A SYNTHESIS OF N-(4'-QUINAZOLON-3'-YL)-2-PYRIDINECARBOXAMIDINES
AND THEIR CONVERSION INTO 1,2,4-TRIAZoles

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Abstract --- Treatment of N-(2'-aminobenzoyl)-2-pyridylamidrazone (1) with ethoxymethylenemalononitrile (EMMN) and ethyl
ethoxymethyleneacyanoacetate (EMCA) or ortho esters afforded the
corresponding N-(2'-alkyl-4'-quinazolon-3'-yl)-2-pyridinecarbox-
amidines (2). Furthermore, treatment of 2 with ethanolic hydro-
chloric acid caused the ring transformation to give correspond-
ing 5-alkyl-3-(2'-pyridyl)-1H-1,2,4-triazoles (3).

We have recently described that the acid hydrolysis of 3-hydroxyiminoacyl-4-quina-
zelones gives the corresponding 3,5-diaryl-1,2,4-oxadiazoles derivatives by ring
transformation.1 We now report the syntheses of N-(2'-alkyl-4'-quinazolon-3'-yl)-
2-pyridinecarboxamidines (2) by the reaction of N-(2'-aminobenzoyl)-2-pyridyl-
amidrazone (1)2 with ethoxymethylenemalononitrile (EMMN) and ethyl ethoxymethylene-
cyanoacetate (EMCA) or ortho esters as well as a new ring transformation of 2 to
5-alkyl-3-(2'-pyridyl)-1H-1,2,4-triazoles (3).

Heating of 1 (0.006 mol) with an equivalent amount of EMMN and EMCA in ethanol
(70 ml) under reflux for 2 h afforded N-substituted 3,4-dihydro-4-oxoquinazoline
derivatives in good yields, which were previously unknown, i.e., N-(4'-quinazolon-
3'-yl)-2-pyridinecarboxamidine (2a). Similarly, the treatment of 1 (0.01 mol)
with ortho esters (triethyl orthoformate, triethyl orthoacetate or triethyl ortho-
propionate)(50 ml) at 160-170°C for 8 h gave the corresponding N-(2'-alkyl-4'-
quinazolon-3'-yl)-2-pyridinecarboxamidines (2a-c) in good yields.

The structure of 2a,b,c was established on the basis of their IR, NMR, mass spectral,
and elemental analytical data (Table I, II).3
Next, refluxing of (2a-c) (0.004 mol) with a mixture of 15% hydrochloric acid (50 ml) and ethanol (50 ml) for 8 h afforded 3a-c.4)
**Table I**  
N-(4'-quinazolon-3'-yl)-2-pyridinecarboxamidines (2)

<table>
<thead>
<tr>
<th>Compds R</th>
<th>Mp a)</th>
<th>Yield (%)</th>
<th>IR <em>KBr</em> max (cm⁻¹)</th>
<th>Analysis (%)</th>
<th>MS (m/e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td></td>
<td>νN-H  νC=O νC=N νC=C</td>
<td>Formula</td>
<td>C</td>
</tr>
<tr>
<td>2a H</td>
<td>227-229</td>
<td>70 b), 61 c), 71 d)</td>
<td>3400 1680 1630 1590</td>
<td>C_{14}H_{11}N_{5}O</td>
<td>65.51 4.58 (65.69) (4.59) (25.09)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3300 1660</td>
<td></td>
<td>26.08 279</td>
</tr>
<tr>
<td>2b CH₃</td>
<td>206-208</td>
<td>41</td>
<td>3380 1660 1615 1580</td>
<td>C_{15}H_{13}N_{5}O</td>
<td>64.50 4.65 (65.51) (5.15) (23.88)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3240 1670 1625 1590</td>
<td></td>
<td>25.10 293</td>
</tr>
<tr>
<td>2c C₂H₅</td>
<td>203-205</td>
<td>74</td>
<td>3380 1670 1625 1590</td>
<td>C_{16}H_{15}N_{5}O</td>
<td>65.15 5.15 (65.51) (5.19) (24.04)</td>
</tr>
</tbody>
</table>

a) All compounds were recrystallized from EtOH.  
b) From EMNN.  
c) From EMCA.  
d) From Triethyl Orthoformate.

**Table II**  
^1H-NMR data (DMSO-d₆, ppm) of compounds 2-3.

<table>
<thead>
<tr>
<th>Compds R</th>
<th>NH a)</th>
<th>H</th>
<th>CH₃</th>
<th>C₂H₅</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>No</td>
<td></td>
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<tr>
<td>2a H</td>
<td>7.50</td>
<td>8.16</td>
<td>(2H, s)</td>
<td>(1H, s)</td>
<td></td>
<td></td>
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<tr>
<td>2b CH₃</td>
<td>7.43</td>
<td>2.40</td>
<td>(2H, s)</td>
<td>(3H, s)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>2c C₂H₅</td>
<td>7.43</td>
<td>1.26</td>
<td>(2H, s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3a H</td>
<td>14.63</td>
<td>8.30</td>
<td>(1H, s)</td>
<td>(1H, s)</td>
<td>8.73</td>
<td>7.50</td>
<td>7.93</td>
<td>8.13</td>
</tr>
<tr>
<td>3b CH₃</td>
<td>13.30</td>
<td>2.33</td>
<td>(1H, br)</td>
<td>(3H, s)</td>
<td>8.66</td>
<td>7.43</td>
<td>7.86</td>
<td>8.05</td>
</tr>
<tr>
<td>3c C₂H₅</td>
<td>14.16</td>
<td>1.30</td>
<td>(1H, br)</td>
<td></td>
<td>8.73</td>
<td>7.46</td>
<td>7.90</td>
<td>8.10</td>
</tr>
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</table>

a) These signals disappeared on addition of D₂O.
The ring transformation of 2 to 3 probably proceeds by initial hydrolysis of the pyrimidine moiety and subsequent dehydration of the resultant acylamidrazones (Chart 2).

\[
\begin{array}{c}
\text{Chart 2} \\
\end{array}
\]

Table III 5-Alkyl-3-(2'-pyridyl)-1H-1,2,4-triazoles (3)

<table>
<thead>
<tr>
<th>Compds. No</th>
<th>R</th>
<th>Recryst. solvent</th>
<th>Mp(°C)</th>
<th>Yield (%)</th>
<th>IRvKBr max(cm(^{-1}))</th>
<th>MS (m/e)</th>
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</thead>
<tbody>
<tr>
<td>3a</td>
<td>H</td>
<td>Benzene</td>
<td>166-167</td>
<td>50</td>
<td>3440 1600</td>
<td>146</td>
</tr>
<tr>
<td>3b</td>
<td>CH(_3)</td>
<td>Benzene</td>
<td>169-171</td>
<td>51</td>
<td>3400 1590</td>
<td>160</td>
</tr>
<tr>
<td>3c</td>
<td>C(_2)H(_5)</td>
<td>Carbon+Carbon</td>
<td>153-155</td>
<td>71</td>
<td>3440 1590</td>
<td>174</td>
</tr>
</tbody>
</table>

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ACKNOWLEDGMENT
The authors wish to thank Misses. Misa Tazawa and Chikako Kobayashi, the students of Kitasato University, for their skilled technical assistance.

REFERENCES AND NOTES
1. K.Nagahara and A.Takada, Heterocycles, 1979, 12, 239.
3. The structure of 2 was assigned on the basis of NMR spectral data of 1. The NMR spectrum (DMSO-d6) of 1 shows singlets at 66.15 (2H; aromatic amine), 6.87 (2H; amidine amine), and 10.00 ppm (1H; amide amine).
4. The structures of 3a-c were confirmed by the spectral data and elemental analyses.

Received, 19th January, 1982