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SHORT COMMUNICATIONS

Spiro-Heterocyclization of Pyrrolo[2,1-*c*][1,4]benzoxazine-1,2,4-trione by the Action with Cyclic Enehydrazine

N. L. Racheva[a], Z. G. Aliev[b], and A. N. Maslivets[a]

[a] *Perm State University, ul. Bukireva 15, Perm, 614990 Russia*
e-mail: koh2@psu.ru

[b] *Institute of Chemical Physics Problems, Russian Academy of Sciences, Chernogolovka, Moscow oblast, Russia*

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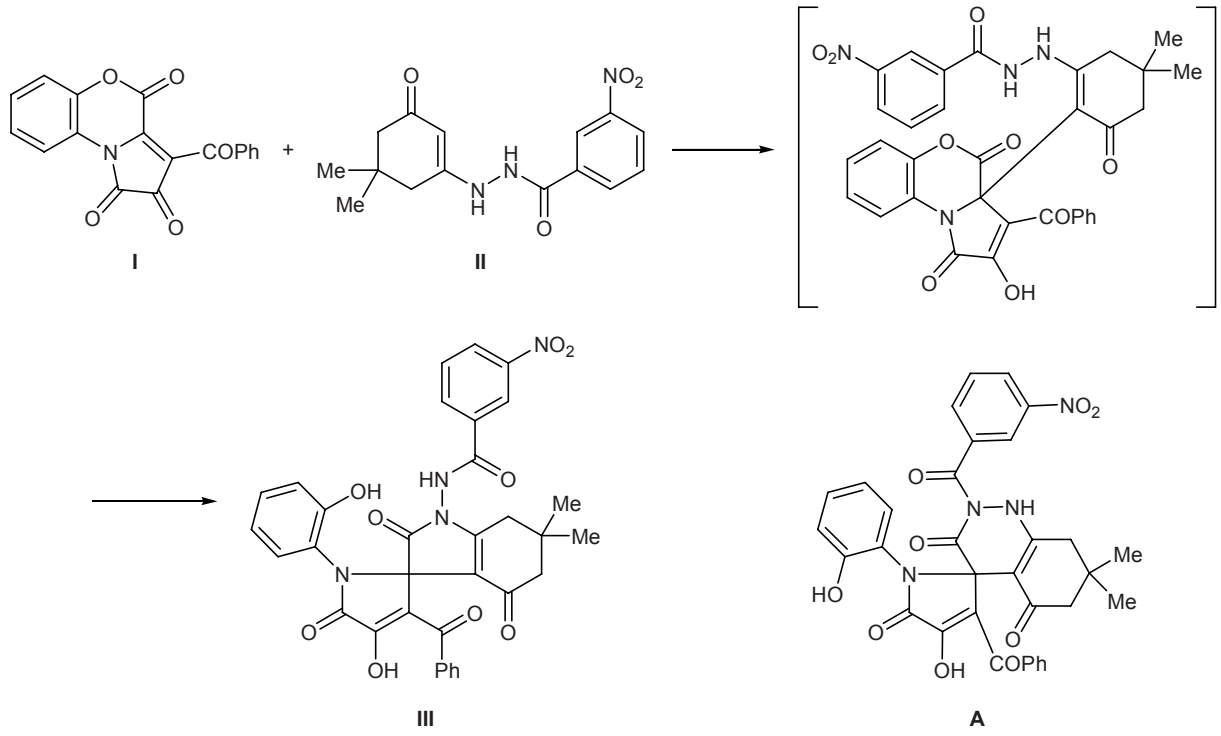
Reactions of 2,3-dihydro-1*H*-pyrrole-2,3-diones, including those fused at the [*a*]-side to nitrogen-containing heterocycles, with cyclic enehydrazines were not reported previously. By reaction of 3-benzoyl-2,4-dihydro-1*H*-pyrrolo[2,1-*c*][1,4]benzoxazine-1,2,4-trione (**I**) with an equimolar amount of *N*′-(5,5-dimethyl-3-oxocyclohex-1-en-1-yl)-3-nitrobenzohydrazide (**II**) (which may be regarded as a cyclic enehydrazine) in boiling anhydrous *m*-xylene (reaction time 10–15 min) we obtained in high yield *N*-[3′-benzoyl-4′-hydroxy-1′-(2-hydroxyphenyl)-6,6-dimethyl-2,4,5′-trioxo-1′,4,5,5′,6,7-hexahydrospiro[indole-3,2′-pyrrol]-1(2*H*)-yl]-3-nitrobenzamide (**III**) whose structure was proved by X-ray analysis.

Presumably, the process involves successive attacks by the β-CH and NH groups in cyclic enehydrazine **II** on the C^{3a} and C^4 atoms in pyrrolobenzoxazine **I**, respectively (as in the reactions of **I** with mononucleophiles [1]), cleavage of the 1,4-oxazine ring at the C^4–O^5 bond, and pyrrole ring closure with participation of the hydrazine fragment. The formation of structure like **A** via closure of pyridazine ring did not occur,



presumably because of reduced nucleophilicity of the NH group neighboring to the carbonyl group.

The described reaction is a rare example of regioselective synthesis of difficultly accessible spiro[indole-3,2′-pyrrole] system with various functional substituents in different positions of both heterocycles.

***N*-[3′-Benzoyl-4′-hydroxy-1′-(2-hydroxyphenyl)-6,6-dimethyl-2,4,5′-trioxo-1′,4,5,5′,6,7-hexahydrospiro[indole-3,2′-pyrrol]-1(2*H*)-yl]-3-nitrobenzamide (III).** Yield 87%, mp 230–232°C (from methanol). IR spectrum (mineral oil), ν, cm^{-1}: 3377 br, 3214 br (NH, OH); 1771, 1698 (C^2=O, $C^{5'}$=O); 1655, 1620, 1605 (COPh, $C^{4'}$=O, NHCO), 1524 (δNH). ^{1}H NMR spectrum (DMSO-d_6), δ, ppm: 0.80 s (3H, Me), 0.86 s (3H, Me), 2.03 d.d and 2.14 d.d (1H each, 7-H, J =15.9 Hz), 2.26 d.d and 2.42 d.d (1H each, 5-H, J = 18.5 Hz), 6.76–8.51 m (13H, H_{arom}), 9.35 s (1H, OH), 12.03 s (1H, NH), 12.40 br.s (1H, OH, enol). Found, %: C 62.57; H 4.01; N 9.50. $C_{33}H_{26}N_4O_9$. Calculated, %: C 63.66; H 4.21; N 9.00.

The IR spectrum was recorded on an FMS-1201 spectrometer. The ^{1}H NMR spectrum was measured on a Bruker WP-400 instrument using tetramethylsilane as internal reference. The purity of compound **III** was checked by TLC on a Silufol plate using ethyl acetate as eluent (development with iodine vapor).

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