Give the product for the following reactions:

\[
\begin{align*}
\text{[2+2]cycloaddition} + \text{a compound} & \xrightarrow{\text{H}} X \xrightarrow{1,3 \text{butadiene}} Y \\
\text{Diels-Alder} & \\
\end{align*}
\]

\[
\begin{align*}
\text{[2+2]} & \\
\end{align*}
\]

\[
\begin{align*}
\text{[2+2]} & \\
\end{align*}
\]

\[
\begin{align*}
\text{[2+2]} & \\
\end{align*}
\]

- The Pd catalyst serves to withdraw \( \sigma \) density from \( N \) and speed the \( \sigma_\pi \) rearrangement.
- Notice the vinyl allyl ether structure.
Provide a mechanism for the following transformations.

Diels-Alder

Loss e⁻ cyclization

Diels-Alder

\(-\text{CO}_2\) to mesomeric
Mechanisms Continued

Although D₃ is obtained in the diet through dairy products, and animal livers, it is also produced in human skin when 7-dehydrocholesterol is exposed to UV light.
The following two reactions come from the synthesis of (±)-Eremopetasidione, a compound used in Chinese medicine for poisonous snake bites, tonsilitis and contusions.

Give a mechanism for the following steps.

Diels Alder

- Note the possibility of secondary overlap (Text p.659) to stabilize the transition state.

End 2 isomers

Cope Rearrangement

Numbering carbons helps!

Flip

Although the 8-9 double bond is assumed to form first, the 9-10 double bond is thermally more stable (we're heating) and is isolated.