dinitro compound by hydrazine, catalyzed by Raney nickel, afforded the *p,p'*-diamino compound. From the partial reduction of the dinitro compound by sodium polysulfide, the *p*-amino-*p'*-nitro compound was obtained in 38% yield. Although the aminonitro compound is bright yellow in the solid state in contrast to the dinitro and the diamino compounds both of which are colorless, the ultraviolet absorption spectrum of the aminonitro compound in 95% ethanol is virtually identical with a calculated spectrum derived from the dinitro and the diamino compounds, indicative of a lack of intramolecular complexing in the former compound in solution.[2]

The potentiometric titration curve for the diamine was markedly similar to that for *p*-toluidine. The lack of two breaks is suggestive of only a small difference in the first and second ionization constants, in accord with the results of Schwarzenbach on a series of straight chain aliphatic diamines.[3] The lack of appreciable interaction of the aryl amino group with the aryl ammonium group is also suggested by the close resemblance of the ultraviolet absorption spectrum of a 50% ethanol-water solution of the diamino compound 0.1*N* in sulfuric acid with that of 1,3-diphenylpropane. The correspondence in ultraviolet spectra of protonated aryl amines with the spectra of the parent hydrocarbons has been observed in other cases.[4]

EXPERIMENTAL[5]

p,p'-Dinitro-1,3-diphenylpropane. A nitration medium was prepared by the slow addition of 4 ml. of concentrated sulfuric acid and 12 ml. of concentrated nitric acid to 20 ml. of acetic anhydride, keeping the temperature below 0°. To the medium was added a solution of 15 ml. of 1,3-diphenylpropane (b.p. 78–80° at 0.1 mm.; n_D^{25} 1.5570) in 20 ml. of acetic anhydride over a 30-min. period. After the mixture was stirred at 0° for 30 min., 100 ml. of water was added and the mixture was stirred at room temperature for an additional 30 min. The crude product was collected by filtration and washed with water, 19 g., m.p. 85–100°. Four recrystallizations from ethanol afforded 4.5 g. (yield 22%) of colorless needles, m.p. 140–141° (reported for *x,x*-dinitro-1,3-diphenylpropane, white needles, m.p. 139°).[1] The ultraviolet absorption spectrum in 95% ethanol has a maximum at 216 mμ (ε 15,400) and 278 mμ (ε 21,000) and a minimum at 233 mμ (ε 4,250).

Oxidation of a 0.28-g. sample of the dinitro compound essentially by the procedure of Shriner, Fuson, and Curtin[6] afforded 0.24 g. (yield 74%) of *p*-nitrobenzoic acid after recrystallization from ethanol, m.p. 234–236°, mixed m.p. with an authentic sample, 238–240°.

p,p'-Diamino-1,3-diphenylpropane was prepared by a modification of the general procedure of Balcom and Furst.[7] To a warmed solution of 0.55 g. of the dinitro compound and 0.5 ml. of 95% hydrazine hydrate in 10 ml. of dioxane was added 0.5 g. of Raney nickel catalyst. After 1 hr. at 60°, during which time additional small amounts of catalyst were added, the solution was filtered, treated with Norite, filtered, and 30 ml. of water was added. White platelets separated on cooling, m.p. 99–101°. Recrystallization from 20 ml. of hexane afforded 0.2 g. (yield 50%) of lustrous white needles, m.p. 103–104°.

Anal. Calcd. for $C_{15}H_{18}N_2$: C, 79.60; H, 8.02; N, 12.38. Found: C, 79.54; H, 8.14; N, 12.29.

The ultraviolet absorption spectrum of the diamine in 95% ethanol has maxima at 238 mμ (ε 21,200) and 290 mμ (ε 2,960) and minima at 216 mμ (ε 7,810) and at 266 mμ (ε 1,280).

p-Amino-p'-nitro-1,3-diphenylpropane. To a solution of 2 g. of *p,p'*-dinitro-1,3-diphenylpropane in 150 ml. of ethanol was added 3.2 g. of sodium sulfide nonahydrate and 0.8 g. of sulfur in 12 ml. of water. The mixture was heated at reflux for 4 hr., cooled, diluted with 500 ml. of water, and extracted with 4–100 ml. portions of ether. The combined ether layers were extracted with 4–80 ml. portions of 5% hydrochloric acid. From the ether layer, 0.23 g. of impure starting material was recovered. The acidic aqueous phase was made basic and extracted with ether. Removal of ether after drying over magnesium sulfate yielded 1.34 g. of a red oil. The oil was dissolved in benzene and chromatographed on a 50-g. column of alumina in benzene. Elution with benzene afforded 776 mg. (yield 38%) of crystalline material. Two recrystallizations from cyclohexane afforded bright yellow needles m.p. 92–93°.

Anal. Calcd. for $C_{15}H_{16}N_2O_2$: C, 70.29; H, 6.31; N, 10.93. Found: C, 70.34; H, 6.45; N, 10.61.

The ultraviolet absorption spectrum in 95% ethanol has maxima at 238 mμ (ε 4,080) and 278 mμ (ε 11,100) and minima at 225 mμ (ε 9,680) and at 256 mμ (ε 8,150).

Further elution of the column with benzene-ether yielded 180 mg. of impure diamine, established as such by m.p. and mixed m.p. of 103–104° for a recrystallized sample. Elution with ether and ether-methanol yielded two oily fractions which were not investigated further.

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(2) For a discussion of the color changes produced by the mixing of aniline and nitrobenzene, see R. E. Gibson and O. H. Loeffler, *J. Am. Chem. Soc.*, **62**, 1324 (1940), and L. J. Andrews, *Chem. Revs.*, **54**, 713 (1954).

(3) G. Schwarzenbach, *Helv. Chim. Acta*, **16**, 522 (1933).

(4) A. O. Tischler and J. N. Howard, National Advisory Committee Aeronautics, A. R. R. No. E5H27a. L. A. Flexler, L. P. Hammett, and A. Dingwall, *J. Am. Chem. Soc.*, **57**, 2107, Fig. 3 (1935).

(5) Melting points are corrected. We are indebted to Dr. S. M. Nagy and his associates for analyses and spectra.

(6) R. L. Shriner, R. C. Fuson, and D. Y. Curtin, *The Systematic Identification of Organic Compounds*. Fourth Edition, John Wiley and Sons, Inc., New York, 1956, p. 250.

(7) D. Balcom and A. Furst, *J. Am. Chem. Soc.*, **75**, 4334 (1953).

Hydrogen Bromide–Acetic Acid Cleavage of Several Methoxyindanones and Methoxytetralones

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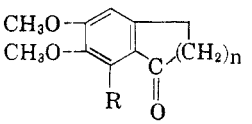
The cleavage of methoxyl groups *ortho* to the

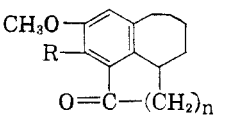
(1) A portion of the Doctoral Dissertation of Bryant W. Rossiter.

carbonyl group in a benzosuberone III[2a] and in acetophenones[2b] by means of *ca.* 6% hydrogen bromide-acetic acid has been shown to proceed in good yield at room temperature provided that a second methoxyl group is present *ortho to the group cleaved.*[2c]

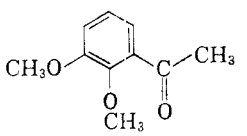
The cleavage of VI with hydrogen bromide-acetic acid was attempted since the necessary acetophenone-like structure was present. The compound did not react. Similarly the indanone I failed to cleave. These cases constitute the only exceptions found thus far to the generalization made above. The five-membered ring is implicated in this failure to react as shown by the expected cleavage of the six-membered ring ketones II and VII.



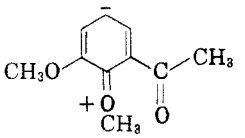
I, n, 1; R, OCH_3
II, n, 2; R, OCH_3
III, n, 3; R, OCH_3
IV, n, 2; R, OH
V, n, 3; R, H



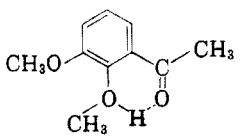
VI, n, 1; R, OCH_3
VII, n, 2; R, OCH_3
VIII, n, 1; R, OH
IX, n, 2; R, OH



X



XI

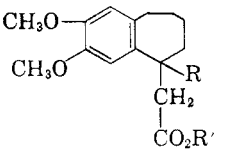


XII

In a careful study of the rate of cleavage of X[2c] it was concluded that the role of the 3-methoxyl group is steric in that it distorts the 2-methoxyl group out of the plane of the benzenoid ring thereby decreasing the contribution of the resonance form XI. The effect of this suppression of XI is to increase the basicity of the oxygen atom at the site of cleavage. This proposal assumes that protonation of this oxygen atom is an essential prerequisite to cleavage.

The role of the indispensable carbonyl group in this cleavage reaction is not completely understood. It seems likely that it too decreases the contribution of XI by forcing the 2-methoxyl group out of the benzenoid plane. The failure of I and VI to cleave might then be ascribed to the expected decrease in interference between the methoxyl and carbonyl groups in indanones as contrasted to tetralones or benzosuberones. An alternate explanation postulates as an essential requirement for cleavage a hydrogen-bonded structure[3] XII which is less stable in indanones due to the increase in ether oxygen-carbonyl oxygen distance.

The benzosuberone V with methyl bromoacetate in a Reformatsky reaction gave XIII in 88% yield. Catalytic reduction of this ester and saponification gave XIV which was also obtained by dehydration



XIII, R, OH; R′, CH_3
XIV, R, H; R′, H

of XIII followed by catalytic reduction of the unsaturated ester and saponification. Polyphosphoric acid (PPA) brought about cyclization of XIV to the ketone VI in 87% yield. Although hydrogen bromide-acetic acid on VI produced no isolateable phenol, aluminum chloride in ether gave (36%) crystalline VIII.

In a similar manner the propionic acid obtained from XIV in the Arndt Eistert reaction gave VII (22%) when PPA was used. Hydrogen bromide-acetic acid produced the phenol IX in 67% yield. The known indanone I was recovered unchanged (89%) after hydrogen bromide-acetic acid treatment whereas the tetralone II under the same conditions gave IV in 62% yield.

EXPERIMENTAL[4]

2,3-Dimethoxybenzosuberone (V). Glutaric acid-glutaric anhydride (188.5 g.) from Carbide and Carbon Chemicals Company was converted to the anhydride (185 g.) by refluxing for 2 hr. with 320 ml. of acetyl chloride. The anhydride, refluxed for 2 hr. with 95 ml. of absolute ethanol, gave 193 g. (74.3%) of ethyl hydrogen glutarate, b.p. 140–148° (12 mm.). Reported b.p. 159–165° (17 mm.).[5]

A mixture of 67.5 g. of veratrole, 78.0 g. of ethyl hydrogen glutarate and 660 g. of polyphosphoric acid (PPA) was thoroughly stirred without heating. The temperature rose to 40°. The mixture was then heated in a bath at 53–58° for 2.5 hr. with occasional stirring. When thorough prior mixing or good temperature control was neglected, an intense red ether insoluble material was formed which made isolation of the product very difficult. The PPA complex was decomposed with 1500 g. of crushed ice and water and the alkali washed benzene extract yielded after crystallization from ethanol 96.8 g. (70.5%) of ethyl γ-(3,4-dimethoxybenzoyl)-

(2) (a) P. D. Gardner and W. J. Horton, *J. Org. Chem.*, 19, 213 (1954). (b) W. J. Horton and J. T. Spence, *J. Am. Chem. Soc.*, **77**, 2894 (1955). P. D. Gardner, W. J. Horton and R. E. Pincock, *J. Am. Chem. Soc.*, **78**, 2541 (1956). (c) It has been found that 3-methyl-2-methoxyacetophenone cleaved faster than X indicating that groups other than methoxyl can be effective. W. J. Horton and J. T. Spence, unpublished work.

(3) Such a hydrogen-bonded structure was proposed to account for the selectivity in the cleavage of methoxyacetophenones by G. K. Hughes, *et al.*, *Australian J. Sci. Res., Ser. A*, **5**, 207 (1952). Objections have been put forward by L. A. Wiles, *Chem. Revs.*, **56**, 353 (1956).

(4) Melting points of materials for analysis are corrected. Petroleum ether refers to the fraction b.p. 60–120°.

(5) W. E. Bachman, S. Kushner, and A. C. Stevenson, *J. Am. Chem. Soc.*, **64**, 974 (1942).

butyrate as colorless needles m.p. 58.5–60.5° (lit.[6] 63°). Saponification of the ester gave the acid m.p. 144–146° (lit.[7] 145–146°). The latter was reduced catalytically[6] (97.6%) or by the Clemmensen reduction[7] (70.5%) to δ-(3,4-dimethoxyphenyl)valeric acid which was cyclized to V by PPA. The product (93.7%) melted at 61.5–64° and at 64–65° after crystallization from ether (lit.[7] 63–64°).

Methyl 2,3-dimethoxy-5-hydroxy-5-benzosuberylacetate (XIII). A solution of 13.3 g. of the above suberone in 800 ml. of 1:1 anhydrous ether-benzene was combined with 20 g. of cleaned zinc and a crystal of iodine and 2 g. of methyl bromoacetate. After 3 hr. stirring and refluxing, additional zinc, iodine, and methyl bromoacetate were added so that after 10 hr. 27.5 g. of bromoacetate and 45 g. of zinc had been used. The product, isolated in the usual manner and crystallized from ethyl acetate–petroleum ether, weighed 15.5 g. (88%) m.p. 106–106.5°.

Anal. Calcd. for $C_{16}H_{22}O_5$: C, 65.28; H, 7.54. Found: C, 65.24; H, 7.43.

2,3-Dimethoxy-$\Delta^{5,\alpha}$ (or $\Delta^{5,6}$)-5-benzosuberenylacetic Acid. (*a*) The hydroxy ester XIII (10.0 g.) after 15 min. at 165° (0.20 mm.) gave crystals on trituration with petroleum ether. After recrystallization from methanol, 6.3 g. (67%) of colorless crystals of methyl ester were obtained m.p. 102–104° raised to 105–105.5° by further purification from methanol.

Anal. Calcd. for $C_{16}H_{20}O_4$: C, 69.54; H, 7.30. Found: C, 70.28; H, 7.58.

Saponification of the ester gave the corresponding acid which was recrystallized from aqueous ethanol m.p. 152.5–153.0° (gas evol.). The ultraviolet spectrum was identical to that of the acid obtained in (*b*).

Anal. Calcd. for $C_{15}H_{18}O_4$: C, 68.68; H, 6.92. Found: C, 68.56; H, 6.82.

(*b*) A solution of 1.45 g. of the hydroxy ester XIII in 2 ml. of anhydrous benzene and 0.6 ml. of pyridine was treated with 1.2 ml. of thionyl chloride for 30 min. at room temperature. The solvent was distilled at the aspirator at 30° and the residue, dissolved in 15 ml. of benzene, was decanted from pyridinium chloride and saponified by refluxing with aqueous methanolic potassium hydroxide. On acidification, 1.15 g. (89%) of buff colored crystals m.p. 133–139° was obtained. The material for analysis, recrystallized from dilute ethanol, melted at 147–148° (gas evol.); $\lambda_{max}^{ethanol}$ 255 mμ (log ε 4.04) and 292 mμ (log ε 3.69).

Anal. Calcd. for $C_{15}H_{18}O_4$: C, 68.68; H, 6.92. Found: C, 68.24; H, 7.02.

A mixture of the acids from (*a*) and (*b*) melted at 151.8–152.4° (gas evol.).

2,3-Dimethoxy-5-benzosuberylacetic acid (XIV). (*a*) The ester XIII (24.1 g.) in 200 ml. of acetic acid was shaken with 1.2 g. of 5% palladium-carbon at 90° under 30 lb. pressure of hydrogen. After 5 hr. the resultant oil was saponified to yield the acid XIV which crystallized from benzene-petroleum ether. The colorless crystals weighed 20.8 g. (97.4%) and melted at 100–102°. (*b*) Reduction of 5.5 g. of the olefinic acid obtained by dehydration of XIII, in 100 ml. of acetic acid with hydrogen and 0.1 g. of platinum oxide at room temperature gave 5.41 g. (98.6%) of colorless crystals m.p. 100–102° identical by mixed melting point to the material in (*a*). Purification by crystallization from ethyl acetate-petroleum ether gave material m.p. 100.4–102.0°.

Anal. Calcd. for $C_{15}H_{20}O_4$: C, 68.16; H, 7.63. Found: C, 68.36; H, 7.47.

8,9-Dimethoxy-1-keto-1,2,2a,3,4,5,6-heptahydrobenz[cd]-azulene (VI). A solution of 4.20 g. of the acid XIV in 96 g. of PPA was held at 90° for 25 min. The reaction mixture was poured onto 200 g. of ice and the aqueous suspension was extracted four times with benzene. After washing the extract with 10% sodium hydroxide and water, the solution was concentrated, warm petroleum ether added, and the material was cooled. The light yellow crystals (3.43 g. 87.6%) melted at 120–122° and recrystallization gave a melting point of 120.5–121.5°.

Anal. Calcd. for $C_{15}H_{18}O_3$: C, 73.15; H, 7.37. Found: C, 73.18; H, 7.54.

The *oxime* from ethanol melted at 187.0–190.5°.

Anal. Calcd. for $C_{15}H_{19}NO_3$: C, 68.94; H, 7.33. Found: C, 69.28; H, 7 58.

9-Hydroxy-8-methoxy-1-keto-1,2,2a,3,4,5,6-heptahydrobenz-[cd] azulene (VIII). To 1.60 g. of anhydrous aluminum chloride and 10 ml. of ether was added 1.23 g. of VI and the mixture was refluxed for 10.5 hr. The complex was decomposed with hydrochloric acid and the ether solution on addition of benzene and petroleum ether (b.p. 60–72°) gave 0.55 g. (36.5%) of yellow crystals, m.p. 118–123.0°. Several crystallizations from petroleum ether (b.p. 60–72°) gave material m.p. 124.8–126.0°. The compound gave a deep green ferric chloride test and melted with decomposition when mixed with VI.

Anal. Calcd. for $C_{14}H_{16}O_3$: C, 72.39; H, 6.95. Found: C, 72.02; H, 6.97.

Attempted ether cleavage with hydrogen bromide-acetic acid[2b] gave less than 10% phenolic material with an 80% recovery of crystalline starting compound.

4,5-Dimethoxy-3-keto-1,2,3,7,8,9,10,10a-octahydrocyclohepta[de] naphthalene (VII). The acid XIV (5.25 g.) in the Arndt-Eistert reaction[8] gave 3.87 g. of β-(2,3-dimethoxy-5-benzosuberyl) propionic acid as a light orange oil. This was combined with 55 g. of PPA and heated at 95° for 20 min. On addition of ice and water 0.80 g. (22%) of crystalline VII was obtained which melted at 72.0–73.5° after several crystallizations from benzene-petroleum ether.

Anal. Calcd. for $C_{16}H_{20}O_3$: C, 73.82; H, 7.74. Found: C, 73.68; H, 7.61.

4-Hydroxy-5-methoxy-3-keto-1,2,3,7,8,9,10,10a-octahydrocyclohepta[de]naphthalene (IX). Hydrogen bromide-acetic acid splitting[2b] of 0.600 g. of VII gave 0.44 g. (67%) of yellow solid sodium salt of IX when the product in benzene was washed with 40% sodium hydroxide. The sodium salt was treated with 2*N* hydrochloric acid, the oil obtained was collected in benzene and concentrated. Addition of petroleum ether precipitated an oil which crystallized after several days at −5°, m.p. 55.5–58.5°. Additional crystallizations from petroleum ether (60–72°) containing a small amount of acetone gave yellow cubelets m.p. 66.5–67.0°.

Anal. Calcd. for $C_{15}H_{18}O_3$: C, 73.15; H, 7.37. Found: C, 73.48; H, 7.36.

Attempted cleavage of 5,6,7-trimethoxyindanone (I). The indanone was obtained in 82% yield (m.p. 94–98°) by cyclization of β-(3,4,5-trimethoxyphenyl)propionic acid in PPA.[9] It melted after further purification using ethyl acetate-petroleum ether (carbon) at 107–111° (lit.[9] 111.5–113.5°). When 1.0 g. of the indanone was allowed to stand with hydrogen bromide-acetic acid,[2b] 89% of the crystalline trimethoxyindanone I was recovered. The crude reaction product failed to give a color with alcoholic ferric chloride.

6,7-Dimethoxy-8-hydroxy-1-keto-1,2,3,4-tetrahydronaphthalene (IV). β-(3,4,5-Trimethoxyphenyl)propionic acid was converted by the Arndt-Eistert reaction[8] to the butyric acid in 41.7% yield. The acid melted at 80–84° (lit.[10] 83–84°). PPA cyclization gave II m.p. 123–126° in 68% yield (lit.[10] 125°).

From 0.60 g. of II, hydrogen bromide-acetic acid[2b] gave 0.35 g. (62%) of IV m.p. 110–112°. Repeated recrystal-

(6) E. C. Horning and J. Koo, *J. Am. Chem. Soc.*, **73**, 5830 (1951).

(7) J. A. Barltrop, A. J. Johnson, and G. D. Meakins, *J. Chem. Soc.*, 181 (1951).

(8) W. E. Bachman, W. Cole, and A. L. Wilds, *J. Am. Chem. Soc.*, **62**, 824 (1940).

(9) J. Koo, *J. Am. Chem. Soc.*, **75**, 1891 (1953).

(10) R. D. Haworth, B. P. Moore, and P. L. Pauson, *J. Chem. Soc.*, 3271 (1949).

lizations from ethanol gave crystals m.p. 112.0–113°. With ferric chloride a deep wine-red color was obtained.

Anal. Calcd. for $C_{12}H_{14}O_4$: C, 64.85; H, 6.35. Found: C, 64.74; H, 6.32.

Acknowledgment. We are indebted to a grant from the National Science Foundation which aided this work.

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Synthesis of Analogs of Thymidine[1]

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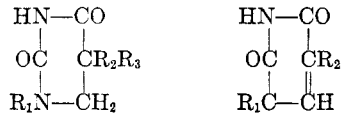
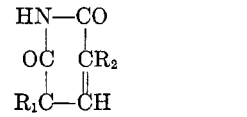
The concept of antimetabolites has been in vogue for several years and the application of this concept to cancer chemotherapy has lead to the preparation of several active compounds, *e.g.* azaguanine, 6-mercaptopurine, 2,6-diaminopurine, 6-azathymine, 5-hydroxy and 5-aminouridine, A-methopterin, etc. It has been shown that these effect thymine metabolism.[2,3] Since DNA is concerned with cell division and differs from RNA in that it contains thymine instead of uracil, it appeared that a logical approach to the problem of reducing cell division would be to prepare an antimetabolite which will block the introduction of thymine into DNA. The fact that mammalian cells incorporate the corresponding nucleosides indicates that an effective antimetabolite might be a pyrimidine substituted in the one position. Since it has been shown that 5-bromouracil inhibits the growth of several bacteria, it appeared that the 5-halogenated-1-substituted pyrimidines should also be prepared for testing.[4] We have prepared, therefore, and tested a number of 1-substituted uracils, 1-substituted-5-bromouracils, 1-substituted dihydrouracils, and 1-substituted-5-bromodihydrouracils in which the substituent was either methyl, isopropyl, or benzyl.



R_1 = benzyl, isopropyl, or methyl
R_2 = hydrogen or bromine
RR_3 = hydrogen or bromine



R_1 = benzyl, isopropyl, or methyl
R_2 = hydrogen or bromine

While several of the uracils and 5-bromouracils have previously been prepared, the following method was developed as it offered an unequivocal synthesis of the uracils and produced as intermediates the desired dihydro and 5-bromodihydrouracils.

N-Substituted-β-alanine esters, prepared by the addition of the proper primary amine to ethyl acrylate, were converted to dihydrouracils when treated with potassium cyanate and hydrochloric acid. This is an adaptation of a method employed by Johnson and Livak for the conversion of β-substituted-β-alanines to 6-substituted dihydrouracils.[5] The resulting *N*-substituted dihydrouracils were brominated to give 1-substituted-5-bromodihydrouracils, which upon dehydrohalogenation gave the corresponding substituted uracils. Since the uracils with the exception of *N*-isopropyl uracil were known, this served as a further confirmation of the structures of the previous unreported 1-substituted dihydro-and 1-substituted-5-bromodihydrouracils.

Previous bromination of substituted dihydrouracils had been carried out in sealed tubes.[6] 1-Benzyldihydrouracil and 1-methyldihydrouracil, however, gave satisfactory yields of the corresponding 5-bromo compounds when one molecular equivalent of bromine was added to a boiling acetic acid solution of the dihydrouracil. 1-Isopropyldihydrouracil, however, failed to give a pure monobrominated derivative but when treated with two molecular equivalents of bromine yielded 1-isopropyl-5,5-dibromodihydrouracil. 1-Benzyl dihydrouracil was also brominated to yield 1-benzyl-5,5-dibromodihydrouracil.

When added to boiling dimethylformamide the 1-substituted-5-bromodihydrouracils were dehydrohalogenated to give good yields of 1-substituted uracils and the 1-substituted-5,5-dihydrobromouracil gave good yields of 1-substituted-5-bromouracils (Table I).

1-Methyl-5-bromouracil was prepared by the direct bromination of 1-methyl uracil.[7]

EXPERIMENTAL[10]

The ethyl esters of *N*-methyl-β-alanine and *N*-benzyl-β-alanine were prepared by the procedure described by Adamson.[11] When 30.0 g. (0.30 mole) of ethyl acrylate was added dropwise to a cooled solution of 35.4 g. (0.60 mole of isopropylamine in 100 ml. of absolute alcohol and the product distilled, 40.5 g. (85%) of *N*-isopropyl-β-alanine ethyl ester was obtained. It boiled at 91–92° (20 mm.).

(1) Presented in part before the Medicinal Division of the American Chemical Society, Miami, Fla., April, 1957.
(2) R. Maxwell and V. Nickel, *Science*, **120**, 270 (1954).
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