**Plant Gene Register**

**Cloning of a cDNA Encoding 3-Ketoacyl-Acyl Carrier Protein Synthase III from Arabidopsis**

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The initial step of fatty acid biosynthesis in both plants and *Escherichia coli* is the condensation of malonyl-acyl carrier protein with acetyl-CoA, a reaction that is catalyzed by KAS III (Jackowski and Rock, 1987; Jackowski et al., 1989; Jaworski et al., 1989; Clough et al., 1992). In *E. coli*, KAS III has been implicated as a site of regulation for de novo fatty acid synthesis (Jackowski and Rock, 1987; Jackowski et al., 1989). At present, the regulation of fatty acid biosynthesis has not been clearly delineated in plants. Alteration of KAS III expression in *Arabidopsis* by sense and antisense constructs will help elucidate its regulatory role in vivo.

The first plant cDNA clone of KAS III was recently isolated from spinach (Tai and Jaworski, 1993). The spinach clone showed a high degree of amino acid identity to the *E. coli* KAS III (Tsay et al., 1992) and the putative KAS III from *Porphyra umbilicalis* (red alga) (Reith, 1993), but no similarity to clones of other KAS isozymes from either plants or *E. coli*. We have isolated an *Arabidopsis* KAS III cDNA clone using the spinach clone as a heterologous probe (Table I).

**Table I. Characteristics of a cDNA encoding KAS III from Arabidopsis**

| Organism: | Arabidopsis thaliana cv Columbia. |
| Function: | Encodes KAS III. |
| Source: | cDNA library in λ-PRL 2 (derivative of λZipLox [Gibco-BRL]), constructed with equal amounts of mRNA isolated from (a) tissue culture-grown roots; (b) 7-d-old etiolated seedlings; (c) rosettes; and (d) aerial tissue from staged plants of different age and two light regimes (this library was a kind gift of Dr. Tom Newman of Michigan State University). |
| Methods of Isolation: | Heterologous screening of the cDNA library using a spinach KAS III cDNA fragment as a probe. |
| Methods of Identification: | Nucleotide and deduced amino acid sequence identity (60.4 and 71.8%, respectively) to the spinach KAS III cDNA clone. |
| Characteristics of the cDNA: | The 1764-bp clone contains a 1215-bp open reading frame (nucleotides 171–1385). |
| Structural Features of the Deduced Amino Acid Sequence: | An open reading frame of 405 amino acids with calculated molecular mass of 42.8 kD and isoelectric point 7.08. Predicted active site at Cys 179. |
| Sequencing Strategy: | The λ clone was in vivo excised into a plasmid (pZl.1) clone. Double-stranded DNA was prepared and sequenced on both strands with an automated sequencer (Applied Biosystems, Foster City, CA; model 373A) using custom-made primers. |
| Gene Copy Number: | Southern hybridization indicates one copy is present per genome as well as additional, less homologous sequences. |

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The GenBank accession number for the sequence reported in this article is L31891.

**LITERATURE CITED**


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Abbreviation: KAS III, 3-ketoacyl acyl carrier protein synthase III.

Tai H, Jaworski JG (1993) 3-Ketoacyl-acyl carrier protein synthase III from spinach (Spinacia oleracea) is not similar to other condensing enzymes of fatty acid synthase. Plant Physiol 103: 1361–1367