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SHORT COMMUNICATIONS

Synthesis of Heterocyclic Compounds on the Basis of 2*H*-Chromen-2-one Derivatives

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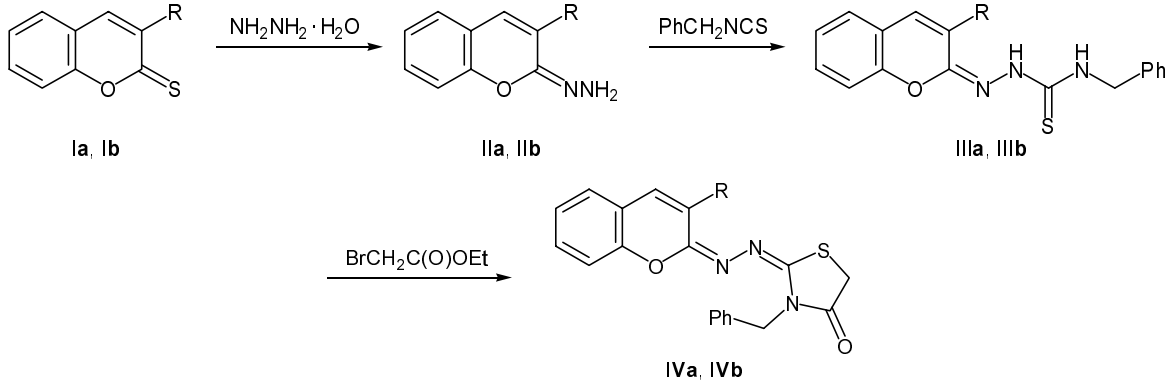
Thiazolidinone derivatives are known to exhibit versatile pharmacological activity [1, 2]. Obushak et al. [3] recently developed a procedure for the synthesis of thiazolidinones via reaction of substituted carbothioamides with iodoacetic acid [3]. With the goal of obtaining new substituted thiazolidinones, we used a related modified heterocyclization of 2*H*-chromen-2-one and 3-(4-bromophenyl)-2*H*-chromen-2-one thiosemicarbazones **IIIa** and **IIIb** with ethyl bromoacetate. Initial 3-substituted 2*H*-chromen-2-one hydrazones **IIa** and **IIb** were prepared from the corresponding 2*H*-chromene-2-thiones **Ia** and **Ib** which were reported previously [4, 5]. Treatment of hydrazones **IIa** and **IIb** with benzyl isothiocyanate in anhydrous ethanol gave *N*-benzylthiosemicarbazones **IIIa** and **IIIb**. The condensation of the latter with ethyl bromoacetate in the presence of sodium acetate was accompanied by closure of thiazolidine ring with formation of substituted thiazolidin-4-ones **IVa** and **IVb**.

2*H*-Chromen-2-one hydrazones IIa and IIb (*general procedure*). A solution of 10 mmol of 2*H*-chromene-2-thione **Ia** or **Ib** and 0.6 ml (12 mmol) of hydrazine hydrate in 50 ml of anhydrous ethanol was heated for 3 h under reflux. The solvent was removed under reduced pressure, and the residue was extracted with boiling petroleum ether. The extract was cooled, and the precipitate was filtered off and recrystallized from methanol.

2*H*-Chromen-2-one hydrazone (IIa). Yield 1.28 g (80%). ^{1}H NMR spectrum, δ, ppm: 5.68 br.s (2H, NH_2), 6.15 d (1H, 3-H, ^3J = 9.8 Hz), 6.71 d (1H, 4-H, ^3J = 9.8 Hz), 7.20 d (1H, 5-H, ^3J = 6.8 Hz), 7.02 d.d (1H, 6-H, ^3J = 6.8 Hz), 7.23 d.d (1H, 7-H, ^3J = 7.6 Hz), 7.04 d (1H, 8-H, ^3J = 7.6 Hz).

3-(4-Bromophenyl)-2*H*-chromen-2-one hydrazone (IIb). Yield 2.36 g (75%), mp 115–116°C. ^{1}H NMR spectrum, δ, ppm: 5.90 br.s (2H, NH_2), 6.85 s (1H, 4-H), 7.28 d (1H, 5-H, ^3J = 7.2 Hz), 7.04 d.d (1H, 6-H, ^3J = 7.2 Hz), 7.26 d.d (1H, 7-H, ^3J = 8.1 Hz), 7.11 d (1H, 8-H, ^3J = 8.1 Hz), 7.45–7.60 m (4H, C_6H_4). Found, %: C 57.01; H 3.43; Br 25.20; N 8.77. $C_{15}H_{11}BrN_2O$. Calculated, %: C 57.16; H 3.52; Br 25.35; N 8.89.



Ia, **Ib** **IIa**, **IIb** **IIIa**, **IIIb**

IVa, **IVb**

R = H (**a**), 4-BrC_6H_4 (**b**).

***N*-Benzylthiosemicarbazones IIIa and IIIb (*general procedure*).** A solution of 15 mmol of benzyl isothiocyanate in 10 ml of ethanol was added to a suspension of 10 mmol of hydrazone **IIa** or **IIb** in 50 ml of ethanol. The mixture was heated for 3.5–4 h, and the precipitate was filtered off and recrystallized from dimethylformamide.

2*H*-Chromen-2-one *N*-benzylthiosemicarbazone (IIIa). Yield 2.63 g (85%), mp 177–178°C. ^{1}H NMR spectrum, δ, ppm: 4.80 d (2H, CH_2, ^3J = 5.6 Hz), 6.35 d (1H, 3-H), 7.35 d (1H, 4-H), 7.37 d (1H, 5-H), 7.13 d.d (1H, 6-H), 7.39 d.d (1H, 7-H), 7.16 d (1H, 8-H), 7.10–7.40 m (5H, C_6H_5), 8.49 t (1H, NH, ^3J = 5.6 Hz), 10.07 s (1H, NH). Found, %: C 65.78; H 4.73; N 13.52; S 10.19. $C_{17}H_{15}N_3OS$. Calculated, %: C 66.0; H 4.89; N 13.58; S 10.36.

3-(4-Bromophenyl)-2*H*-chromen-2-one *N*-benzylthiosemicarbazone (IIIb). Yield 3.62 g (78%), mp 225–227°C. ^{1}H NMR spectrum, δ, ppm: 4.71 d (2H, CH_2, ^3J = 5.6 Hz), 7.30 s (1H, 4-H), 7.33 d (1H, 5-H), 7.17 d.d (1H, 6-H), 7.41 d.d (1H, 7-H), 7.28 d (1H, 8-H), 7.20–7.55 m (9H, C_6H_5, C_6H_4), 7.60 t (1H, NH, ^3J = 5.6 Hz), 10.51 s (1H, NH). Found, %: C 59.17; H 3.62; Br 16.99; N 8.79; S 6.64. $C_{23}H_{18}BrN_3OS$. Calculated, %: C 59.49; H 3.91; Br 17.21; N 9.05; S 6.90.

3-Benzyl-2-(2*H*-2-chromen-2-ylidene)hydrazonothiazolidin-4-ones IVa and IVb (*general procedure*). A solution of 3 mmol of ethyl bromoacetate in 10 ml of ethanol was added over a period of 1 h to a suspension of 2 mmol of thiosemicarbazone **IIIa** or **IIIb** and 0.25 g (3 mmol) of sodium acetate in 10 ml ethanol, heated to the boiling point. The mixture was then heated for 3–4 h under reflux, and the precipitate was filtered off, washed with hot alcohol, and recrystallized from DMF.

3-Benzyl-2-(2*H*-chromen-2-ylidene)hydrazonothiazolidin-4-one (IVa). Yield 0.52 g (75%), mp 167–168°C. ^{1}H NMR spectrum, δ, ppm: 3.91 s (2H, SCH_2), 4.92 s (2H, NCH_2), 6.47 d (1H, 3-H), 7.27 d (1H, 4-H), 7.41 d (1H, 5-H), 7.16 d.d (1H, 6-H), 7.40 d.d (1H, 7-H), 7.17 d (1H, 8-H), 7.20–7.60 m (5H, C_6H_5). Found, %: C 65.03; H 4.07; N 11.95; S 8.97. $C_{19}H_{15}N_3O_2S$. Calculated, %: C 65.31; H 4.33; N 12.03; S 9.18.

3-Benzyl-2-[3-(4-bromophenyl)-2*H*-chromen-2-ylidene]hydrazonothiazolidin-4-one (IVb). Yield 0.76 g (68%), mp 256–257°C. ^{1}H NMR spectrum, δ, ppm: 3.84 s (2H, SCH_2), 4.94 s (2H, NCH_2), 7.38 s (1H, 4-H), 7.47 d (1H, 5-H), 7.16 d.d (1H, 6-H), 7.40 d.d (1H, 7-H), 7.19 d (1H, 8-H), 7.25–7.65 m (9H, C_6H_5, C_6H_4). Found, %: C 59.39; H 3.46; Br 15.63; N 8.15; S 6.15. $C_{25}H_{18}BrN_3O_2S$. Calculated, %: C 59.53; H 3.60; Br 15.84; N 8.33; S 6.36.

The ^{1}H NMR spectra were recorded on a Bruker spectrometer operating at 400 MHz in a pulse mode; the chemical shifts were measured relative to tetramethylsilane as internal reference; DMSO-d_6 was used as solvent. The progress of reactions and the purity of products were monitored by TLC on Silufol UV-254 plates using benzene–acetone (5 : 1) as eluent; spots were visualized under UV light.

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