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Syntheses of the Novel Furo[3,4-*b*][1,5]benzodiazepinone and Pyrrolo[3,4-*b*][1,5]benzodiazepinone Systems[1)]

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10-Substituted 3,3-dimethyl-3,4,9,10-tetrahydro-1*H*-furo[3,4-*b*][1,5]benzodiazepin-1-ones and 10-substituted 3,3-dimethyl-3,4,9,10-tetrahydro-1*H*-pyrrolo[3,4-*b*][1,5]benzodiazepin-1-ones were synthesized by Mannich-type cyclization of the appropriate enaminolactone or enaminolactam obtained by the reaction of 5,5-dimethyltetronic acid or 5,5-dimethyltetramic acid with *o*-phenylenediamine.

Keywords——5,5-dimethyltetronic acid; 5,5-dimethyltetramic acid; furobenzodiazepinone; pyrrolobenzodiazepinone, Mannich reaction

Miyano and Abe synthesized 3,3-dimethyl-2,3,4,5,10,11-hexahydro-11-phenyl-1*H*-dibenzo[*b*,*e*][1,4]diazepin-1-one by Mannich-type cyclization of 3-(2-aminoanilino)-5,5-dimethyl-2-cyclohexen-1-one and benzaldehyde in the presence of a catalytic amount of acetic acid in good yield.[2)] They also found that it had narcotic and analgesic activities.[2)]

In the course of our synthetic studies on biologically active compounds using tetronic acids and tetramic acids,[3)] we planned to synthesize novel furo[3,4-*b*][1,5]benzodiazepinone and pyrrolo[3,4-*b*][1,5]benzodiazepinone systems (**11** and **12**) starting from 5,5-dimethyltetronic acid (**7**) and 5,5-dimethyltetramic acid (**8**) *via* the Mannich-type cyclization of the enaminolactone (**9**) and enaminolactam (**10**) with various aldehydes. The starting material **7**[4)] was synthesized in 53% overall yield by acylation of methyl 2-hydroxyisobutyrate (**1**) with methyl malonyl chloride, followed by Dieckmann condensation of the resulting diester (**3**), and then hydrolysis-decarboxylation of the keto ester (**5**). The other starting material **8** was prepared in 66% overall yield by similar reaction sequences starting with ethyl 2-aminoisobutyrate (**2**).

The enaminolactone (**9**) was prepared in 95% yield by boiling a benzene solution of **7** in the presence of an equimolar amount of *o*-phenylenediamine. Similarly, the enaminolactam (**10**) was synthesized in 93% yield from **8** and *o*-phenylenediamine in the presence of a catalytic amount of *p*-toluenesulfonic acid. When an ethanol solution of **9** and an equimolar amount of an aldehyde was stirred at room temperature in the presence of 2—3 drops of acetic acid for 1 h, the Mannich-type cyclization took place cleanly to give the corresponding 10-substituted 3,3-dimethyl-3,4,9,10-tetrahydro-1*H*-furo[3,4-*b*][1,5]benzodiazepin-1-one (**11**) as a crystalline powder in excellent yield.[5)]

The structures of **11** were assigned on the basis of elemental analyses, and infrared (IR) and nuclear magnetic resonance (NMR) spectral data. The IR spectra (Nujol) of **11** had absorptions at 3250—3380 cm^{-1} (NH stretching band), at 1703—1730 cm^{-1} (lactone carbonyl), and at 1640—1655 cm^{-1} (carbon–carbon double bond). In the NMR spectra (DMSO-d_6) of **11**, the methine proton signal at C-10 was found to be coupled with the proton at N-9. Acetylation of **11a** with acetic anhydride and pyridine gave a monoacetate (**13**).

When the same Mannich-type cyclization reaction was applied to **10**, the 10-substituted

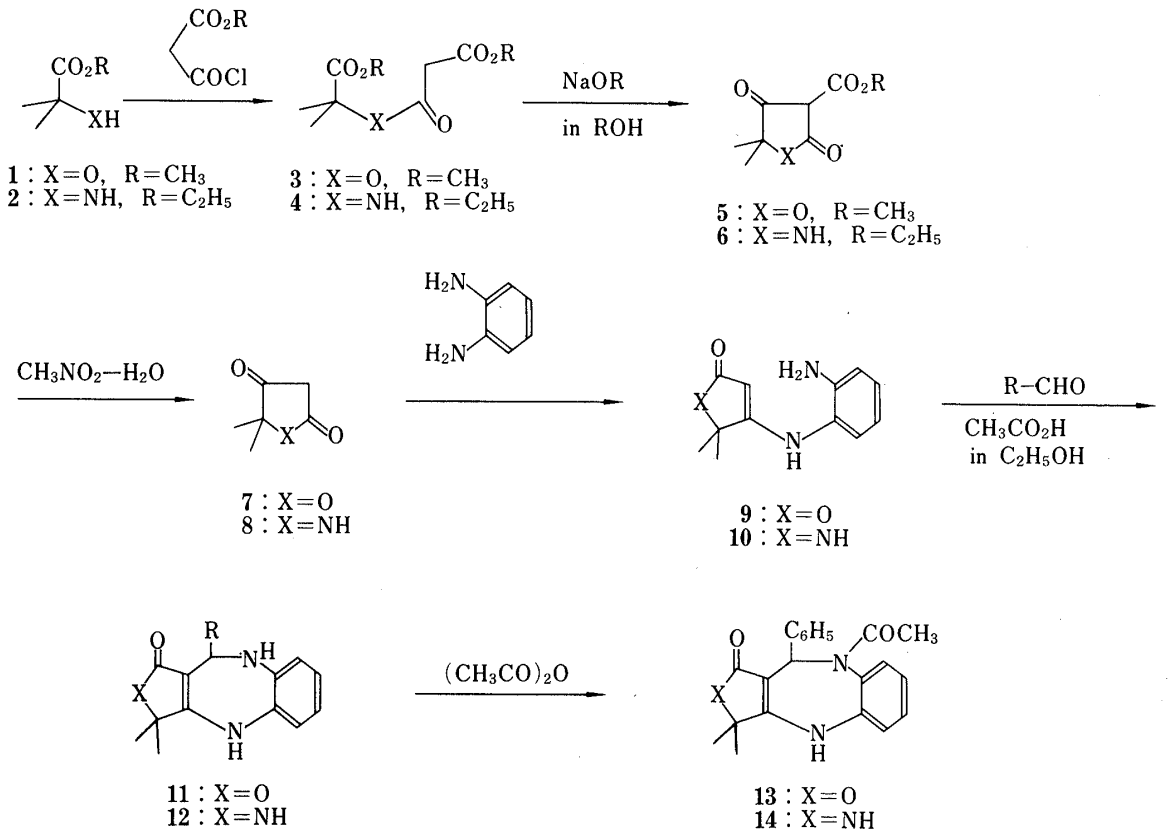

Chart 1

TABLE I. Melting Points, Yields, and Elemental Analyses of **11**

Compound	R	mp (°C) (Recryst. solvent)	Yield (%)	Formula	Analysis (%) Calcd (Found)		
					C	H	N
a	Phenyl	165—168 (dec.) (MeOH)	98	$C_{19}H_{18}N_2O_2 \cdot 1/2H_2O$	72.35 (72.30	6.08 6.36	8.88 8.60)
b	2-Fluorophenyl	240—243 (dec.) (MeOH)	94	$C_{19}H_{17}FN_2O_2$	70.35 (70.52	5.29 5.37	8.64 8.65)
c	2-Chlorophenyl	285—288 (MeOH)	92	$C_{19}H_{17}ClN_2O_2$	66.95 (66.97	5.04 5.04	8.22 8.16)
d	4-Methoxyphenyl	149—152 (MeOH)	96	$C_{20}H_{20}N_2O_3$	71.41 (71.43	5.99 6.02	8.33 8.34)
e	4-Nitrophenyl	281—283 (DMSO–H_2O)	89	$C_{19}H_{17}N_3O_4 \cdot 1/4H_2O$	64.12 (64.46	4.97 4.93	11.81 11.75)
f	2-Thienyl	148—151 (dec.) (MeOH)	85	$C_{17}H_{16}N_2O_2S \cdot 1/2H_2O$	63.52 (63.64	5.34 5.41	8.72 8.51)
g	2-Pyridyl	270—275 (dec.) (MeOH)	98	$C_{18}H_{17}N_3O_2 \cdot H_2O$	66.44 (66.45	5.90 5.90	12.92 12.89)
h	1-Propenyl	219—222 (MeOH–C_6H_6–hexane)	87	$C_{16}H_{18}N_2O_2$	71.08 (71.57	6.72 6.73	10.36 10.05)
i	Styryl	201—203 (C_6H_6–MeOH)	99	$C_{21}H_{20}N_2O_2 \cdot 1/2H_2O$	77.59 (77.59	6.25 6.26	7.54 7.50)

3,3-dimethyl-3,4,9,10-tetrahydro-1*H*-pyrrolo[3,4-*b*][1,5]benzodiazepin-1-ones (**12**) were isolated in good to excellent yields. The structures of **12** were also assigned on the basis of elemental analyses, and IR and NMR spectral data. The IR spectra (Nujol) of **12** showed

TABLE II. IR and NMR Spectral Data for **11**

Compound	IR ν_{max}^{Nujol} cm^{-1}	NMR (DMSO-d_6) δ (J in Hz)
a	3380, 3320, 3280, 1705, 1640, 1565	1.60 (6H, s, 2 × CH_3), 5.03 (1H, d, J=4, CHNH), 5.90 (1H, d, J=4, CHNH), 6.52—8.20 (9H, m, Ar-H), 9.08 (1H, s, CNHC)
b	3280, 1705, 1640	1.60 (6H, s, 2 × CH_3), 5.31 (1H, d, J=4, CHNH), 5.62 (1H, d, J=4, CHNH), 7.54—8.20 (8H, m, Ar-H), 9.19 (1H, s, CNHC)
c	3275, 1703, 1640	1.61 and 1.64 (each 3H, s, 2 × CH_3), 5.42 (2H, br s, CHNH), 6.80—7.42 (8H, m, Ar-H), 9.24 (1H, s, CNHC)
d	3290, 1720, 1705, 1640	1.59 (6H, s, 2 × CH_3), 3.64 (3H, s, OCH_3), 4.98 (1H, d, J=4, CHNH), 5.83 (1H, d, J=4, CHNH), 6.50—7.10 (8H, m, Ar-H), 9.04 (1H, s, CNHC)
e	3370, 1730, 1655, 1555, 1355	1.61 and 1.62 (each 3H, s, 2 × CH_3), 5.15 (1H, d, J=4, CHNH), 6.12 (1H, d, J=4, CHNH), 6.54—7.16 (4H, m, Ar-H), 7.33 (2H, d, J=8, Ar-H), 8.03 (2H, d, J=8, Ar-H), 9.24 (1H, s, CNHC)
f	3250, 1715, 1645	1.56 and 1.58 (each 3H, s, 2 × CH_3), 5.24 (1H, d, J=4, CHNH), 5.98 (1H, d, J=4, CHNH), 6.64—7.17 (7H, m, Ar-H), 9.10 (1H, s, CNHC)
g	3450, 3260, 3220, 1715, 1645	1.60 (6H, s, 2 × CH_3), 5.08 (1H, d, J=4, CHNH), 5.89 (1H, d, J=4, CHNH), 6.50—8.42 (8H, m, Ar-H), 9.10 (1H, s, CNHC)
h	3350, 3260, 1703, 1635	1.49 (3H, d, J=4, CH_3CH=CH), 1.52 (6H, s, 2 × CH_3), 4.36 (1H, m, CHNH), 5.30 (2H, m, $CHCH=CHCH_3$), 5.58 (1H, d, J=4, CHNH), 6.70—7.12 (4H, m, Ar-H), 8.93 (1H, s, CNHC)
i	3350, 3280, 1705, 1655, 1645	1.57 and 1.59 (each 3H, s, 2 × CH_3), 4.58 (1H, ddd, J=6, 4, 1, CHNH), 5.82 (1H, d, J=4, CHNH), 6.06 (1H, dd, J=16, 6, CHCH=CH), 6.29 (1H, dd, J=16, 1, CHCH=CH-Ar), 6.75—8.36 (9H, m, Ar-H), 9.06 (1H, s, CNHC)

absorptions at 1630—1670 cm^{-1} due to lactam carbonyl and carbon–carbon double bond. In the NMR spectra (DMSO-d_6) of **12**, the methine proton signal at C-10 was again found to be coupled with the proton at N-9. Just as in the case of **11**, a monoacetate (**14**) was obtained by treatment of **12a** with acetic anhydride and pyridine.

The generality of this reaction is illustrated by the good to excellent yields obtained in the reactions using aldehydes with a variety of electron-withdrawing and electron-releasing substituents on the phenyl group. Further, when the aldehyde had a heteroaromatic ring or alkyl group in place of the phenyl ring, the reaction also occurred smoothly in good yield. Pharmacological testing of compounds **11** and **12** is now under way.

Experimental

Melting points were determined on a Yanagimoto micro-melting point apparatus, model MP-S3, and are uncorrected. IR and NMR spectra were measured in Nujol mulls with a Hitachi 260-30 infrared spectrometer, and

TABLE III. Melting Points, Yields, and Elemental Analyses of **12**

Compound	R	mp (°C) (Recryst. solvent)	Yield (%)	Formula	Analysis (%) Calcd (Found)		
					C	H	N
a	Phenyl	265—267 (iso-PrOH–hexane)	71	$C_{19}H_{19}N_3O$	74.73 (74.58	6.27 6.36	13.76 13.54)
b	2-Chlorophenyl	264—266 (iso-PrOH–MeOH)	89	$C_{19}H_{18}ClN_3O$	67.16 (66.87	5.34 5.50	12.37 12.41)
c	2-Nitrophenyl	180—183 (dec.) (DMSO–H_2O)	94	$C_{19}H_{18}N_4O_3$	65.13 (64.80	5.18 5.53	15.99 15.82)
d	3,4-Dimethoxyphenyl	270—273 (iso-PrOH–MeOH)	78	$C_{21}H_{23}N_3O_3$	69.02 (69.04	6.34 6.28	11.50 11.59)
e	2-Thienyl	173—176 (iso-PrOH–hexane)	84	$C_{17}H_{17}N_3OS$	65.57 (65.29	5.50 5.90	13.49 13.40)
f	2-(5-Nitro)furyl	184—186 (DMSO–H_2O)	95	$C_{17}H_{16}N_4O_4 \cdot 1/2H_2O$	58.44 (58.80	4.91 5.03	16.04 16.40)
g	Ethyl	256—258 (iso-PrOH–hexane)	95	$C_{15}H_{19}N_3O$	70.01 (70.11	7.44 7.43	16.33 16.46)
h	1-Propenyl	256—257 (iso-PrOH–MeOH)	67	$C_{16}H_{19}N_3O$	71.35 (71.48	7.11 6.97	15.60 15.57)
i	Styryl	234—237 (EtOH–hexane)	96	$C_{21}H_{21}N_3O$	76.11 (76.04	6.39 6.39	12.68 12.87)

NMR spectra were measured with a JEOL JNM-FX 200 (200 MHz) spectrometer using tetramethylsilane (TMS) as an internal standard.

5,5-Dimethyltetronic Acid (7)——Triethylamine (3.04 g, 30 mmol) and 4-dimethylaminopyridine (0.1 g, 0.82 mmol) were added to a solution of methyl 2-hydroxyisobutyrate (**1**) (2.36 g, 20 mmol) in dry pyridine (20 ml) at room temperature. Methyl malonyl chloride (4.1 g, 30 mmol) was added dropwise to the above solution with ice-cooling. The whole was stirred at room temperature overnight, then water was added, and the resulting mixture was extracted three times with chloroform. The extracts were washed with 2 N HCl and saturated brine, then dried over Na_2SO_4. Removal of the solvent gave a light yellow oil, which was distilled under reduced pressure to give 3.811 g of diester (**3**); bp 141—143 °C (20 Torr). A solution of the diester (**3**) (3.811 g, 17.5 mmol) in absolute methanol (40 ml) was added to a solution of sodium methoxide in methanol [prepared from sodium (0.6 g, 26.2 g atom) and absolute methanol (14 ml)] at room temperature with stirring under an N_2 atmosphere. The whole was stirred at reflux temperature for 2 h, then being concentrated under reduced pressure. The residue was treated with 2 N HCl (20 ml) then extracted three times with chloroform. The combined extract was washed with saturated brine, dried over Na_2SO_4, and concentrated under reduced pressure to give 4.175 g of crude keto ester (**5**) as a colorless solid. Water (0.63 ml, 35 mmol) was added to a solution of the keto ester (**5**) (4.175 g) in nitromethane (60 ml) and the whole was stirred at reflux temperature for 35 min, then being concentrated under reduced pressure. The residue was recrystallized from benzene to furnish 1.345 g of **7** as light yellow needles (53% from **1**); mp 151—152 °C (lit.[4] mp 142—143 °C). IR ν_{max}^{Nujol} cm^{-1}: 2450 (br), 1670 (br), 1550 (br), 1295, 1220, 1195, 990, 800. (NMR ($CDCl_3$–DMSO-d_6) δ: 1.44 (3H, s, $2 \times CH_3$), 4.79 (1H, s, –O–C(=O)–CH=C(OH)–), 11.80 (1H, br s, –O–C(=O)–CH=(OH)–).

5,5-Dimethyltetramic Acid (8)——A solution of ethyl malonyl chloride (29.23 g, 0.1942 mol) in dry ether (60 ml) was added to a solution of ethyl 2-aminobutyrate (21.202 g, 0.1618 mol) in dry ether (100 ml) containing 19.65 g (0.1942 mol) of triethylamine, with ice-cooling and stirring. The mixture was held at room temperature for 2 h, then water was added with cooling and the layers were separated. The water layer was extracted twice with ethyl acetate and the organic layer was combined with the original organic layer. The combined organic layer was washed with 2 N HCl and saturated brine and dried over Na_2SO_4. Removal of the solvent gave 37.137 g of the diester (**4**) as an yellow oil. Dry benzene (170 ml) was added to a solution of sodium ethoxide in absolute ethanol [prepared from sodium (5.22 g, 0.227 g atom) and ethanol (95 ml)]. A solution of the diester (**4**) (37.074 g) in dry benzene (45 ml) was added dropwise to the above solution at reflux temperature with stirring under an N_2 atmosphere. The whole was maintained under the same conditions for 2 h. After being concentrated under reduced pressure, the mixture was treated with 3 N HCl (130 ml) and extracted three times with chloroform. The combined extract was washed with saturated brine and dried over Na_2SO_4. Removal of the solvent gave 27.575 g of crude keto ester (**6**). Water (4.97 ml, 0.276 mol) was added to a solution of the crude keto ester (**6**) (27.575 g) in nitromethane (476 ml) and the whole was

TABLE IV. IR and NMR Spectral Data for **12**

Compound	IR ν_{max}^{Nujol} cm^{-1}	NMR (DMSO-d_6) δ (J in Hz)
a	3230, 3070, 1630, 1570	1.44 (6H, s, 2×CH_3), 5.04 (1H, d, J=4, CHNH), 5.71 (1H, d, J=4, CHNH), 6.44—7.14 (9H, m, Ar-H), 7.17 and 8.36 (each 1H, s, 2×NH)
b	3280, 3200, 3150, 3100, 1645, 1610, 1560, 1510	1.45 and 1.49 (each 3H, s, 2×CH_3), 5.20 (1H, d, J=5, CHNH), 5.43 (1H, d, J=5, CHNH), 6.38—7.40 (9H, m, Ar-H and NH), 8.54 (1H, s, NH)
c	3300, 3190, 1640, 1600, 1560, 1520	1.46 and 1.48 (each 3H, s, 2×CH_3), 5.18 (1H, d, J=4, CHNH), 5.57 (1H, d, J=4, CHNH), 6.40—7.95 (8H, m, Ar-H), 7.30 (1H, s, NH), 8.68 (1H, s, NH)
d	3360, 3300, 1630, 1605, 1510	1.44 (6H, s, 2×CH_3), 3.58 and 3.63 (each 3H, s, 2×OCH_3), 4.98 (1H, d, J=4, CHNH), 5.67 (1H, d, J=4, CHNH), 6.48—7.08 (7H, m, Ar-H), 7.16 (1H, s, NH), 8.32 (1H, s, NH)
e	3400, 3330, 3280, 3200, 1655, 1610, 1560, 1505	1.40 (6H, s, 2×CH_3), 5.14 (1H, d, J=5, CHNH), 5.80 (1H, d, J=5, CHNH), 7.60—8.12 (7H, m, Ar-H), 7.20 (1H, s, NH), 8.38 (1H, s, NH)
f	3620, 3570, 3250, 1635, 1610, 1595, 1555, 1520	1.42 and 1.44 (each 3H, s, 2×CH_3), 5.09 (1H, d, J=4, CHNH), 6.06 (1H, d, J=4, CHNH), 6.14 (1H, d, J=5, Ar-H), 6.66—6.80 (3H, m, Ar-H), 7.12 (1H, d, J=7, Ar-H), 7.34 (1H, s, NH), 7.38 (1H, d, J=4, Ar-H), 8.60 (1H, s, NH)
g	3350, 3300, 3210, 1650, 1615, 1570, 1510	0.84 (3H, t, J=7, CH_2CH_3), 1.32 and 1.36 (each 3H, s, 2×CH_3), 1.16—1.52 (2H, m, $CHCH_2CH_3$), 3.70 (1H, m, $CHCH_2CH_3$), 5.35 (1H, d, J=4, CHNH), 6.66—7.80 (5H, m, Ar-H and NH), 8.14 (1H, s, NH)
h	3450, 3330, 3250, 1670, 1640, 1600, 1575, 1505	0.85 (1H, s, CH_3), 1.15 (3H, d, J=7, $CHCH_3$), 1.25 (3H, s, CH_3), 4.00 (1H, m, $CH=CHCH_3$), 4.85 (1H, s, NH), 6.20 (1H, dd, J=9, 5, $CHCH=CH$), 6.12 (1H, d, J=9, CHNH), 6.54—7.22 (6H, m, Ar-H and 2×NH)
i	3430, 3250, 1655 (sh), 1635, 1620 (sh), 1560, 1500	1.40 and 1.42 (each 3H, s, 2×CH_3), 4.58 (1H, dd, J=6, 4, CHNH), 5.64 (1H, d, J=4, CHNH), 6.06 (1H, dd, J=15, 6, $CHCH=CH$), 6.26 (1H, d, J=15, $CH=CH$-Ar), 6.70—8.35 (10H, m, Ar-H and NH), 8.36 (1H, s, NH)

refluxed for 35 min. Removal of the solvent and washing with ethyl acetate gave 12.327 g of **8** as colorless prisms. Further crops (1.181 g) of **8** were obtained by concentration of the washings and recrystallization from benzene. The yield was 66% from **2**. mp 128—131 °C. IR ν_{max}^{Nujol} cm^{-1}: 3180, 3080, 1760, 1680, 1205, 1105, 780, 730. NMR ($CDCl_3$) δ: 1.38 (6H, s, 2×CH_3), 3.80 (2H, s, $C(=O)CH_2CO$), 7.30 (1H, br s, NH).

3-(2-Aminoanilino)-4,4-dimethyl-2-buten-4-olide (9)——A solution of 5,5-dimethyltetronic acid (**7**) (3 g, 23.44 mmol) and *o*-phenylenediamine (2.535 g, 23.44 mmol) in benzene (75 ml) was stirred at reflux temperature, while water was removed as an azeotropic mixture. When no more water appeared, the precipitates formed were filtered off, washed with benzene, and recrystallized from isopropanol to give 4.832 g (95%) of **9** as colorless prisms; mp 249—252 °C. IR ν_{max}^{Nujol} cm^{-1}: 3490, 3400, 3350, 1695, 1640 (sh), 1610, 1580, 1295, 1250, 1195, 1115, 990, 955, 915, 800, 760. NMR (DMSO-d_6) δ: 1.55 (6H, s, 2×CH_3), 4.26 (1H, s, $C(=O)CH=C$), 4.76 (2H, s, NH_2), 6.54—7.40 (4H, Ar-H),

8.40 (1H, s, NH). *Anal.* Calcd for $C_{12}H_{14}N_2O_2$: C, 66.03; H, 6.48; N, 12.84. Found: C, 66.08; H, 6.50; N, 12.75.

3-(2-Aminoanilino)-4,4-dimethyl-2-buten-4-lactam (10)——A solution of 5,5-dimethyltetramic acid (**8**) (5 g, 39.37 mmol) and *o*-phenylenediamine (4 g, 37.5 mmol) in benzene (125 ml) containing a catalytic amount of *p*-toluenesulfonic acid monohydrate was stirred at reflux temperature, while water was removed as an azeotropic mixture. Precipitates formed were filtered off and recrystallized from methanol–hexane to give 7.577 g (93%) of **10** as colorless prisms; mp 252—253 °C. IR ν_{max}^{Nujol} cm^{-1}: 3400, 3230, 1630, 1610, 1580, 1545, 1505. NMR (DMSO-d_6) δ: 1.40 (6H, s, 2 × CH_3), 4.18 (1H, s, C(=O)CH=C), 4.66 (2H, s, NH_2), 6.52—7.0 (5H, m, Ar-H and NH), 7.66 (1H, s, NH). *Anal.* Calcd for $C_{12}H_{15}N_3O$: C, 66.34; H, 6.96; N, 19.34. Found: C, 66.35; H, 7.08; N, 19.12.

General Method for Syntheses of 10-Substituted 3,3-Dimethyl-3,4,9,10-tetrahydro-1*H*-furo[3,4-*b*][1,5]-benzodiazepin-1-ones (11) and 10-Substituted 3,3-Dimethyl-3,4,9,10-tetrahydro-1*H*-pyrrolo[3,4-*b*][1,5]benzodiazepin-1-ones (12)——An enaminolactone (**9**) (300 mg, 1.375 mmol) or an enaminolactam (**10**) (300 mg, 1.38 mmol) was dissolved in ethanol (15 ml). An equimolar amount of an aldehyde and 2—3 drops of acetic acid were added to the above solution and the whole was stirred at room temperature for 1—2 h. Precipitates formed were filtered off and recrystallized from the appropriate solvent. In the case of **11a**, **11i**, **12a**, **12g**, **12h**, and **12i**, no precipitate formed. The solvent was therefore removed under reduced pressure and then the residue was recrystallized from the appropriate solvent. Yields, mp, microanalyses, IR, and NMR spectral data are listed in Tables I, II, III, and IV.

9-Acetyl-3,3-dimethyl-10-phenyl-3,4,9,10-tetrahydro-1*H*-furo[3,4-*b*][1,5]benzodiazepin-1-one (13)——Acetic anhydride (1 ml) was added to a solution of **11** (200 mg, 0.65 mmol) in dry pyridine (2 ml) with cooling. The whole was allowed to stand at room temperature overnight. Water was added to the mixture and the precipitates formed were filtered off and recrystallized from isopropanol–methanol to give 201 mg (88%) of **13** as colorless prisms; mp >300 °C. IR ν_{max}^{Nujol} cm^{-1}: 3280, 1700, 1665, 1640, 1540, 1270, 1215, 1090, 1040, 950, 855, 770. NMR (DMSO-d_6) δ: 1.57 (3H, s, $COCH_3$), 1.67 and 1.73 (each 3H, s, CH_3), 6.74—7.28 (10H, m, Ar-H and CHN), 9.41 (1H, s, CNHC). *Anal.* Calcd for $C_{21}H_{20}N_2O_3$: C, 72.38; H, 5.80; N, 8.04. Found: C, 72.26; H, 5.82; N, 7.99.

9-Acetyl-3,3-dimethyl-10-phenyl-3,4,9,10-tetrahydro-1*H*-pyrrolo[3,4-*b*][1,5]benzodiazepin-1-one (14)——Acetic anhydride (1 ml) was added to a solution of **12** (250 mg, 0.82 ml) in dry pyridine (2 ml) with cooling. The whole was allowed to stand at room temperature overnight, then water was added to the mixture. The precipitates formed were filtered off and recrystallized from isopropanol–methanol to give 270 mg (95%) of **14** as colorless plates; mp 249—251 °C. IR ν_{max}^{Nujol} cm^{-1}: 3300 (sh), 3240, 3130, 1660, 1625, 1600, 1535, 1500. NMR (DMSO-d_6) δ: 1.40 and 1.49 (each 3H, s, CH_3), 1.70 (3H, s, $COCH_3$), 6.60—7.26 (10H, m, Ar-H and CHN), 7.44 and 8.68 (each 1H, s, NH). *Anal.* Calcd for $C_{21}H_{21}N_3O_2$: C, 72.60; H, 6.09; N, 12.10. Found: C, 72.84; H, 6.12; N, 11.89.

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5) When diphenylacetaldehyde was employed as an aldehyde component, no cyclized product was obtained, but the Schiff base was formed in 63% yield; mp 234—239 °C.