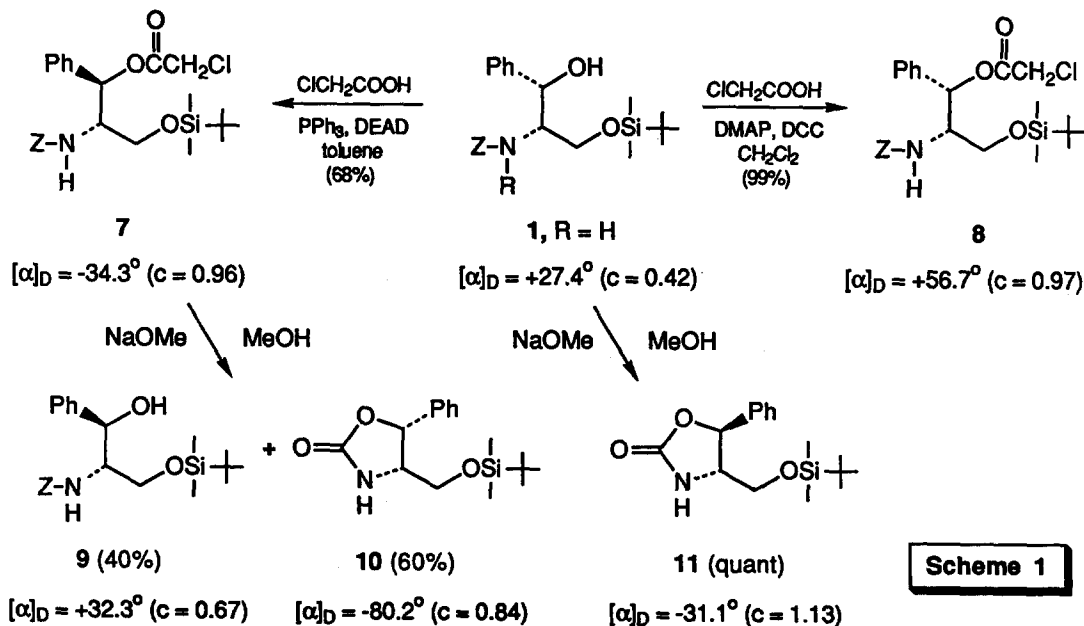
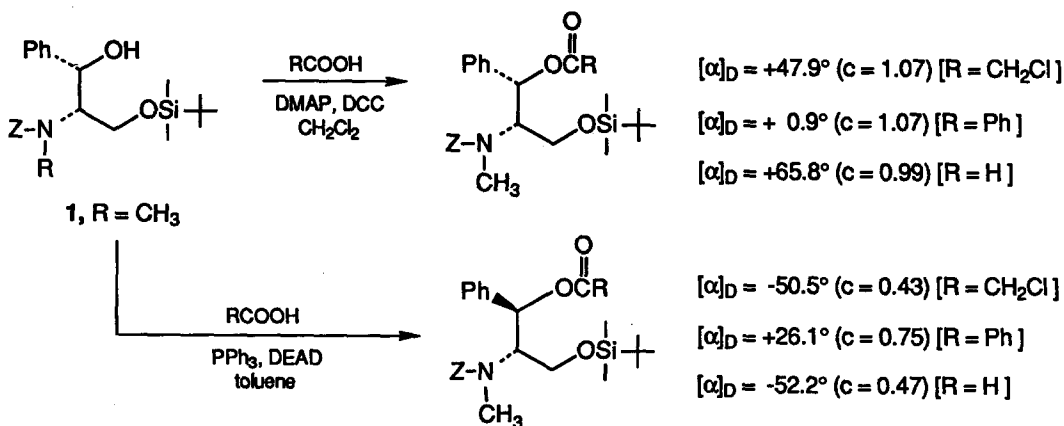


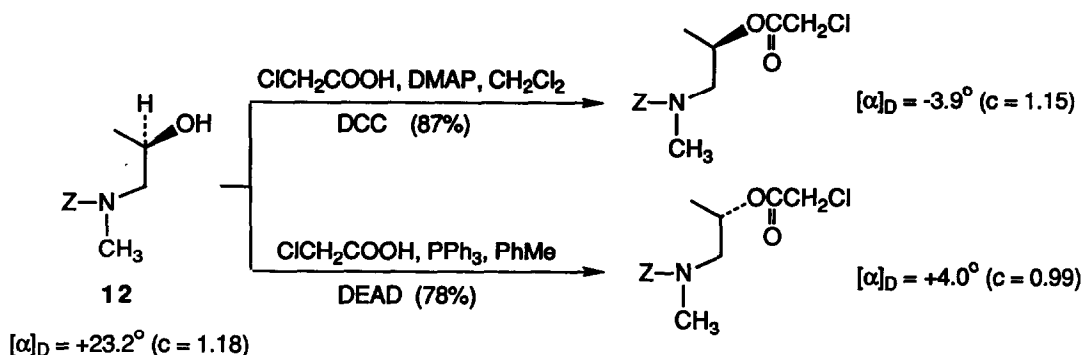
Exposure of **1** ($R=H$) in the presence of $RCOOH$ to standard Mitsunobu conditions⁹ afforded a single product, ester **7**. That clean *inversion* had occurred was readily discerned by comparison of **7** with the product (**8**) of DCC coupling of **1** ($R=H$) with the same acid (Scheme 1). In addition, transesterification of **7** led to two new materials, compounds **9** and **10**, the former being a diastereomer of **1**, while the oxazolidone is a diastereomer of **11** formed by ring closure directly from **1**.



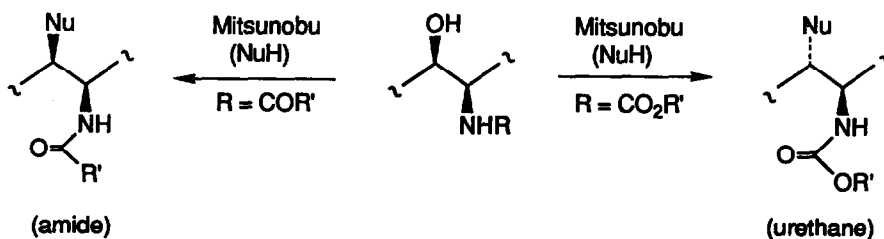
Tertiary carbamate **1** ($R=CH_3$) was tested in a likewise manner using three different acids (Scheme 2). In all cases, the same conclusions were drawn (i.e., that a single inversion had taken place) and hence, both secondary and tertiary carbamates give the same stereochemical results.



To insure the generality of these observations, given the benzylic nature of alcohol **1** and the presence of a heteroatom at the β -site (however unlikely its involvement), educt **12**^a was subjected to the identical series of reactions. As expected, the product of net inversion was realized.



In conclusion, it has been unequivocally established that both secondary and tertiary carbamates bearing a vicinal relationship to a hydroxyl function undergo Mitsunobu couplings with clean inversion at carbon.⁹ Unlike secondary amides, which readily form oxazolines and would be expected to lead to net retention, urethanes in general do not participate in such intramolecular closures. This presumably reflects the greater buildup of negative charge on oxygen due to amide resonance as compared with that for carbamates. *The ability to predetermine the stereochemical consequences of Mitsunobu reactions on vic-amino alcohols by simply choosing an appropriate nitrogen protecting group represents, therefore, a valuable tool for controlling acyclic stereochemistry.*



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References and Notes

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8. Alcohol **12** was prepared from commercially available (Aldrich Chemical Co.) S-(+)-1-amino-2-propanol.
9. All new compounds were fully characterized by IR, NMR, MS, and HRMS analyses. Optical rotations were obtained in EtOH at ambient temperatures (ca. 23°).