The nodulisporic acids are a family of indole terpenes with potent insecticidal activity that were initially reported by Merck. These compounds are ligands for a subset of ligand-gated chloride channels that are found in arthropods but not mammals. Scholars maintain that this makes them interesting.

Biological activity aside, these compounds have garnered considerable attention from the synthetic community, namely from the groups of Amos Smith and more recently Sergey Pronin. Both of their synthetic strategies rely on late stage indole formation which serves to couple two fragments of considerable complexity, completing the 6,6,5,5,6,5,6 (haha) fused ring system.

1. A general disconnection is shown below. Propose some indolizations!

![nodulisporic acid]

Despite broadly similar endgame strategies, the Smith and Pronin groups have developed very different syntheses of the eastern/western hemispheres of the scaffold.

2. Pronin employs a HAT-driven polycyclization for the construction of the eastern hemisphere. Propose a synthesis of dialdehyde 1 and provide a mechanism for the formation of tricycle 2.

With the tricylic core of the eastern hemisphere in hand, Pronin uses different indole forming reactions to make emindol SB and nodulisporic acid C, highlighting the utility of this modular synthetic strategy for accessing different members of this family of indole terpenes.

4. Provide a mechanism/reaction name for the conversion of 3 to 4. This is quite a large scheme given the content of the question, but I made the chemdraw before writing the question and couldn’t bring myself to just throw it away....
The different strategies employed by the Smith and Pronin groups for accessing the western hemisphere are summarized below.

5. Propose a synthesis of compound 6 using the starting materials employed by the Smith group (blue arrow). Propose a synthesis of compound 7 and provide a mechanism for the key polycyclization.