Enantioselective Total Synthesis of (+)-Chinensiolide B

The Chinensiolides constitutes a family of guaiane type α-methylene γ-lactone natural products with a tricyclic 5,7,5-ring system. They have been isolated from *Ixeris chinensis* Nakai, a plant used in Chinese folk medicine.\(^1\)\(^2\) Chinensiolide B (1) displays cytotoxic behaviour against human primary liver cancer (HepG2) and human lung fibroblast (WI-38 and VA-13) cell lines.\(^3\) Its activity against HepG2 is comparable to that of paclitaxel, used in cancer chemotherapy.

The first total synthesis of (+)-chinensiolide B has been reported by D. G. Hall *et al.*\(^4\)

**Scheme 1**

1. Give the structure of compound (2).
2. Show the mechanism of the named reaction from 2 to 3 (step (d)).

Reduction and oxidation proceed ed uneventfully to form compound 4 in a combined yield of 76%.

**Scheme 2**

3. Suggest a synthesis of compound 5, which was made as an inseparable mixture of alkene isomers.
4. Compound 5 was used in the key allylboration/lactonis- 
ation step to afford compound 6 from 4. Draw a mechanism and account for the trans diastereoselectivity observed (Felkin model).

5. Suggest a structure for 7 and by-product 8.

6. Give step (b) in this transformation a name.

**Scheme 3**

7. Give reagents for steps (a) and (b).

8. Suggest the structure of 11 from mechanisms of steps (c) and (d).

9. Give the reagent for step (e).

**References**


