Merck recently disclosed a series of γ-secretase inhibitors (GSIs) that were assessed in a nontransgenic animal model of Alzheimer's disease, demonstrating reduction of amyloid-β in the central nervous system after acute oral dosing. Their most promising compound, Merck-2, elaborated upon a previous lead, Merck-1. Merck-1 was the starting point in a medicinal chemistry discovery effort, leading to a new spirocyclic series, including Merck-2.

**Part 1.** Working in teams, propose a retrosynthesis and forward synthesis of Merck-1 that is concise and scalable. All starting materials in your synthesis must be available from any reputable commercial supplier in ≥5 g scale.

**Part 2.** Propose a medicinal chemistry route to Merck-2 and at least 3 other spirocyclic analogs (varying the group in gray) using reagents available from a reputable commercial supplier on any scale.

You are only permitted to use a computer to search emolecules.com or vendor websites for commercial availability.