A New Route to 5,6-Diarylpyridazin-3-ones by Metalation and Cross-coupling of Pyridazines

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Starting from 3,6-dichloropyridazine, a new route is described to antihypertensive 5,6-diarylpyridazin-3-ones. This pathway comprises the regioselective metalation followed by a substitution of the trimethylsilyl moeity. The introduction of iodine by another metalation allowed the cross coupling of arylboronic acids. The 6-methoxy group was then cleaved to afford the pyridazinones.

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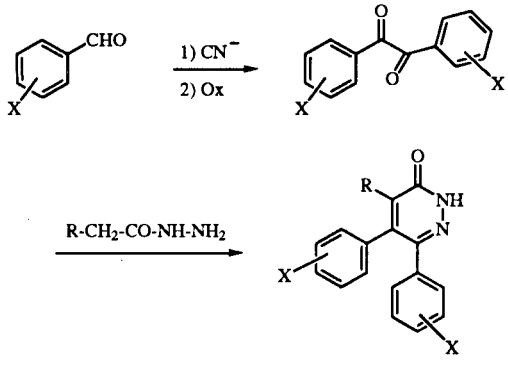
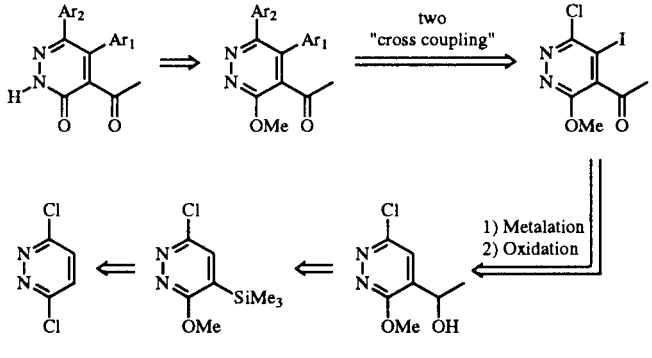
Introduction.

The well known antihypertensive effect of hydralazine has induced an extensive research for antihypertensive agents including a pyridazine nucleus. Some reports on diarylpyridazinones have shown that beside the antihypertensive effect, these molecules had also cardiotonic or antithrombic activities [1]. In the literature the synthesis of many 5,6-diarylpyridazin-3-ones was described and the structure activity relationship was studied. These compounds were usually synthesized *via* a classical route including the ring closure of suitably substituted diketones with hydrazides [2], Scheme 1.

Scheme 1



Scheme 2

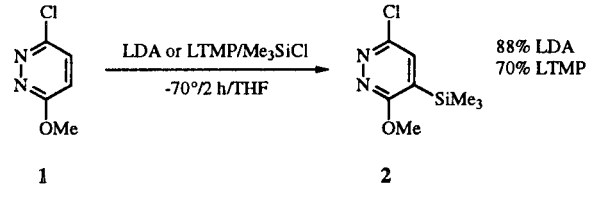


This synthetic methodology did not allow us to introduce two different aryl substituents on the pyridazinone nucleus. We propose (Scheme 2) a new synthetic route starting from the easily available 3,6-dichloropyridazine and using the metalation and cross-coupling reactions to synthesize 4-acetyl-5,6-diarylpyridazin-3-ones which are among the most active products [2].

Results.

The synthesis of 3-chloro-6-methoxypyridazine [3] was performed with a 95% yield starting from 3,6-dichloropyridazine but we had previously shown that its metalation was not regioselective and the resulting compounds difficult to separate [4]. Using the *in situ* trapping methodology [5] with trimethylchlorosilane as the electrophile, we could obtain regioselectively the substituted pyridazine **2**, Scheme 3.

Scheme 3

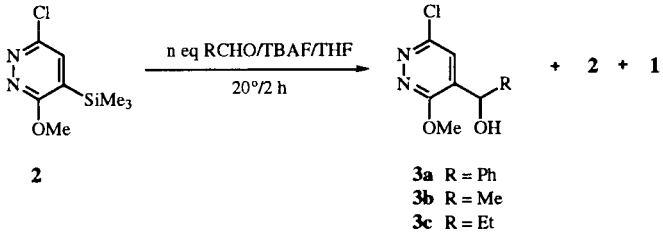


1 **2**

The reaction of organosilicon compounds under nucleophilic catalytic conditions has been widely used in synthesis [6]. In the pyridine series some reactions have been published [7-9] but in the diazines series, to our knowledge, this reaction has never been described. The desilylation was performed in THF with tetra-*n*-butylammonium fluoride (TBAF) in presence of aliphatic or aromatic aldehydes. The experimental process was optimized with benzaldehyde and this reaction was extended to acetaldehyde and propanal, Scheme 4, Table 1.

We noticed (entry 3) that excess benzaldehyde decreased the yield of substituted product **3** but in that case no desilylated compound was obtained. So it was necessary to

Scheme 4



2

3a R = Ph
3b R = Me
3c R = Et

Table 1

Entry	R	Equivalent Amount of RCHO	% TBAF	Yields of 3%	2%	1%
1	Ph	1	5	65	—	35
2 [a]	Ph	1	5	67	—	33
3	Ph	5	5	30	67	—
4	Ph	5	10	60	—	40
5	Ph	5	5 + 5 + 5	71	—	27
6	CH_3	5	5 + 5 + 5	78	—	22
7	CH_3CH_2	5	5 + 5 + 5	66	—	34
8	CH_3CH_2	1	5	39	—	59

[a] The reaction temperature was 0°.

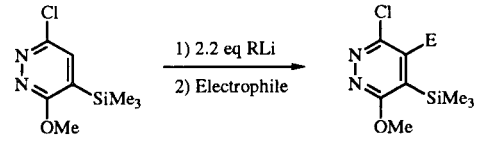
increase the amount of TBAF (entries 4-7) to obtain good yields.

The best experimental conditions were obtained for entries 5-7 when 5% more of TBAF was added after 30 minutes and after 1 hour. In general some desilylated product **1** was also obtained.

This method afforded regioselectively pure trisubstituted pyridazines with an overall yield of 62% from 3-chloro-6-methoxypyridazine (**1**). This was impossible by direct metalation of **1** because the two isomers so obtained could not be separated [4].

In order to obtain a 3,4,5,6-tetrasubstituted-pyridazine (Scheme 2) a possible route could be the regioselective metalation of the silylated product **2** followed by the substitution of the trimethylsilyl moiety, Scheme 5.

Scheme 5



2

Various experimental conditions were tested and are listed in the Experimental. It was never possible to induce a successful metalation at C4. Another strategy was to perform metalation reactions on compounds **3a,b**. This metalation was first tested with compound **3a** and acetaldehyde as the electrophile, then used with compound **3b** with iodine as the electrophile, Scheme 6, Table 2.

Scheme 6

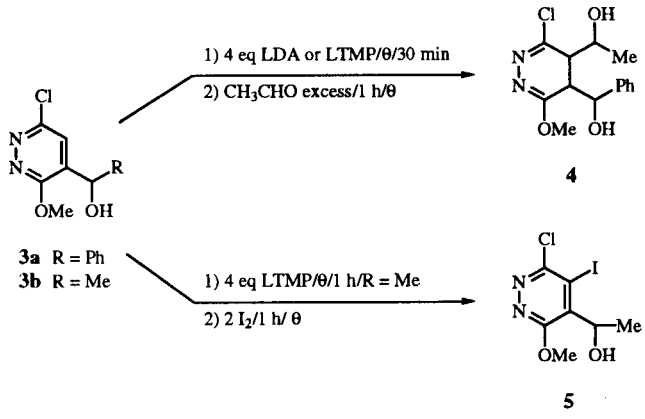


Table 2

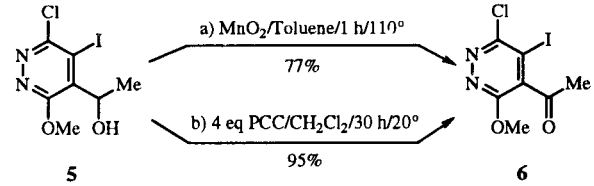
Entry	Starting Material	Temperature θ	Product	Yield %	Starting Material
1	**3a**	-70	**4**	70	30
2 [a]	**3a**	-70	**4**	44	54
3	**3a**	-30	**4**	91	7
4	**3a**	0	**4**	87	8
5	**3b**	-70	**5**	42	55
6	**3b**	-40	**5**	57	38
7	**3b**	-30	**5**	64	32
8	**3b**	0	**5**	86	—
9 [b]	**3b**	0	**5**	53	45

[a] Metalation with LDA, all others with LTMP. [b] Metalation time reduced to 15 minutes.

By using best experimental conditions determined in Table 2 the yields of **4** and **5** for entries 3, 4, 8 were good and few or no starting material was recovered.

For the end of the synthesis, alcohol **5** must be oxidized to a methyl ketone with manganese(IV) oxide (a) as well as with pyridinium chlorochromate (PCC) (b), Scheme 7.

Scheme 7



5 **6**

The cross-coupling reaction step between halodiazine compounds and boronic acids has already been described [4,10] and afforded good yields. Since compound **6** bore

two different halogen groups, it was possible to perform successively two selective coupling reactions with two different boronic acids. Phenylboronic and *p*-chlorophenylboronic acids were thus reacted with **6**, Scheme 8, Table 3.

Scheme 8

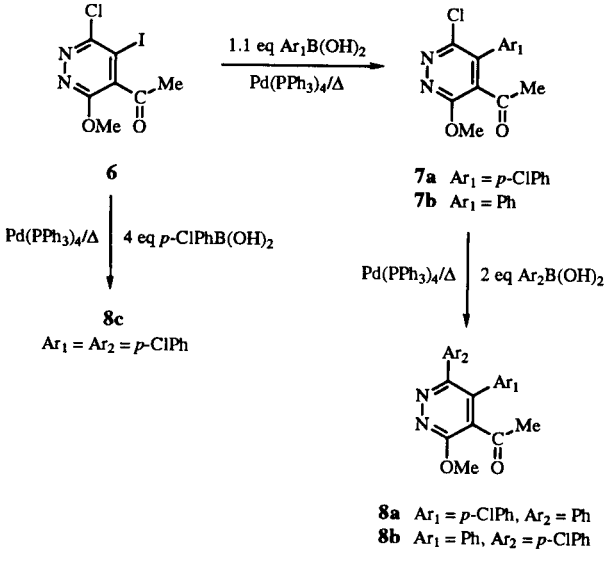


Table 3

Entry	Product	Ar_1	Yield %	Product	Ar_2	Yield %
1	**7a**	*p*-ClPh	87	**8a**	Ph	87
2	**7b**	Ph	84	**8b**	*p*-ClPh	89
3		*p*-ClPh	—	**8c**	*p*-ClPh	85

The coupling reactions afforded diarylpyridazines bearing two different aryl groups with good yields.

A diarylpyridazine **8c** bearing the same aryl group twice could also be prepared in one step. The cleavage of the methoxy group of compounds **8** was tested unsuccessfully using either boron bromide in dichloromethane or hydroiodic acid in water.

These methods were too drastic and led to intense degradation of the reaction mixture. However, good yields could be obtained by the use of a solution of hydroiodic acid in methanol, Scheme 9, Table 4.

The next step would be the substitution of the hydrogen of the pyridazinone with various substituents to afford *N*-

Scheme 9

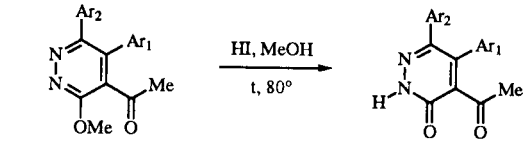


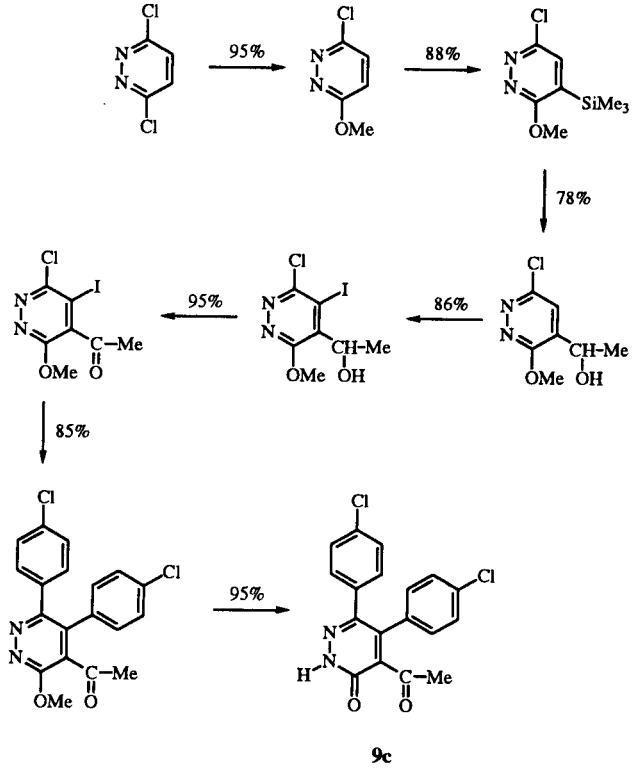
Table 4

Entry	Product	Ar_1	Ar_2	Time (hours)	Yield %	Starting Material
1	**9a**	*p*-ClPh	Ph	1	80	19%
2	**9a**	*p*-ClPh	Ph	3	95	—
3	**9b**	Ph	*p*-ClPh	1	77	23%
4	**9b**	Ph	*p*-ClPh	3	92	—
5	**9c**	*p*-ClPh	*p*-ClPh	1	95	—

substituted pyridazones which are already described [2].

In Scheme 10 we summarize the synthesis of compound **9c** by previous synthetic methods.

Scheme 10



The overall yield from 3,6-dichloropyridazine was 43%; it can be favorably compared with the 20% obtained by the classical method [2] and it must also be noticed that this strategy allowed us to introduce two different aryl groups on the pyridazine nucleus.

EXPERIMENTAL

Tetrahydrofuran (THF) was distilled from a benzophenone/sodium and used immediately (water content <40 ppm). The synthesis of 3-chloro-6-methoxypyridazine from 3,6-dichloropy-

ridazine (commercial) was already published [3]. The ir spectra were obtained as potassium bromide pellets with a Perkin-Elmer FMR 1650 spectrometer. The nmr spectra were recorded on a JEOL JNM-PMX 60 SI (60 MHz) or a Bruker 200 MHz spectrometer. All nmr spectra were carried out with deuteriochloroform solutions and δ are given in ppm. Microanalysis were performed with a Carlo Erba 1106 apparatus. Melting points were determined with a Kofler hot-stage and are uncorrected.

6-Chloro-3-methoxy-4-trimethylsilylpyridazine (**2**).

A solution of *n*-butyllithium (2.5 *M* in hexane, 3.1 ml, 7.8 mmoles) was added to cold (-75°), stirred, anhydrous tetrahydrofuran (60 ml) under an atmosphere of dry argon. Diisopropylamine (0.89 ml, 7.8 mmoles) was added, the mixture was warmed to 0° and kept at this temperature for 15 minutes; it is then cooled to -70°. A solution of 3-chloro-6-methoxypyridazine (0.5 g, 3.5 mmoles), trimethylchlorosilane (0.49 ml, 3.8 mmoles) in 5 ml of tetrahydrofuran was added slowly and the mixture was stirred for 2 hours at -70°. Hydrolysis was then carried out at -70° using a mixture of 35% aqueous hydrochloric acid (2 ml), ethanol (2 ml) and tetrahydrofuran (2 ml). The solution was gently warmed to 0°, made slightly basic with a saturated sodium hydrogencarbonate solution and evaporated under vacuum nearly to dryness. The residue was extracted with dichloromethane (3 x 30 ml). The organic extract was dried (magnesium sulfate) and evaporated. The crude product was purified by column chromatography on silica gel with dichloromethane as an eluent to give 0.67 g (88%) of a white solid, **2**, mp <35°; ^{1}H nmr (deuteriochloroform): δ 0.15 (s, 9H, $SiMe_3$), 4.00 (s, 3H, OMe), 7.25 (s, 1H, H_5); ir: ν 2950, 1555, 1485, 1360 cm^{-1}.

Anal. Calcd. for $C_8H_{13}ClN_2OSi$ (M = 216.7): C, 44.32; N, 12.92; H, 6.05. Found: C, 44.5; N, 12.9; H, 6.1.

General Procedure for the *ipso*-Desilylation of Compound **2**.

A solution of **2** (0.433 g, 2 mmoles) in tetrahydrofuran (2 ml) was added to a mixture of aldehyde (10 mmoles) and tetrabutylammonium fluoride (1 *M* in tetrahydrofuran, 0.1 ml, 5% molar) in tetrahydrofuran (3 ml). The mixture was stirred and kept at room temperature for 30 minutes before introduction of tetrabutylammonium fluoride (0.1 ml, 5% molar). After 1 hour, tetrabutylammonium fluoride was again added. The mixture was stirred for 2 hours at room temperature, then filtered on silica gel. The solvent was removed under reduced pressure and the crude product was purified by chromatography on silica gel with a mixture of dichloromethane and diethyl ether (95:5) as an eluent.

6-Chloro-4-(hydroxyphenylmethyl)-3-methoxypyridazine (**3a**).

ipso-Desilylation according to the general procedure with benzaldehyde (1.02 ml, 10 mmoles) gave **3a**, 0.36 g (71%), mp 109-111°; ^{1}H nmr: δ 3.21 (br s, 1H, OH), 4.03 (s, 3H, OCH_3), 5.88 (s, 1H, CH), 7.34 (s, 5H, phenyl), 7.67 (s, 1H, H_5); ir: ν 3204, 3094, 1594, 1456, 1378 cm^{-1}.

Anal. Calcd. for $C_{12}H_{11}ClN_2O_2$ (M = 250.69): C, 57.50; N, 11.17; H, 4.42. Found: C, 57.3; N, 11.4; H, 4.6.

6-Chloro-4-(1-hydroxyethyl)-3-methoxypyridazine (**3b**).

ipso-Desilylation according to the general procedure with acetaldehyde (0.56 ml, 10 mmoles) gave **3b**, 0.29 g (78%), mp 105-107°; ^{1}H nmr: δ 1.48 (d, 3H, J = 6.5 Hz, CH_3), 4.07 (s, 3H, OCH_3), 4.20 (d, 1H, J = 4.5 Hz, OH), 5.00 (m, 1H, CH), 7.57 (s, 1H, H_5); ir: ν 3254, 2988, 2872, 1590, 1468 cm^{-1}.

Anal. Calcd. for $C_7H_9ClN_2O_2$ (M = 188.61): C, 44.58; N, 14.85; H, 4.81. Found: C, 44.5; N, 14.6; H, 4.7.

6-Chloro-4-(1-hydroxypropyl)-3-methoxypyridazine (**3c**).

ipso-Desilylation according to the general procedure with propionaldehyde (0.72 ml, 10 mmoles) gave **3c**, 0.27 g (66%), mp 79-81°; ^{1}H nmr: δ 1.00 (t, 3H, J = 7 Hz, CH_3), 1.75 (m, 2H, CH_2), 3.35 (br s, 1H, OH), 4.10 (s, 3H, OCH_3), 4.85 (t, 1H, J = 7 Hz, CH), 7.53 (s, 1H, H_5); ir: ν 3373, 2966, 2876, 1461 cm^{-1}.

Anal. Calcd. for $C_8H_{11}ClN_2O_2$ (M = 202.64): C, 47.42; N, 13.82; H, 5.47. Found: C, 47.5; N, 13.5; H, 5.2.

General Procedure for Metalation.

A solution of butyllithium (2.5 *M* in hexane, 1.6 ml, 4.0 mmoles) was added to cold (-70°), stirred, anhydrous tetrahydrofuran (15 ml) under an atmosphere of dry argon, then 2,2,6,6-tetramethylpiperidine (0.675 ml, 4 mmoles) was added and the mixture was warmed to 0° and kept at this temperature for 15 minutes. The solution was cooled to -70° and a solution of secondary alcohol **3** (1 mmole) in 2 ml of tetrahydrofuran was added and the mixture was stirred for 30 minutes at -30°. The solution was cooled to -70° and the electrophile was added and stirring was continued for 1 hour at -70°. Hydrolysis is then carried out at -70° using a mixture of 35% aqueous hydrochloric acid (1 ml), ethanol (2 ml) and tetrahydrofuran (2 ml). The solution is gently warmed to 0°, made slightly basic with a saturated solution of sodium hydrogencarbonate and the solvent was evaporated under reduced pressure. The residue was extracted with dichloromethane (3 x 30 ml). The organic extract was dried (magnesium sulfate) and evaporated. The crude product was purified by column chromatography on silica gel.

6-Chloro-5-(1-hydroxyethyl)-4-(hydroxyphenylmethyl)-3-methoxypyridazine (**4**).

Metalation of **3a** (0.25 g, 1 mmole) according to the general procedure and reaction with acetaldehyde (0.56 ml, 10 mmoles) gave after purification with a mixture of dichloromethane, ether (9:2) as an eluent 0.27 g (92%) of **4**, mp 184-186°; ^{1}H nmr: δ 1.56 (d, J = 6.4 Hz, 3H, CH_3), 3.40 (br s, 2H, OH), 4.02 (s, 3H, OCH_3), 5.47 (q, 1H, J = 6.4 Hz, C*H*-CH_3), 6.75 (s, 1H, C*H*-Ph), 7.28 (s, 5H, phenyl); ir: ν 3406, 2979, 1459, 1375 cm^{-1}.

Anal. Calcd. for $C_{14}H_{15}ClN_2O_3$ (M = 294.74): C, 57.05; N, 9.50; H, 5.13. Found: C, 57.2; N, 9.2; H, 5.4.

6-Chloro-4-(1-hydroxyethyl)-5-iodo-3-methoxypyridazine (**5**).

Metalation of **3b** (0.19 g, 1 mmole) by the general procedure and reaction with a solution of 0.51 g (2 mmoles) of iodine in 5 ml of tetrahydrofuran gave after purification, 0.27 g (86%) of **5**, mp 83-85°; ^{1}H nmr: δ 1.53 (d, 3H, J = 7 Hz, CH_3), 3.70 (br s, 1H, OH), 4.20 (s, 3H, OCH_3), 5.10 (m, 1H, CH); ir: ν 3338, 2944, 1654, 1530, 1365 cm^{-1}.

Anal. Calcd. for $C_7H_8ClIN_2O_2$ (M = 314.51): C, 26.73; N, 8.91; H, 2.56. Found: C, 26.8; N, 8.8; H, 2.7.

4-Acetyl-6-chloro-5-iodo-3-methoxypyridazine (**6**).

Procedure 1.

To a solution of **5** (0.16 g, 0.5 mmole) in dichloromethane (7 ml) were added with stirring, molecular sieves 3Å (0.32 g) and pyridinium chlorochromate (0.43 g, 2 mmoles). After 30 hours at room temperature the reaction mixture was filtered on celite, thoroughly washed with ether and dichloromethane. The solution was dried over magnesium sulfate then evaporated. The

crude product was purified by chromatography on silica gel with a mixture of dichloromethane and diethyl ether (95:5) as an eluent to give a pale yellow solid 0.15 g of **6** (95%).

Procedure 2.

The reaction was performed in a 100 ml two-necked flask equipped with a magnetic stirring bar and a Dean-Stark apparatus. The mixture of anhydrous toluene (50 ml), manganese(IV) oxide (1.74 g, 20 mmoles) and alcohol **5** (0.31 g, 1 mmole) was heated at 100° for 2 hours. More manganese(IV) oxide (0.87 g, 10 mmoles) was added later. The mixture was then heated for 1 hour at 110° before allowing it to cool to room temperature. The same procedure of filtration and purification as previously described gave 0.24 g (77%) of **6**, mp 128-130°; ^{1}H nmr: δ 2.51 (s, 3H, $COCH_3$), 4.12 (s, 3H, OCH_3); ir: ν 1718, 1501, 1465, 1360 cm^{-1}.

Anal. Calcd. for $C_7H_6ClIN_2O_2$ (M = 312.50): C, 26.91; N, 8.96; H, 1.94. Found: C, 26.9; N, 8.8; H, 1.8.

General Procedure for the Reaction of Heteroaryl Halides **6** and **7** with Arylboronic Acid.

Halopyridazine (0.5 mmole) and arylboronic acid (n mmole) were added to a solution of potassium carbonate (2 *M*, 0.5 ml) and ethanol (0.25 ml) in deoxygenated toluene (12.5 ml). The resulting mixture was stirred under an argon atmosphere for 1 hour. Tetrakis(triphenylphosphine)palladium(0) (0.0175 g, 0.015 mmole) was added and the reaction mixture was warmed under an argon atmosphere at 110° for 3 days. The solvent was removed and the crude product was treated with 5 ml of water, then extracted with dichloromethane (3 x 20 ml). The solvent removal afforded a crude product which was purified by flash chromatography on silica gel with dichloromethane as an eluent.

4-Acetyl-6-chloro-5-(4-chlorophenyl)-3-methoxypyridine (**7a**).

Halopyridazine **6** (0.16 g, 0.5 mmole) reacted according to the general procedure with (4-chlorophenyl)boronic acid (0.09 g, 0.55 mole) to give **7a** as a white solid, 0.13 g (87%), mp 135-137°; ^{1}H nmr: δ 2.03 (s, 3H, $COCH_3$), 4.17 (s, 3H, OCH_3), 7.17 (d, 2H, J = 9 Hz, phenyl), 7.43 (d, 2H, J = 9 Hz, phenyl); ir: ν 2959, 1716, 1485, 1460, 1375 cm^{-1}.

Anal. Calcd. for $C_{13}H_{10}Cl_2N_2O_2$ (M = 297.14): C, 52.55; N, 9.43; H, 3.39. Found: C, 52.7; N, 9.1; H, 3.3.

4-Acetyl-6-Chloro-3-methoxy-5-phenylpyridazine (**7b**).

Halopyridazine **6** (0.16 g, 0.5 mmole) reacted according to the general procedure with phenylboronic acid (67 mg, 0.55 mmole) to afford **7b** as a pale yellow solid, 0.11 g (84%), mp 129-131°; ^{1}H nmr: δ 2.17 (s, 3H, $COCH_3$), 4.20 (s, 3H, OCH_3), 7.40 (m, 5H, phenyl); ir: ν 3050, 2959, 1717, 1460, 1374 cm^{-1}.

Anal. Calcd. for $C_{13}H_{11}ClN_2O_2$ (M = 262.70): C, 59.44; N, 10.66; H, 4.22. Found: C, 59.3; N, 10.4; H, 4.1.

4-Acetyl-5-(4-chlorophenyl)-3-methoxy-6-phenylpyridazine (**8a**).

Halopyridazine **7a** (0.15 g, 0.5 mmole) reacted according to the general procedure with phenylboronic acid (0.12 g, 1 mmole) to afford **8a** as a white solid, 0.15 g (87%), mp 133-135°; ^{1}H nmr: δ 2.17 (s, 3H, $COCH_3$), 4.22 (s, 3H, OCH_3), 6.98 (d, 2H, J = 9 Hz, *p*-Cl phenyl), 7.23 (s, 5H, phenyl), 7.27 (d, 2H, J = 9 Hz, *p*-Cl phenyl); ir: ν 2999, 2948, 1711, 1455, 1372 cm^{-1}.

Anal. Calcd. for $C_{19}H_{15}ClN_2O_2$ (M = 338.80): C, 67.36; N, 8.27; H, 4.46. Found: C, 67.1; N, 8.0; H, 4.7.

4-Acetyl-6-(4-chlorophenyl)-3-methoxy-5-phenylpyridazine (**8b**).

Halopyridazine **7b** (0.13 g, 0.5 mmole) reacted according to the general procedure with (4-chlorophenyl)boronic acid (0.16 g, 1 mmole) to afford **8b** as a pale yellow solid, 0.15 g (89%), mp 116-117°; ^{1}H nmr: δ 2.15 (s, 3H, $COCH_3$), 4.28 (s, 3H, OCH_3), 7.33 (m, 9H, phenyl and *p*-Cl phenyl); ir: ν 3058, 2950, 1712, 1459, 1371 cm^{-1}.

Anal. Calcd. for $C_{19}H_{15}ClN_2O_2$ (M = 338.80): C, 67.36; N, 8.27; H, 4.46. Found: C, 67.1; N, 8.0; H, 4.7.

4-Acetyl-5,6-bis(4-chlorophenyl)-3-methoxypyridazine (**8c**).

Halopyridazine **6** (0.16 g, 0.5 mmole) reacted according to the general procedure with (4-chlorophenyl)boronic acid (0.31 g, 2 mmoles) to afford **8c** as a white solid, 0.16 g (85%), mp 143-145°; ^{1}H nmr: δ 2.17 (s, 3H, $COCH_3$), 4.25 (s, 3H, OCH_3), 7.20 (m, 8H, *p*-Cl phenyl); ir: ν 1715, 1492, 1458, 1370 cm^{-1}.

Anal. Calcd. for $C_{19}H_{14}Cl_2N_2O_2$ (M = 373.24): C, 61.14; N, 7.51; H, 3.78. Found: C, 61.1; N, 7.8; H, 3.5.

General Procedure for the Cleavage of the Methoxy Group of Compounds **8**.

To a solution of **8** (0.13 mmole) in methanol (3 ml), a solution of 57% hydroiodic acid (1 ml) was added. The mixture was stirred at 80° for n hours. The mixture was cooled to room temperature and neutralized with a saturated solution of sodium hydrogencarbonate. The mixture was extracted with dichloromethane and the combined organic extracts were dried over magnesium sulfate and evaporated. The crude product was purified by chromatography on silica gel with dichloromethane, diethyl ether (9:1) as an eluent.

4-Acetyl-5-(4-chlorophenyl)-6-phenyl-2*H*-pyridazin-3-one (**9a**).

The reaction was performed in 3 hours. Compound **9a** was obtained as a white solid, 40.1 mg (95%), mp 235-237°; ^{1}H nmr: δ 2.25 (s, 3H, $COCH_3$), 7.17 (m, 9H, phenyl and *p*-Cl phenyl), 12.5 (br s, 1H, NH); ir: ν 2862, 1706, 1645 cm^{-1}.

Anal. Calcd. for $C_{18}H_{13}ClN_2O_2$ (M = 324.77): C, 66.57; N, 8.63; H, 4.03. Found: C, 66.7; N, 8.3; H, 4.3.

4-Acetyl-6-(4-chlorophenyl)-5-phenyl-2*H*-pyridazin-3-one (**9b**).

The reaction was performed in 3 hours. Compound **9b** was obtained as a white solid, 38.8 mg (92%), mp >190° dec; ^{1}H nmr: δ 2.20 (s, 3H, $COCH_3$), 7.20 (m, 9H, phenyl and *p*-Cl phenyl), 13.20 (br s, 1H, NH); ir: ν 2926, 1721, 1642, 1491 cm^{-1}.

Anal. Calcd. for $C_{18}H_{13}ClN_2O_2$ (M = 324.77): C, 66.57; N, 8.63; H, 4.03. Found: C, 66.6; N, 8.5; H, 4.2.

4-Acetyl-5,6-bis(4-chlorophenyl)-2*H*-pyridazin-3-one (**9c**).

The reaction was performed in 1 hour. Compound **9c** was obtained as a white solid, 44.4 mg (95%), mp >250°; ^{1}H nmr: δ 2.23 (s, 3H, $COCH_3$), 7.20 (m, 8H, *p*-Cl phenyl), 13.37 (br s, 1H, NH), ir: ν 3447, 2870, 1717, 1648 cm^{-1}.

Anal. Calcd. for $C_{18}H_{12}Cl_2N_2O_2$ (M = 359.21): C, 60.19; N, 7.80; H, 3.37. Found: C, 60.1; N, 7.7; H, 3.5.

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