

NEW POLYENOIC FATTY ACIDS IN NORWAY SPRUCE WOOD

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Saponification of the lipophilic extractives from the wood of Norway spruce, *Picea abies* (L.) Karst., yields a complex mixture of odd- and even-numbered straight-chain and *anteiso*-branched fatty acids with different degrees of unsaturation. The saturated fatty acids have been investigated in detail [1] and in further studies on the monoenoic acids in *P. abies* the occurrence of some unusual *anteiso*-monoenoic acids has been reported [2]. The major polyenoic fatty acids have also been identified [3].

The present paper reports the detection and characterization of five new polyenoic fatty acids, present in minor amounts in the wood of *Picea abies*: 16-methyl-octadeca-5,9-dienoic (*anteiso* 5,9-19:2), 16-methyl-

octadeca-9,12-dienoic (*anteiso* 9,12-19:2), 16-methyl-octadeca-5,9,12-trienoic (*anteiso* 5,9,12-19:3), eicosa-7,11,14-trienoic (7,11,14-20:3) and octadeca-5,9,12,15-tetraenoic (5,9,12,15-18:4) acids.

Chain structures were determined by hydrogenation and the double bond positions were determined by GC-MS of the trimethylsilyloxy (TMSO) derivatives of the methyl esters obtained by OsO₄ hydroxylation of the double bonds and subsequent silylation.

Hydrogenation of the polyenoic methyl esters isolated on AgNO₃-TLC gave mainly methyl octadecanoate and methyl eicosanoate. Methyl 16-methyloctadecanoate (*anteiso* 19:0) was third in abundance whereas only trace amounts of methyl nonadecanoate

Table 1. Polyenoic fatty acids in *Picea abies* wood

Compound*	Percentage composition	ECL value BDS, 190°	TMSO derivative GC-MS 20 eV <i>m/e</i> (rel. int.)
<i>anteiso</i> 5,9-19:2	0.5	19.23	203 (A; 47), 371 (B-90; 52), 281 (B-180; 13), 345 (C-90; 100), 255 (C-180; 33), 229 (D; 40)
<i>anteiso</i> 9,12-19:2	0.8	19.52	259 (A; 42), 405 (B; 10), 315 (B-90; 97), 387 (C-90; 100), 297 (C-180; 12), 187 (D; 19)
<i>anteiso</i> 5,9,12-19:3	0.5	19.78	203 (A; 39), 457 (B-180; 18), 367 (B-360; 12), 345 (C-90; 62), 255 (C-180; 12), 315 (D-90; 100), 473 (E-180; 12), 383 (E-270; 32), 187 (F; 18)
5,9,12,15-18:4	1.2	19.89	203 (A; 46), 529 (B-270; 10), 439 (B-360; 11), 345 (C-90; 67), 255 (C-180; 13), 387 (D-180; 19), 297 (D-270; 15), 563 (E-90; 10), 473 (E-180; 11), 383 (E-270; 26), 349 (F; 10), 259 (F-90; 100), 601 (G-270; 10), 131 (H; 17)
7,11,14-20:3	1.0	21.19	231 (A; 32), 443 (B-180; 32), 353 (B-270; 36), 373 (C-90; 87), 283 (C-180; 18), 301 (D-90; 100), 591 (E-90; 10), 501 (E-180; 19), 411 (E-270; 33), 173 (F; 35)
5,9-18:2, 9,12-18:2 11,14-20:2, 5,9,12-18:3 9,12,15-18:3, 5,11,14-20:3	96.0		

* Analysed as the methyl ester.

