experimental errors. That the activity coefficient variation should cause this spread we find less probable.

Separate studies of the range \( Z_n < 4 \) (assuming \( n = 1, 2, 3, \) and 4) and determinations of \( K_a(C_3H_5N_2)^+ \) gave the equilibrium constants and standard deviations collected in Table 1. In these separate investigations the upper limits for the concentration ranges (in mM) were: 3 M (NaClO₄, 3 M (NaCl); \( B = 20, \) (80); \( C = 330, \) (324) \([C_3H_5N_2] = 281, \) (111). Within these concentration ranges, the acidity constant of \( C_3H_5N_2^+ \) appeared to be independent of \( C, \) and the formation constants for the different copper complexes were independent of \( B \) and \( C \) as long as \( C/B \geq 8. \) This supports our assumption that activity factors cannot cause the spread at \( Z_n > 5. \)

Calculations and results. First we try to explain the range \( 3 \leq Z_n \leq 5, \) where the different \( Z_n \)-curves seem to coincide (cf. Figs. 1a and 1b). The results of the calculations of main interest are given in Table 2. A rather good fit to experimental data is obtained in 3 M (NaClO₄ as well as in 3 M (NaCl, if one introduces the formation constants \( \beta_A \) and \( \beta_B \) to the model with only four mononuclear complexes \( Cu(C_3H_5N_2)^{2+}, \) \( n = 1...4. \) In 3 M (NaCl) this model fits data better than a correction in \( C, \) \( D \) and \( K_a \) without \( \beta_A \) and \( \beta_B. \) In 3 M (NaClO₄ a good fit is obtained with a variation in \( C \) without \( \beta_A \) and \( \beta_B. \) However, \( AC \) appears too great to be experimentally possible (in some instances \( 4 \ldots 9 \) %). A somewhat better fit is obtained if, in addition to a correction in \( C, \) \( \beta_A \) and \( \beta_B \) were introduced. In this case the corrections in \( C \) become more tolerable (cf. Table 2).

We consider next the data range extended to include data where \( Z_n > 5. \) A calculation was made where log \( \beta_A \) and log \( \beta_B \) were kept constant in the two media, and had values determined in the range \( Z_n \leq 5. \) Assuming the deviations from the model \( Cu(C_3H_5N_2)^{2+}, \) \( n = 1...6 \) to be due to an error \( C, \) a good fit is obtained with corrections in \( C \) (usually \( < 0.5 \) %, cf. Table 2), which would seem to be reasonable, considering the experimental conditions. It is worth noticing that variations in \( K_a \) give \( K_a \)-values in very good agreement with those separately determined.

Calculations assuming mixed or polymeric complexes were also carried out, but these calculations gave no further improvements.

Obviously the present complementary measurements and analysis at \( Z_n > 4 \) strongly confirmed the results earlier published. It has been clearly established that the effects at high \( Z_n \)-values cannot be explained solely by analytical or experimental errors. Additional complex formation must be taken into account. There is evidence for the formation of both the complexes \( Cu(C_3H_5N_2)^{2+} \) and \( Cu(C_3H_5N_2)^{3+}. \)

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Fatty Acid Composition of the Seed Fats of a Few Vacciniaeae and Empetraceae

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No previous studies of fatty acids from seeds of plants belonging to the families Vacciniaeae and Empetraceae have been recorded. As to the related family Ericaceae, (occasionally considered as including Vacciniaeae), a single analysis on Arctostaphylos glauca has been published, cf. Table 1.

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Table 1. Fatty acid composition of the seed oils (weight %).

<table>
<thead>
<tr>
<th>Acid</th>
<th>Vaccinium uliginosum</th>
<th>Oxyccoccus quadripetalus</th>
<th>Empetrum nigrum</th>
<th>Arctostaphylos glauca a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palmitic</td>
<td>1.1</td>
<td>5</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Stearic</td>
<td>0.2</td>
<td>1.5</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Oleic</td>
<td>23</td>
<td>21</td>
<td>14</td>
<td>32</td>
</tr>
<tr>
<td>Linoleic</td>
<td>46</td>
<td>36</td>
<td>42</td>
<td>33</td>
</tr>
<tr>
<td>Linolenic</td>
<td>29</td>
<td>36</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>Oil content</td>
<td>30 %</td>
<td>20 %</td>
<td>8 %</td>
<td>56 %</td>
</tr>
</tbody>
</table>

* a Literature values (Ref. 2).

The present study was performed on berries of *Vaccinium uliginosum*, *Oxyccoccus quadripetalus* and *Empetrum nigrum*, collected near Lodbjerg light-house, Denmark, in August 1966. The kernels were isolated and after crushing extracted with light petroleum (b.p. 40–60°) in a Soxhlet apparatus as described, the oil contents of the seeds appear from Table 1. After saponification of the glycerides with ethanolic KOH, and acidification with H$_2$SO$_4$, the fatty acids were isolated by extraction with Et$_2$O and converted into methyl esters by reaction with CH$_3$N$_2$. The esters were chromatographed on an Aerograph instrument, model 1520, equipped with a heat conductivity detector, using a polar stationary phase (DEGS) as well as a nonpolar phase (E 301). Assuming the areas under the recorded curves to be proportional to the molar percentages of the individual components, the compositions listed in Table 1 were determined (as weight per cent of the fatty acid mixture). The identity of the individual fatty acids has been further verified by mass spectrometry. The methyl ester mixtures were investigated on a GLC/MS-instrument (Perkin-Elmer model 270) at 70 eV and an ion source pressure of 3 x 10$^{-4}$ torr. The spectra obtained were in accordance with those reported as well as with spectra of authentic specimens. Obviously, the three oils investigated all belong to the group of fatty acids classified by Hilditch as rich in linolenic and linoleic acid.