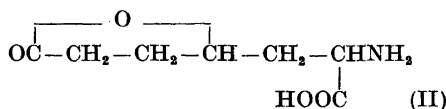
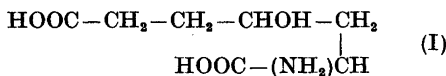


The solution was evaporated to a syrup. In the syrup appeared star-like clusters of needle-shaped crystals. The recrystallized substance which did not give other spots than Z on the paper chromatogram had a melting point 226–227° (decomposition). (Found: C 48.78; H 6.27; N 8.02. Calc. for $C_7H_{11}O_4N$: C 48.55; H 6.40; N 8.09.)

The substance was reduced with 66% HJ (d 1.96) and red phosphorus at 136° C during 4 hours. α -Aminopimelic acid (Fig. 3) could be shown as the reduction product.

Our results show that *Asplenium septentrionale* contains γ -hydroxy- α -aminopimelic acid (I), and its lactone (II) as free amino acids. The γ -position of the OH-group was proved by oxidation of the deaminated lactone with permanganate in acid solution, whereby succinic acid was formed.



In the protein these amino acids could not be found. Also other *Asplenium* species seem to contain these amino acids. In addition to *Aspl. septentrionale* also *Aspl. nidus*, *Aspl. trichomonas*, and *Aspl. viviparum* have so far been investigated.

The amount of γ -hydroxy- α -aminopimelic acid in *Aspl. septentrionale* is relatively high (cf. Fig. 1). It is the most abundantly appearing free amino acid in this plant. The amount of its lactone is much smaller corresponding probably to the chemical equilibrium between the acid and the lactone.

We have not found in literature that any hydroxy- α -mono-aminopimelic acid should have been found earlier in living organisms. Also synthetic products of this kind seem to be unknown.

Virtanen and Linko have found acetyl-ornithine (Fig. 1) in *Asplenium* species, and in *Aspl. nidus* also free ornithin. They will communicate about the isolation of this acetyl compound.

We wish to thank Mr. R. E. Ruotsalo for his help in procuring *Asplenium septentrionale*, and Professor A. Kalela for *Asplenium* species obtained from the University Botanica Gardens.

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Adsorptiochromism of 1,4-Naphthoquinones

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A number of organic compounds are adsorbed to inorganic salts with an accompanying color change¹⁻³. We have observed that some 1,4-naphthoquinones (all of which are yellow) in petroleum ether solution were adsorbed to Al_2O_3 with a concomitant shift to deeper colors (Table 1). 1,4-Naphthoquinone and 1,2-naphthoquinone remained yellow.

Color intensity varied with the source of the alumina. On Merck's *purissimo* colors were faint; they were more evident on Merck's Al_2O_3 *nach Brockmann*, and most intense on May and Baker's Al_2O_3 .

Table 1. Colors of some 1,4-naphthoquinones when adsorbed to alumina.

Derivatives of 1,4-naphthoquinone	Color of compound on Al_2O_3
2-hydroxy-	orange
2-methyl-	deep violet
2-methyl-3-hydroxy-	orange
2,3,6-trimethyl-	pink
2,6,7-trimethyl-	pink
3,5,7-trimethyl-	pink
2-hydroxy-3-(2-methyl)octyl-	pink
2-methyl-3-phytyl-	violet
2,3-oxide of 2-methyl-3-phytyl	violet
2-methyl-3-difarnesyl-	violet

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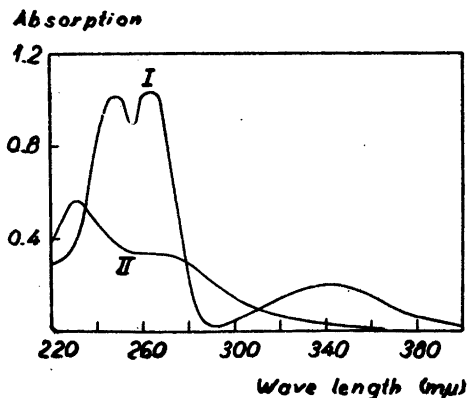


Fig. 1. Absorption spectra of pure menadione in water (curve I) and the water eluate after Al_2O_3 adsorption (curve II).

for chromatography. Pre-treatment of the adsorbent with water prevented color formation.

At least in one instance the colored compound can be eluted, as shown by the following procedure which was carried out in the dark. One hundred mg of 2-methyl-1,4-naphthoquinone (*i.e.*, menadione) were dissolved in 100 ml petroleum ether and poured through an 8×1.5 cm column of May and Baker's Al_2O_3 . The upper violet zone which remained after elution with 200 ml benzene was eluted with 200 ml H_2O . The ultraviolet absorption spectrum of the violet water-

eluate was measured in a Beckman DU Spectrophotometer; the blank was a water-"eluate" of a fresh column treated with the same solvents. The spectrum is shown in Figure 1, along with that of the pure untreated menadione in H_2O .

The nature of the change induced by adsorption to Al_2O_3 is unknown, but it is interesting that the spectrum of the resultant compound(s) is similar to that induced by light-activation of 1,4-naphthoquinones⁴. It should be emphasized, however, that the spectrum differs markedly from the spectrum of one of the products resulting from light-activation of menadione (*viz.*, the dimer of menadione)⁵ which we have found absorbs maximally at 265 $\text{m}\mu$ and 272 $\text{m}\mu$. That the violet compound can be eluted with water but not with benzene suggests highly polar groupings, such as hydroxy groups. Perhaps pertinent is the suggestion of Schoenberg *et al.*³ that anthrones are changed to anthranols by Al_2O_3 adsorption.

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