic or methyl protons. Under the same hydrogenation conditions, substance I absorbed 4.8 molar equiv of hydrogen and yielded 1,2-dimethylcyclooctane (IV),[3] homogeneous by glpc; mass spectrum, molecular ion peak at *m/e* 140; nmr spectrum, broad band (14 H) at τ 8.2–8.7 assigned to the ring protons, signals at τ 9.11 and 9.18 (6 H) assigned to the methyl protons.

Irradiation of 7-methylene-8-bromomethylenecycloocta-1,3,5-triene (V)[4] also led to II, but the 9-bromo derivative of II could not be isolated from this reaction. Preliminary experiments designed to convert II to the fully conjugated bicyclo[6.2.0]deca-1,3,5,7,9-pentaene (VI)[5] have so far not met with success.



V



VI

The transformation of I to II is an example of the now well-established photochemical cyclization of conjugated dienes to cyclobutenes.[6]

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[1] (a) J. A. Elix, M. V. Sargent, and F. Sondheimer, *Chem. Commun.*, 508 (1966); (b) F. A. L. Anet and B. Gregorovich, *Tetrahedron Letters*, 5961 (1966).

[2] See A. C. Cope and C. G. Overberger, *J. Am. Chem. Soc.*, **70**, 1433 (1948); B. Ekström, *Chem. Ber.*, **92**, 749 (1959).

[3] A. C. Cope and H. C. Campbell, *J. Am. Chem. Soc.*, **74**, 179 (1952).

[4] Compound V was prepared from 1,2-bisbromomethylcyclooctatetraene[1a] in almost quantitative yield by treatment with potassium *t*-butoxide in ether.

[5] See A. Rosowsky, H. Fleischer, S. T. Young, R. Partsch, W. H. Saunders, and V. Boekelheide, *Tetrahedron*, **11**, 121 (1960).

[6] See R. Srinivasan, *J. Am. Chem. Soc.*, **84**, 4141 (1962); K. J. Crowley, *Proc. Chem. Soc.*, 334 (1962).

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