Discussion of the Term "Unusual" When Discussing Δ5-Olefinic Acids in Plant Lipids

Sir:

In a recent reinvestigation of *Ginkgo biloba* seed oil fatty acid composition, Hierro *et al.* (1) reported on some "unusual" components, such as 5,9-18:2, 5,9,12-18:3, and 14-methyl-16:0 acids. We wish here to comment on the term "unusual." Since the major study of Takagi and Itabashi (2), who established the fatty acid composition of the seeds from 21 species of Gymnosperms, including *G. biloba*, it is known that all species contain Δ5-unsaturated polymethylene-interrupted fatty acids (Δ5-UPIFA). This was later confirmed in two systematic studies by Wolff and Bayard (3) and Wolff *et al.* (4), who analyzed the seed lipids from 32 conifer species. Confirmation of the structures of six Δ5-UPIFA by gas–liquid chromatography (GLC) coupled with mass spectrometry has indicated that the use of equivalent chainlength was sufficient to characterize these acids by capillary GLC (5).

Among conifers, it is well established that 5,9-18:2 and 5,9,12-18:3 acids (along with variable amounts of 5,11,14-20:3 acid, also reported in *G. biloba* seed lipids) are present in all Pinaceae and Taxaceae analyzed until now (2–4). On the other hand, these acids are lacking in Cupressaceae and Taxodiaceae, where 5,11,14,17-20:4 acid, derived from α-linolenic acid, is generally the principal Δ5-UPIFA (2,4).

With respect to 5,9-18:2 and 5,9,12-18:3 acids, they are not only habitual in conifer seeds but also in conifer leaves (6) and wood (7). Consequently, though these acids may appear as unusual in some laboratories, they are in fact common components of lipids in Gymnosperms. Lipid researchers should be aware that Gymnosperms are characterized by the systematic presence of a fourth desaturase, the Δ5-desaturase, that is otherwise extremely rare in Angiosperms. Two figures illustrate and emphasize how widespread this desaturase is: Gymnosperms contain approximately 600 species, and in the Northern Hemisphere, one tree out of two is a conifer (and hence a Gymnosperm).

The Δ5-desaturase apparently uses 9-18:1, 9,12-18:2, 9,12,15-18:3 acids, and their elongation products, 11-20:1, 11,14-20:2, and 11,14,17-20:3 acids, as substrates (4). Particularly in *G. biloba* seeds, and also in *Cycas revoluta* and *Podocarpus macrophylla* (2), a seventh Δ5-UPIFA has been tentatively identified as 5,11-18:2 acid. This would not be surprising in *G. biloba* seed lipids, where 11-18:1 acid is the major octadecenoic acid (1,2). However, Hierro *et al.* (1) failed to detect and characterize this acid. So, it is not clear whether 11-18:1 acid is a substrate of the Δ5-desaturase. This point deserves reinvestigation.

A branched-17:0 acid is not unusual in conifers. It has been formally identified as 14-methyl-16:0 in the wood of several pines (8) and detected in the leaves of many conifer species (6). We also systematically observed this component in the seed lipids of all Pinaceae we analyzed, but it was apparently lacking in Cupressaceae (unpublished results).

In conclusion, none of the acids described by Hierro *et al.* (1) should be described as "unusual" when considering Gymnosperms. At present, almost 100 species have been analyzed, and their seed oils always contain some of the series of Δ5-UPIFA, which may even reach in some instances slightly more than 33% of the total fatty acids (9). Their distribution is so characteristic that these acids may even be used as a chemometric means of taxonomic systematization for conifer families and genera (10).

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