from MeOH–H_2O gave 75 mg (75%) of **8b**: pale yellow needles (MeOH–H_2O); mp 152–153 °C; IR (KBr) 3010, 2950, 1615, 1590, 1450, 1360, 1200, 870, 850, 810, 720 cm^{-1}; NMR ($CDCl_3$) δ 0.68 (3 H, t, J = 8 Hz), 0.76 (3 H, t, J = 8 Hz), 1.12 (9 H, s), 1.32 (9 H, s), 1.60–2.20 (4 H, m), 5.44 (1 H, d, J = 1.5 Hz), 5.87 (1 H, d, J = 1.5 Hz), 6.01 (1 H, d, J = 10 Hz), 6.23 (2 H, s), 6.38 (1 H, d, J = 10 Hz), 6.85 (1 H, d, J = 2 Hz), 6.90 (1 H, d, J = 2 Hz); mass spectrum, m/e 372 (M^+).

Anal. Calcd for $C_{28}H_{36}$: C, 90.26; H, 9.74. Found: C, 89.98; H, 9.75.

The yields of products were summarized in Table I. The thermal rearrangements of **1c–i** were carried out under the same conditions, worked up, and treated as described above.

8c: pale yellow needles (MeOH–H_2O); mp 162–164 °C; IR (KBr) 3020, 2950, 1610, 1590, 1450, 1350, 1260, 1200, 870, 850, 730, 675 cm^{-1}; NMR ($CDCl_3$) δ 0.64 (3 H, t, J = 7 Hz), 0.71 (3 H, t, J = 7 Hz), 1.11 (9 H, s), 1.32 (9 H, s), 0.96–1.40 (4 H, m), 1.60–2.10 (4 H, m), 5.43 (1 H, d, J = 1.5 Hz), 5.86 (1 H, d, J = 1.5 Hz), 6.01 (1 H, d, J = 10 Hz), 6.23 (2 H, s), 6.35 (1 H, d, J = 10 Hz), 6.85 (1 H, d, J = 2 Hz), 6.89 (1 H, d, J = 2 Hz); mass spectrum, m/e 400 (M^+).

Anal. Calcd for $C_{30}H_{40}$: C, 89.94; H, 10.06. Found: C, 89.60; H, 10.15.

8d: pale yellow prisims (MeOH–H_2O); mp 75–78 °C; IR (KBr) 3020, 2950, 1610, 1590, 1455, 1360, 1250, 1200, 875, 730 cm^{-1}; NMR ($CDCl_3$) δ 0.70 (3 H, t, J = 7 Hz), 0.75 (3 H, t, J = 7 Hz), 0.84–2.10 (12 H, m), 1.09 (9 H, s), 1.31 (9 H, s), 5.44 (1 H, d, J = 1.5 Hz), 5.86 (1 H, d, J = 1.5 Hz), 6.01 (1 H, d, J = 10 Hz), 6.23 (2 H, s), 6.36 (1 H, d, J = 10 Hz), 6.84 (1 H, d, J = 2 Hz), 6.88 (1 H, d, J = 2 Hz); mass spectrum, m/e 428 (M^+).

Anal. Calcd for $C_{32}H_{44}$: C, 89.65; H, 10.35. Found: C, 89.49; H, 10.16.

8e: yellow prisms (MeOH–H_2O); mp 180–182 °C; IR (KBr) 3040, 2950, 1620, 1590, 1450, 1360, 1260, 1230, 1195, 960, 875, 865, 850, 810 cm^{-1}; NMR ($CDCl_3$) δ 1.10 (3 H, s), 1.16 (9 H, s), 1.37 (3 H, s), 1.37 (9 H, s), 6.20 (1 H, d, J = 1.5 Hz), 6.60 (1 H, d, J = 1.5 Hz), 7.64 (1 H, d, J = 2 Hz), 7.76 (1 H, d, J = 2 Hz).

Anal. Calcd for $C_{26}H_{28}Br_4$: C, 47.30; H, 4.28. Found: C, 47.13; H, 4.40.

8f: pale brown needles (MeOH–H_2O); mp 148–149 °C; IR (KBr) 3040, 2950, 1620, 1590, 1450, 1360, 1255, 1020, 960, 875, 820, 775 cm^{-1}; NMR ($CDCl_3$) δ 0.68 (3 H, t, J = 8 Hz), 0.84 (3 H, t, J = 8 Hz), 1.17 (9 H, s), 1.37 (9 H, s), 1.60–2.28 (4 H, m), 6.22 (1 H, d, J = 1.5 Hz), 6.61 (1 H, d, J = 1.5 Hz), 7.61 (1 H, d, J = 2 Hz), 7.71 (1 H, d, J = 2 Hz).

Anal. Calcd for $C_{28}H_{32}Br_4$: C, 48.65; H, 4.69. Found: C, 48.76; H, 4.63.

8g: yellow prisms (MeOH–H_2O); mp 154–157 °C; IR (KBr) 3040, 2950, 1620, 1590, 1450, 1360, 1230, 1200, 960, 875, 860, 820, 840 cm^{-1}; NMR ($CDCl_3$) δ 0.67 (3 H, t, J = 7 Hz), 0.70 (3 H, t, J = 7 Hz), 1.16 (9 H, s), 1.38 (9 H, s), 1.00–1.40 (4 H, m), 1.60–2.10 (4 H, m), 6.22 (1 H, d, J = 1.5 Hz), 6.60 (1 H, d, J = 1.5 Hz), 7.62 (1 H, d, J = 2 Hz), 7.73 (1 H, d, J = 2 Hz).

Anal. Calcd for $C_{30}H_{36}Br_4$: C, 50.31; H, 5.07. Found: C, 50.20; H, 5.15.

8h: pale yellow needles (MeOH–H_2O); mp 155–156 °C; IR (KBr) 3030, 2960, 1620, 1475, 1460, 1370, 1360, 1350, 1205, 875, 860, 820, 730, 670 cm^{-1}; NMR ($CDCl_3$) δ 0.75 (3 H, t, J = 8 Hz), 1.11 (9 H, s), 1.27 (3 H, s), 1.30 (9 H, s), 1.86 (2 H, q, J = 8 Hz), 5.50 (1 H, d, J = 1.5 Hz), 5.86 (1 H, d, J = 1.5 Hz), 6.02 (1 H, d, J = 10 Hz), 6.16 (1 H, d, J = 10 Hz), 6.32 (1 H, d, J = 10 Hz), 6.40 (1 H, d, J = 10 Hz), 6.89 (2 H, s); mass spectrum m/e 358 (M^+).

Anal. Calcd for $C_{27}H_{34}$: C, 90.44; H, 9.56. Found: C, 89.96; H, 9.62.

8i: pale yellow needles (MeOH–H_2O); mp 128–130 °C; IR (KBr) 3020, 2950, 1615, 1455, 1355, 1200, 875, 860, 820, 730, 665 cm^{-1}; NMR ($CDCl_3$) δ 0.71 (3 H, t, J= 7 Hz), 1.11 (9 H, s), 1.26 (3 H, s), 1.32 (9 H, s), 0.96–1.40 (2 H, m), 1.50–1.90 (2 H, m), 5.50 (1 H, d, J = 1.5 Hz), 5.87 (1 H, d, J = 1.5 Hz)8 6.02 (1 H, d, J = 10 Hz), 6.18 (1 H, d, J = 10 Hz), 6.33 (1 H, d, J = 10 Hz), 6.38 (1 H, d, J = 10 Hz), 6.90 (2 H, s); mass spectrum, m/e 372 (M^+).

Anal. Calcd for $C_{28}H_{36}$: C, 90.26; H, 9.74. Found: C, 90.02; H, 9.74.

In the case of **1j**, a mixture of **8j** and **8k** was obtained in 90% yield. However, the attempt at separation of **8j** and **8k** failed.

Registry No. **1a**, 76626-75-0; **1b**, 76626-76-1; **1c**, 76626-77-2; **1d**, 81555-09-1; **1e**, 76447-51-3; **1f**, 76466-35-8; **1g**, 76626-78-3; **1h**, 81555-10-4; **1i**, 81555-11-5; **1j**, 81555-12-6; **4h**, 81600-81-9; **4i**, 81600-82-0; **4j**, 81600-83-1; **5h**, 76447-00-2; **5i**, 76447-01-3; **5j**, 76447-03-5; **6h**, 81583-53-1; **6i**, 81583-55-3; **6j**, 81583-57-5; **8a**, 81555-13-7; **8b**, 81555-14-8; **8c**, 81555-15-9; **8d**, 81555-16-0; **8e**, 81555-17-1; **8f**, 81555-18-2; **8g**, 81555-19-3; **8h**, 81555-20-6; **8i**, 81555-21-7; **8j**, 81555-22-8; **8k**, 81555-23-9.

Desulfurization of Alkyl Phthalimido Disulfides

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In the course of our investigation[3] of the coenzyme, lipoic acid (**2b**, Scheme I), we required thiophthalimide **4** for the attachment of the dihydrolipoate moiety to a thiamine analogue. Simple *N*-(alkylthio)phthalimides (cf. **4**) are generally prepared by the reaction of sulfenyl halides with potassium phthalate or phthalimide/Et_3N.[4] The reaction of **1**[5] with SO_2Cl_2, Cl_2 or Br_2 in attempts to form the required sulfenyl halide, however, gave methyl lipoate (**2a**) as the only product.

The successful synthesis of thiophthalimide **4**[3b] (Scheme I) entails the initial conversion of acetyldihydrolipoate **1** into alkyl phthalimido disulfide **3**,[6] followed by the selective monodesulfurization **3** → **4**. As shown Table I (entries 1–5), the monodesulfurization of secondary and tertiary alkyl phthalimido disulfides is achieved by a range of phosphines. Use of the polymeric phosphine (entry 3) described by Relles and Schluenz in the desulfurization reactions facilitates the separation of the desired alkyl thiophthalimide from the phosphine sulfide byproduct. The reaction of alkyl phthalimido disulfides with 1 equiv of the more nucleophilic tris(diethylamino)phosphine is not selective. Isopropyl phthalimido disulfide (Table I, entry 6) reacts with 1 equiv of $(Et_2N)_3P$ to give a mixture of starting disulfide plus the products of mono- and didesulfurization. In two cases examined (Table I, entries 7 and 8), 2 equivs of $(Et_2N)_3P$ was found to cleanly remove both sulfur atoms from alkyl phthalimido disulfides. At least one limitation of the procedure is shown by the reaction of 2-(methoxycarbonyl)ethyl phthalimido disulfide with $(Et_2N)_3P$ (Table I, entry 9) which yields phthalimide and the phosphine sulfide as the only characterizable

(1) Alfred P. Sloan Fellow, 1980–1982.

(2) Natural Sciences and Engineering Research Council of Canada, Predoctoral Fellow, 1980–1981.

(3) (a) Rastetter, W. H.; Adams, J.; Frost, J. W.; Nummy, L. J.; Frommer, J. E.; Roberts, K. B. *J. Am. Chem. Soc.* **1979**, *101*, 2752. (b) Rastetter, W. H.; Adams, J. *J. Org. Chem.* **1981**, *46*, 1882.

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(5) Gunsalus, I. C.; Barton, L. S.; Gruber, W. *J. Am. Chem. Soc.* **1956**, *78*, 1736. See also ref 3b.

(6) The alkyl phthalimido disulfides reported herein were prepared according to: Harpp, D. N.; Ash, D. K. *Int. J. Sulfur Chem., Part A* **1971**, *1*, 57.

(7) (a) Relles, H. M.; Schluenz, R. W. In "Polymer Supported Reactions in Organic Synthesis"; Hodge, P., Sherrington, D. C., Eds.; Wiley: New York, 1980; p 475. (b) Relles, H. M.; Schluenz, R. W. *J. Am. Chem. Soc.* **1974**, *96*, 6769.

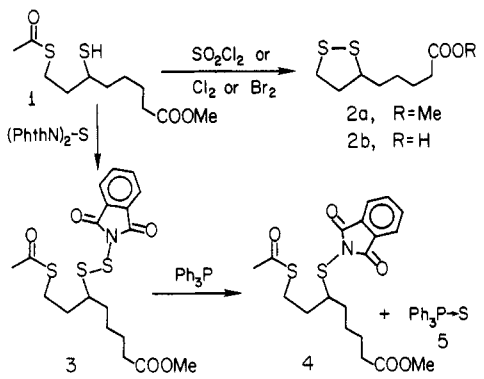
0022-3263/82/1947-2785$01.25/0

Table I. Desulfurizations of Alkyl Phthalimido Disulfides by Phosphines

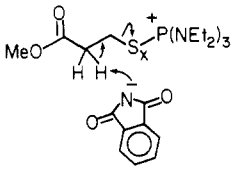
entry	disulfide	phosphine (equiv)	products (yield, %)
1	3	Ph_3P (1.0)	4 (52)[a]
2	t-BuS_2NPhth	Ph_3P (1.0)	t-BuSNPhth (90)[a]
3	t-BuS_2NPhth	polystyryldiphenylphosphine (1.0)	t-BuSNPhth (82)[a]
4	t-BuS_2NPhth	$(n\text{-}Bu)_3P$ (1.0)	t-BuSNPhth (73)[b]
5	i-PrS_2NPhth	Ph_3P (1.0)	i-PrSNPhth (81)[b]
6	i-PrS_2NPhth	$(Et_2N)_3P$ (1.0)	i-PrS_2NPhth (1.1 parts),[a] i-PrSNPhth (1.5 parts), i-PrNPhth (1.0 part)
7	$PhCH_2S_2NPhth$	$(Et_2N)_3P$ (2.0)	$PhCH_2NPhth$[a] (93)
8	n-PrS_2NPhth	$(Et_2N)_3P$ (2.0)	n-PrNPhth (62)[b]
9	$MeO_2C(CH_2)_2S_2NPhth$	$(Et_2N)_3O$ (2.0)	phthalimide[b,c]

[a] See the Experimental Section for details of this reaction. [b] This material was indistinguishable from an authentic sample (spectroscopic data and melting point). [c] An oily, polymeric product was also obtained.

Scheme I



products. These products may be derived from the initially formed phosphonium salt 6[8] by elimination under the reaction conditions.[9]



6, x = 1 or 2

Experimental Section

General Methods. ^1H NMR spectra were obtained on a Varian T-60 (60 MHz), Perkin-Elmer R-24B (60 MHz), or Bruker WM-250 (250 MHz) NMR spectrometer. Chemical shifts are reported downfield from tetramethylsilane on the δ scale. An internal Me_4Si reference was utilized at 60 MHz, and a residual $CHCl_3$ reference was utilized at 250 MHz. Mass spectra were determined on a Varian MAT-44 mass spectrometer. Melting points (corrected) were obtained in open capillaries on a Thomas-Hoover melting point apparatus.

Benzene was distilled from P_2O_5 onto 4-Å molecular sieves; tris(diethylamino)phosphine was distilled in vacuo. Triphenylphosphine (99%, purchased from Aldrich Chemical Co.) was used without further purification. Polystyryldiphenylphosphine was prepared as detailed in ref 7b; alkyl phthalimido disulfides were prepared according to our published procedure.[6]

All reactions were maintained under an atmosphere of dry nitrogen.

Desulfurization of Dihydrolipoyl Phthalimido Disulfide 3. Experimental details for the synthesis of 4 are given in ref 3b. The product displayed[3b] satisfactory combustion analytical and spectroscopic data.

Desulfurization of Alkyl Phthalimido Disulfides by Triphenylphosphine. The disulfurization of *tert*-butyl phthalimido disulfide (Table I, entry 2) is given as a representative example. To *tert*-butyl phthalimido disulfide (85.1 mg, 0.318 mmol) in benzene (2 mL) was added dropwise a solution of triphenylphosphine (83.5 mg, 0.318 mmol) in benzene (1 mL). The reaction mixture was stirred at ambient temperature for 1.5 h, and then the solvent was removed in vacuo. Preparative TLC (silica gel, $CHCl_3$) was used to separate triphenylphosphine sulfide (R_f 0.57) from the product (R_f 0.41), *N*-(*tert*-butylthio)phthalimide. The sulfenamide (67.4 mg, 90%) displayed the following: mp 131–132 °C (lit.[4a] mp 130–131 °C);[4a] ^1H NMR ($CDCl_3$, 60 MHz) 1.40 (s, 9 H), 7.86 (AA'BB' m, 4 H); mass spectrum, *m/e* 235 (M^+). For the analysis, see below.

Desulfurization of *tert*-Butyl Phthalimido Disulfide by Polystyryldiphenylphosphine. *tert*-Butyl phthalimido disulfide (131.9 mg, 0.493 mmol) was stirred in benzene (4 mL) and the polymeric phosphine (264.3 mg, 1.0 equiv, of phosphine as determined by combustion analysis for C, H, and P) was added portionwise over several minutes. The mixture was stirred for 3 h at ambient temperature, and the polymeric phosphine was removed by filtration, affording a solution of the product, *N*-(*tert*-butylthio)phthalimide. A sample of analytical purity (mp 131 °C; 95.1 mg, 82%) was obtained by preparative TLC (see above). For the ^1H NMR and mass spectra, see above. Anal. Calcd: C, 61.24; H, 5.58; N, 5.95; S, 13.62. Found: C, 61.50; H, 5.80; N, 5.66; S, 13.59.

Disulfurization of Isopropyl Phthalimido Disulfide with 1 Equiv of Tris(diethylamino)phosphine. To isopropyl phthalimido disulfide (58.2 mg, 0.229 mmol) in benzene (3 mL) was added tris(diethylamino)phosphine (56.8 mg, 0.229 mmol). The mixture was stirred at ambient temperature for 2 h, and the solvent was removed in vacuo. The ratio of products was determined by high-field ^1H NMR spectroscopy of the crude product mixture by integration of the methyl absorptions for each of the products: isopropyl phthalimido disulfide (δ 1.39, 1.1 parts), *N*-(isopropylthio)phthalimide (δ 1.26, 1.5 parts), *N*-isopropylphthalimide (δ 1.48, 1.0 part).

Desulfurization of Alkyl Phthalimido Disulfides by Tris(diethylamino)phosphine. The desulfurization of benzyl phthalimido disulfide is given as a representative example. To benzyl phthalimido disulfide (71.3 mg, 0.236 mmol) in benzene (3 mL) was added dropwise a solution of tris(diethylamino)-phosphine (116.8 mg, 0.472 mmol) in benzene (1 mL). The mixture was stirred for 2 h at ambient temperature and the solvent removed in vacuo. Preparative TLC (silica gel, 1:1 hexanes/EtOAc) was used to separate the phosphine sulfide (R_f 0.77) from the product (R_f 0.51), *N*-benzylphthalimide. The product was recrystallized from EtOH: 52.1 mg (93%); mp 114–115 °C (lit.[10] mp 116 °C); ^1H NMR ($CDCl_3$, 60 M Hz) 4.80 (s, 2 H), 7.20 (m, 5 H), 7.6 (AA'BB' m, 4 H); mass spectrum, *m/e* 237 (M^+).

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(8) All of the desulfurizations reported herein are assumed to proceed through similar phosphonium salts.[9] Nucleophilic attack of the phthalate anion at sulfur or at carbon, rather than elimination, would lead to the thio imide and *N*-alkylphthalimide products, respectively.

(9) For a discussion of desulfurizations similar to those reported in this paper see the following: Harpp, D. N.; Adams, J.; Gleason, J. G.; Mullins, D.; Steliou, K. *Tetrahedron Lett.* 1978, 3989 and references cited therein.

(10) Weast, R. C.; Selby, S. M., Eds. "Handbook of Chemistry and Physics", 47th ed.; The Chemical Rubber Co.: Cleveland, Oh, 1966; p B-229.

also thank Dr. C. Costello for exact mass measurements.

Registry No. 3, 76756-46-2; 4, 76756-41-7; *tert*-butyl phthalimido disulfide, 33704-41-5; *N*-(*tert*-butylthio)phthalimide, 17796-75-7; isopropyl phthalimido disulfide, 33704-40-4; *N*-(isopropylthio)-phthalimide, 17796-72-4; *N*-isopropylphthalimide, 304-17-6; benzyl phthalimido disulfide, 33704-38-0; *N*-benzylphthalimide, 2142-01-0; propyl phthalimido disulfide, 30912-77-7; *N*-propylphthalimide, 5323-50-2; 2-(methoxycarbonyl)ethyl phthalimido disulfide, 81572-60-3; phthalimide, 85-41-6.

N-Amidoyliminium Ion Cyclizations. Synthesis of Annelated Imidazolidinones

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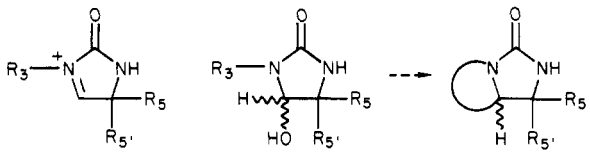
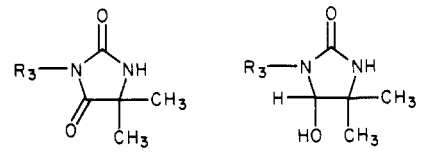
N-Acyliminium ions have proven to be valuable intermediates in the construction of heterocyclic compounds.[2] The corresponding *N*-amidoyl species (**1**) should be accessible from 4-hydroxy-2-imidazolidinones (**2**). In this paper, we describe the use of **2** for the preparation of annelated imidazolidinones **3**. These reactions formally extend the scope of intramolecular amidoalkylation transformations.[3,4]



1 **2** **3**

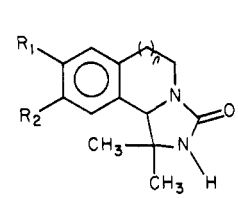
The desired starting materials (**4**) for this study were readily prepared in two steps from 5,5-dimethylhydantoin[5] (**4e**). Alkylation of **4e** with phenethyl bromide,[5] 3,4-dimethoxyphenethyl bromide,[6] *m*-methoxybenzyl chloride,[5] and (*m*-methoxyphenyl)propyl bromide,[7] respectively, under basic conditions (KOH/Me_2SO, 2 days) gave the corresponding 3-substituted hydantoins **4a–d** in moderate yields (55–83%). Reduction of **4a–d** with excess lithium aluminum hydride (THF, room temperature, 2 days) efficiently afforded the 4-hydroxy adducts **5a–d** (75–90% yields).[8] The ^1H NMR spectrum for each of these compounds (**5**) showed two distinct singlets in the upfield region (δ 0.99–1.28) for the *gem*-dimethyl groups.



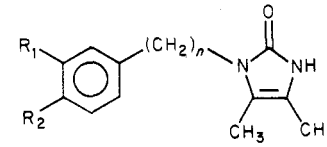
4 **5**

a, $R_3 = C_6H_5(CH_2)_2$; b, $R_3 = 3,4\text{-}(OCH_3)_2C_6H_3(CH_2)_2$; c, $R_3 = 3\text{-}(OCH_3)C_6H_4CH_2$; d, $R_3 = 3\text{-}(OCH_3)C_6H_4(CH_2)_3$; e, $R_3 = H$

Treatment of 4-hydroxy-2-imidazolidinone **5a** with trifluoroacetic acid and trifluoroacetic anhydride (12:1) in methylene chloride (reflux, 2 days) produced the desired tetrahydroisoquinoline **6** (40% yield). A key feature in the decoupled ^{13}C NMR spectrum for **6** was the appearance of six signals in the aromatic region (125.9–135.4 ppm). Moreover, two of these resonances (132.6 and 135.4 ppm) remained singlets in the corresponding coupled spectrum. Conversion of **5a** to **6** was dependent upon the choice of acidic conditions. Use of formic acid or trifluoroacetic acid did not lead to improved yields of **6**. Attempted cyclization of **5a** with a catalytic amount of *p*-toluenesulfonic acid in benzene (reflux, 1 day) gave only the imidazolone **7** (93% yield).



6, $R_1 = R_2 = H$; $n = 1$
8, $R_1 = R_2 = OCH_3$; $n = 1$
10, $R_1 = OCH_3$; $R_2 = H$; $n = 2$



7, $R_1 = R_2 = H$; $n = 2$
9, $R_1 = OCH_3$; $R_2 = H$; $n = 1$

Activation of the aromatic nucleus by the placement of electron-releasing methoxy substituents led to improved yields for the tetrahydroisoquinoline product. By use of similar cyclization conditions, **5b** gave **8** in 72% yield. The site of annelation was ascertained from the infrared and ^1H and ^{13}C NMR spectral data.

Attempts to extend this procedure for the preparation of the corresponding fused five- and seven-membered-ring systems proved successful only in the latter case. Treatment of **5c** with trifluoroacetic acid–trifluoroacetic anhydride gave the rearranged imidazolone **9** (28% yield) along with the recovered starting material **5c**. On the other hand, the 4-hydroxy-2-imidazolidinone **5d** afforded the benzotetrahydro-2-azepine derivative **10** (68%) under these same conditions. These results compare favorably with those previously observed for the cyclization of 1-substituted 5-bromo*hydantoins*.[9] In the latter study, cyclization was limited to the formation of the fused six-membered-ring systems. Neither the five- nor the seven-membered ring product was detected.

The results of this study demonstrate the utility of **2** for the preparation of annelated imidazolidinones. This methodology coupled with either hydrolytic[10,11] or reductive[8] ring opening of the imidazolidinone should permit the synthesis of a wide variety of vicinal diamines.

Experimental Section

General Methods. Melting points were determined with a Thomas-Hoover melting point apparatus and are uncorrected. Infrared spectra (IR) were run on Perkin-Elmer Model 700 and 237B spectrometers. Proton nuclear magnetic resonance (^1H NMR) spectra were recorded on a Varian Associates Model FT-

(1) Fellow of the A. P. Sloan Foundation, 1977–1981. Camille and Henry Dreyfus Teacher-Scholar Grant Recipient, 1977–1982.

(2) For numerous elegant examples, please see: (a) Veenstra, S. J.; Speckamp, W. N. *J. Am. Chem. Soc.* **1981**, *103*, 4645. (b) Schoemaker, H. E.; Dijkink, J.; Speckamp, W. N. *Tetrahedron* **1978**, *34*, 163. (c) Ben-Ishai, D.; Sataty, I.; Bernstein, Z. *Ibid.* **1976**, *32*, 1571. (d) Maryanoff, B. E.; McComsey, D. F. *Tetrahedron Lett.* **1979**, 3797 and references therein.

(3) Zaugg, H. E. *Synthesis* **1970**, *2*, 49. Zaugg, H. E.; Martin, W. B. in Org. *React.* **1965**, *14*, 60.

(4) The corresponding *inter*molecular amidoalkylation reaction with 5-methoxy*hydantoins* has been previously demonstrated.[2c]

(5) Available from Aldrich Chemical Co.

(6) Prepared by treatment of 3,4-dimethoxyphenethanol[5] with phosphorus tribromide.

(7) Available from ICN Pharmaceuticals, Inc.

(8) Further details on the reduction of 2,4-imidazolidinediones are to be submitted for publication by H. Kohn and S. Cortes.

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