

Table I. Confirmed peroxisomal proteins in Arabidopsis

Abbreviations: 2, 4-DB, 2,4-dichlorophenoxybutyric acid ; FAs, fatty acids; IBA, indole butyric acid ; JA, jasmonic acid; mPTS, membrane peroxisomal targeting signal; IEM, immunogold labeling microscopy; alt, alternative.

Numbers in brackets indicate references, which are listed at the end of the table. ^a This protein was confirmed to be peroxisomal by C. Mayer and S. Reumann (unpublished data). ^b This protein was confirmed to be peroxisomal by T. Johnson and L.J. Olsen (unpublished data).

Gene locus	Acronym	Annotation	Function	PTS	Proteomic evidence	Method of localization	Other locations
At1g01710	ACH2	Acyl-CoA thioesterase	Putative auxiliary β -oxidation enzyme [1, 2]	SKL>	Leaves [3, 4] Cell cultures [5]		
At1g01820	PEX11c	Peroxin 11 c	Peroxisome proliferation [6-8]	mPTS	Leaves [4] Cell cultures [5]	GFP fusion [6] CFP fusion and immunodetection in purified peroxisomes [7]	
At1g03000	PEX6	Peroxin 6	Peroxisome protein import [9-11]	-			
At1g04710	KAT1/ PKT4	3-Ketoacyl-CoA thiolase 1/ Peroxisomal 3-Ketoacyl-CoA thiolase 4	Core fatty acid β -oxidation [12]	RQx ₅ HL	Leaves [3, 4] Cell cultures [5]	GFP fusion [13]	
At1g06290	ACX3	Acyl-CoA oxidase 3	β -oxidation of FAs, IBA and 2,4-DB [14-17, 18]	RAx ₅ HI	Leaves [3, 4] Cell cultures [5]	Enzymatic analysis of cell fractions [14]	
At1g06310	ACX6	Acyl-CoA oxidase 6	β -oxidation of FAs [reviewed in 19]	RAx ₅ HI			
At1g06460	Acd31.2	Small heat shock protein/ α -crystallin domain containing protein of 31.2 KDa	Chaperone [20, 21]	RLx ₅ HF	Leaves [3, 4, 21]	EYFP fusion [21]	
At1g19570	DHAR1	Dehydroascorbate reductase 1	Detoxification Pathogen defense [22]	-	Leaves [4]	EYFP fusion [4]	
At1g20510	OPCL1	OPC-8:0 ligase 1	JA biosynthesis [23, 24]	SKL>	Leaves [3, 4] Cell cultures [5]	GFP fusion [23] YFP fusion [24]	
At1g20560	AAE1	Acyl-activating enzyme 1	Auxiliary β -oxidation enzyme [25]	SKL>	Leaves [4] Cell cultures [5]	EYFP fusion [4]	

At1g20620	CAT3	Catalase 3	Detoxification [26-29]	alt. PTS1	Greening cotyledons [30] Etiolated cotyledons [31] Leaves [3, 4] Cell cultures [5]		
At1g20630	CAT1	Catalase 1	Detoxification [26-29] Pathogen defense [22]	alt. PTS1	Leaves [3, 4] Cell cultures [5]		
At1g21770	ATF1	Acetyl transferase 1	Metabolism [32] Pathogen defense [22]	SSI>	Leaves [3, 4]	EYFP fusion [3]	
At1g23310	GGT1	Glutamate-glyoxylate aminotransferase 1	Photorespiration [33, 34] Pathogen defense [22]	SKM	Greening cotyledons [30] Leaves [3, 4] Cell cultures [5]	GFP fusion [33] Immunodetection in cell fractions [34]	
At1g28320	DEG15	Deg/HtrA protease	Cleavage of PTS2-containing proteins [35]	SKL>	Cell cultures [5]	GFP fusion [35]	
At1g29260	PEX7	Peroxin 7	Peroxisome matrix protein receptor [36, 37]	-			Cytosol
At1g47750	PEX11a	Peroxin 11a	Peroxisome proliferation [6, 7, 38]	mPTS	Leaves [4] Cell cultures [5]	GFP fusion [6] CFP fusion and immunodetection in purified peroxisomes [7]	
At1g48320	sT1	Small thioesterase 1	Putative auxiliary β -oxidation enzyme Pathogen defense [22]	AKL>	Leaves [4]	EYFP fusion [4]	
At1g48635	PEX3B	Peroxin 3 isoform B	Peroxisome assembly [39, 40]	-		Immunolocalization [39]	
At1g49670	BSMDR/ ARP/ NQR	Bifunctional short- and medium- chain dehydrogenase/reductase/ NADH:quinone reductase	Unknown function [41]	SRL>	Leaves [3, 4] Cell cultures [5]	GFP fusion [5]	
At1g50510	IndA	Indigoidine synthase A	Unknown function	RIx ₅ HL	Leaves [4] Cell cultures [5]	EYFP fusion [4]	
At1g54340	ICDH/ IDHP1	NADP-dependent isocitrate dehydrogenase	Unknown function	SRL>	Etiolated cotyledons [31] Leaves [3, 4] Cell cultures [5]	EYFP fusion [3] GFP fusion [5]	
At1g55320	AAE18	Acyl-activating enzyme 18	Auxiliary β -oxidation enzyme [25, 41]	SRI>		GFP fusion [41]	
At1g60550	NS/ ECHId	Naphthoate synthase/ monofunctional enoyl CoA hydratase/isomerase d	Putative auxiliary β -oxidation enzyme Pathogen defense [22]	RLx ₅ HL	Leaves [3]	EYFP fusion [3]	

At1g65520	EC11/ ECH1c	Δ^3, Δ^2 -enoyl CoA isomerase/ monofunctional enoyl CoA hydratase/isomerase c	Auxiliary β -oxidation enzyme [42]	SKL>	Leaves [3, 4] Cell cultures [5]	GFP fusion [5]	
At1g65840	PAO4	Polyamine oxidase 4	Polyamine catabolism [43]	SRM	Cell cultures [5]	RFP fusion [43]	
At1g68010	HPR1	Hydroxypyruvate reductase 1	Photorespiration [44] Pathogen defense [22]	SKL>	Greening cotyledons [30] Leaves [3, 4] Cell cultures [5]	IEM [44]	
At1g70580	GGT2	Glutamate-glyoxylate aminotransferase 2	Photorespiration [33, 34]	SRM	Greening cotyledons [30] Leaves [3, 4]	Immunodetection in cell fractions [34]	
At1g76150	ECH2	Monofunctional enoyl-CoA hydratase 2	Auxiliary β -oxidation enzyme [45] Pathogen defense [22]	SSL>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [45]	
At1g77540	ATF2	Acetyltransferase	Metabolism [32] Pathogen defense [22]	SSI>	Leaves [4]	EYFP fusion [4]	
At1g79810	PEX2/ TED3	Peroxin 2	Peroxisome protein import [40, 46]	mPTS		GFP fusion [46] EYFP fusion [47]	
At2g06050	OPR3	12-oxophytodienoate reductase 3	JA biosynthesis [48-50] Pathogen defense [22]	SRL>	Leaves [3, 4] Cell cultures [5]	GFP fusion [23, 51]	
At2g13360	AGT1/ SGT	Alanine-glyoxylate aminotransferase/ Serine-glyoxylate aminotransferase	Photorespiration [34] Pathogen defense [22]	SRI>	Greening cotyledons [30] Leaves [3, 4] Cell cultures [5]	<i>In vitro</i> import and enzymatic analysis of cell fractions [34]	
At2g14120	DRP3B/ ADL2b	Dynamamin- related protein 3B/ Arabidopsis dynamamin-like 2b	Division of peroxisomes and mitochondria [52-55]	-		GFP fusion [52, 53] YFP fusion [55]	Mitochondria
At2g22780	PMDH1	Peroxisomal NAD ⁺ -malate dehydrogenase 1	FAs metabolism [56]	Rlx ₅ HL	Greening cotyledons [30] Etiolated cotyledons [31] Leaves [3, 4] Cell cultures [5]	GFP fusion [56]	
At2g24580	SOX	Sarcosine oxidase	Branched-chain amino acid metabolism [57]	-		<i>In vitro</i> import [57]	
At2g26230	Uri	Uricase	Putative ureide pathway Pathogen defense [22]	SKL>	Leaves [3, 4] Cell cultures [5]		
At2g26350	PEX10	Peroxin 10	Peroxisome protein import [40, 58- 61]	-		YFP fusion [47, 59] IEM of suspension cultured cells and immunodetection in cell fractions [60]	Endoplasmic reticulum
At2g27490	COAE	Dephospho-CoA kinase	Putative CoA biosynthetic enzyme	-	Leaves [4]	EYFP fusion [4]	

At2g29590	sT5	Small thioesterase 5	Putative auxiliary β -oxidation enzyme	SKL>	Leaves [4]	EYFP fusion [4]	
At2g33150	KAT2/ PED1/ PKT3	3-Ketoacyl-CoA thiolase 2/ Defective peroxisome 1/ Peroxisomal 3-Ketoacyl-CoA thiolase 3	β -oxidation of FAs, IBA, 2,4-DB and JA [12, 16, 62-65]	RQx ₅ HL	Etiolated cotyledons [31] Leaves [3, 4] Cell cultures [5]	GFP fusion [13]	
At2g35690	ACX5	Acyl-CoA oxidase 5	β -oxidation of FAs and JA [18, 66]	AKL>	Leaves [3, 4] Cell cultures [5]		
At2g39970	PMP36	Peroxisomal membrane protein of 36 KDa	Putative mitochondrial substrate carrier	mPTS	Leaves [4] Cell cultures [5]		
At2g42490	CuAO	Copper amine oxidase	Putative polyamine catabolism protein	SKL>	Leaves [4] Cell cultures [5]	EYFP fusion [4]	
At2g42790	CSY3	Citrate synthase 3	Glyoxylate cycle [67] Pathogen defense [22]	RAx ₅ HL	Leaves [3, 4] Cell cultures [5]	GFP fusion [67]	
At2g43020	PAO2	Polyamine oxidase 2	Polyamine catabolism [43] Pathogen defense [22]	SRL>		RFP fusion [43]	
At2g44490	PEN2/ BGLU26	Penetration 2/ β -glucosidase 26	Pathogen defense [68-70]	-		GFP fusion [68]	
At2g45690	PEX16/ SSE	Shrunken seed 1	Peroxisome assembly [71-74]	-		GFP fusion [72]	Endoplasmic reticulum
At2g45740	PEX11d	Peroxin 11d	Peroxisome proliferation [6-8]	mPTS	Leaves [3, 4] Cell cultures [5]	GFP fusion [6] CFP fusion and immunodetection in purified peroxisomes [7]	
At3g01910	SO	Sulfite oxidase	Sulfite metabolism [75, 76] Pathogen defense [22]	SNL>	Leaves [3, 4] Cell cultures [5]	IEM and GFP fusion [77]	
At3g02360	6PGDH	Phosphogluconate dehydrogenase	Putative auxiliary β -oxidation enzyme Pathogen defense [22]	SKI>	Leaves [3, 4] Cell cultures [5]	GFP fusion [5]	
At3g03490	PEX19A	Peroxin 19 isoform A	Peroxisome assembly [40, 78]	-			
At3g04460	PEX12/ APM4	Peroxin 12/ Aberrant peroxisome morphology 4	Peroxisome protein import [40, 79, 80]	mPTS		CFP fusion [79] GFP fusion [80]	
At3g05290	PNC1	Peroxisomal adenine nucleotide carrier 1	Counter-exchange of ATP with ADP or AMP [38, 81]	-		RFP fusion [81] EYFP fusion [38]	
At3g05970	LACS6	Long-chain acyl-CoA synthetase 6	Core fatty acid β -oxidation [82]	RIx ₅ HL	Leaves [4] Cell cultures [5]	GFP fusion [82]	

At3g06810	IBR3	IBA-response 3/ Acyl-CoA dehydrogenase	IBA and 2,4-DB metabolism [83, 84] Pathogen defense [22]	SKL>	Leaves [4] Cell cultures [5]		
At3g06860	MFP2	Fatty acid multifunctional protein 2	β -oxidation of FAs, IBA and 2,4-DB [85-87] Pathogen defense [22]	SRL>	Leaves [3, 4] Cell cultures [5]	GFP fusion [88] GFP fusion [17]	
At3g07560	PEX13/ APM2/ AMC	Peroxin 13/ Aberrant peroxisome morphology 2/ Abstinence by mutual consent	Peroxisome protein import [40, 80] Pathogen defense [22]	-		GFP fusion [80]	
At3g12800	SDRb/ DECR	Short-chain dehydrogenase/ reductase b	Putative auxiliary β -oxidation enzyme Pathogen defense [22]	SKL>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [3] GFP fusion [5]	
At3g14150	HAOX1	Hydroxy-acid oxidase 1	Putative auxiliary β -oxidation enzyme	SML>	Leaves [4]	EYFP fusion ^a	
At3g14415	GOX1	Glycolate oxidase 1	Photorespiration	PRL>	Greening cotyledons [30] Leaves [3, 4] Cell cultures [5]		
At3g14420	GOX2	Glycolate oxidase 2	Photorespiration	ARL	Greening cotyledons [30] Leaves [3, 4] Cell cultures [5]		
At3g15290	HBCDH	Hydroxybutyryl-CoA dehydrogenase	Putative auxiliary β -oxidation enzyme	PRL>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [3]	
At3g16910	AAE7/ ACN1	Acyl-activating enzyme 7	Import of free acetate for glyoxylate cycle [25, 89]	SRL>	Leaves [4] Cell cultures [5]	Enzymatic analysis of cell fractions [89]	
At3g17420	GPK1	Glyoxysomal protein kinase 1	Unknown	AKI	Etiolated cotyledons [31]	Immunodetection in cell fractions [31]	
At3g18160	PEX3A	Peroxin 3 isoform A	Peroxisome assembly [39, 40]	-			
At3g21720	ICL	Isocitrate lyase	Glyoxylate cycle [90, 91]	SRM	Etiolated cotyledons [31]	IEM and enzymatic analysis of cell fractions [90] GFP fusion [11]	
At3g21865	PEX22	Peroxin 22	Peroxisome protein import and degradation [11, 92]	-			
At3g27820	MDAR4	Monodehydroascorbate reductase 4	Detoxification [93, 94]	mPTS	Leaves [4]	Immunodetection in cell fractions and immunolocalization [93]	Mitochondria Cytosol

At3g47430	PEX11b	Peroxin 11b	Peroxisome proliferation [6-8, 95]	mPTS	Leaves [4]	GFP fusion [6] CFP fusion and immunodetection in purified peroxisomes [7]	
At3g48140	B12D1	Senescence-associated protein/ B12D-related protein	Unknown function	-	Leaves [4]	EYFP fusion [4]	
At3g51840	ACX4	Acyl-CoA oxidase 4	β -oxidation of FAs, IBA and 2,4-DB [16, 17, 96]	SRL>	Leaves [3, 4] Cell cultures [5]		
At3g52880	MDAR1	Monodehydroascorbate reductase 1	Detoxification [93] Pathogen defense [22]	AKI>	Leaves [3, 4] Cell cultures [5]	Immunodetection in cell fractions and immunolocalization [93]	Mitochondria Cytosol
At3g55640		Ca ²⁺ -dependent carrier	Putative mitochondrial substrate carrier	SNL>	Cell cultures [97]	GFP fusion [98]	Mitochondria
At3g56460	ZnDH	Zinc-binding dehydrogenase	Putative metabolic enzyme	SKL>	Leaves [4] Cell cultures [5]	EYFP fusion [4]	
At3g56490	HIT3	Histidine triad family protein 3	Pathogen defense [99]	RVx ₅ HF	Leaves [3, 4] Cell cultures [5]	EYFP fusion [4]	
At3g57090	FIS1A	Fission 1 isoform A	Division of peroxisomes and mitochondria [8, 55, 100]	-		YFP fusion [55, 100]	Mitochondria
At3g58750	CSY2	Citrate synthase 2	Glyoxylate cycle [67] Pathogen defense [22]	RLx ₅ HL	Leaves [4] Cell cultures [5]	GFP fusion [67]	
At3g59050	PAO3	Polyamine oxidase 3	Polyamine catabolism [43, 101]	SRM		RFP fusion [43] GFP fusion [101]	
At3g61070	PEX11e	Peroxin 11e	Peroxisome proliferation [6-8]	mPTS	Leaves [4] Cell cultures [5]	GFP fusion [6] CFP fusion and immunodetection in purified peroxisomes [7]	
At3g61200	sT3	Small thioesterase 3	Putative auxiliary β -oxidation enzyme	SKL>	Etiolated cotyledons [31] Leaves [4]	EYFP fusion [4]	
At4g02340	EH3	Epoxide hydrolase 3	Putative auxiliary β -oxidation enzyme	ASL>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [3]	
At4g04320	MCD	Malonyl-CoA decarboxylase	Putative auxiliary β -oxidation enzyme	SRL>	Leaves [4] Cell cultures [5]	GFP fusion [98] EYFP fusion [4]	Mitochondria

At4g04470	PMP22	Peroxisomal membrane protein of 22 kDa	Unknown function [102, 103]	mPTS	Cell cultures [5]	Immunodetection in cell fractions and <i>in vitro</i> import [102] Immunolocalization [103]	
At4g05160	4CLP1	4-coumarate:CoA ligase 1	JA biosynthesis [24, 104] Pathogen defense [22]	SKM>	Leaves [3, 4] Cell cultures [5]	YFP fusion [104]	
At4g05530	SDRa/ IBR1	Short-chain dehydrogenase/reductase a/ Indole-3-butyric acid response 1	IBA and 2,4-DB metabolism [41, 84] Pathogen defense [22]	SRL>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [3] GFP fusion [5, 41]	
At4g09320	NDPK1	Nucleoside diphosphate kinase type 1	Pathogen defense [22]	-	Leaves [4]	EYFP fusion [4]	Nucleus Cytosol
At4g12800	PEX17/ PUP7	Peroxin 17/ Purine permease 7	Peroxisome protein import	-			
At4g14430	ECI2/ ECHib/ IBR10	Δ^3, Δ^2 -enoyl CoA isomerase/ monofunctional enoyl CoA hydratase/isomerase b/ Carnitine racemase	β -oxidation of FAs and IBA [42, 84]	PKL>	Leaves [3, 4]	EYFP fusion [3] GFP fusion [5]	
At4g16210	ECH1a	Monofunctional enoyl-CoA hydratase/ isomerase a/ Carnitine racemase	Putative auxiliary β -oxidation enzyme Pathogen defense [22]	SKL>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [3] GFP fusion [5]	
At4g16566	HIT1/ NBP	Histidine triad family protein 1/ Nucleotide-binding protein	Unknown function [105]	SKV>	Leaves [3, 4]	EYFP fusion [4]	
At4g16760	ACX1	Acyl-CoA oxidase 1	β -oxidation of FAs and JA [18, 63, 66, 106, 107]	ARL>	Leaves [4] Cell cultures [5]		
At4g29010	AIM1	Abnormal inflorescence meristem 1	β -oxidation of FAs, IBA, 2,4-DB and JA [10, 85]	SKL>	Leaves [4] Cell cultures [5]		
At4g33650	DRP3A/ ADL2a	Dynamin- related protein 3A/ Arabidopsis dynamin-like 2a	Peroxisome and mitochondrial division [38, 53-55, 108]	-		GFP fusion [53, 108] Immunolocalization [8]	Mitochondria
At4g35000	APX3	Ascorbate peroxidase 3	Detoxification [109, 110]	mPTS	Greening cotyledons [30] Etiolated cotyledons [31] Leaves [3, 4] Cell cultures [5]	Immunolocalization, immunodetection in cell fractions and IEM [109]	Endoplasmic reticulum
At4g35090	CAT2	Catalase 2	Detoxification [26-29]	alt. PTS1	Greening cotyledons [30] Leaves [3, 4] Cell cultures [5]		

At4g39660	AGT2	Alanine: glyoxylate aminotransferase 2	Unknown function [34]	SRL>		GFP fusion [98]	Mitochondria
At4g39850	PXA1/ CTS/ PED3	Peroxisomal ABC transporter 1/ Comatose/ Peroxisome defective 3	Transport of β -oxidation substrates [111-115]	mPTS	Leaves [4] Cell cultures [5]	Immunodetection in cell fractions [112]	
At5g03860	MLS	Malate synthase	Glyoxylate cycle [90, 116]	SRL>	Etiolated cotyledons [31]	IEM and enzymatic analysis of cell fractions [90]	
At5g04870	CPK1	Calcium dependent protein kinase 1	Calcium signaling [117]	-		GFP fusion [117]	
At5g08470	PEX1	Peroxin 1	Peroxisome protein import [40, 118]	-			
At5g09660	PMDH2	Peroxisomal NAD ⁺ -malate dehydrogenase 2	NADH reoxidation [56]	RIX ₅ HL	Leaves [3, 4] Cell cultures [5]	GFP fusion [56]	
At5g11520	ASP3	Aspartate aminotransferase	Photorespiration [119, 120] Pathogen defense [22]	RIX ₅ HL	Greening cotyledons [30] Leaves [3, 4] Cell cultures [5]	GFP fusion [5]	Chloroplast
At5g11910	ELT1	Esterase/ lipase/ thioesterase family 1	Putative auxiliary β -oxidation enzyme	SRI>	Leaves [4]	EYFP fusion [4]	
At5g12390	FIS1B	Fission 1 isoform B	Division of peroxisomes and mitochondria [8, 55, 100]	-		Immunolocalization [8] YFP fusion [55, 100]	Mitochondria
At5g17550	PEX19B	Peroxin 19 isoform B	Peroxisome assembly [40, 78]	-			
At5g18100	CSD3	Copper/zinc superoxide dismutase 3	Detoxification [121] Pathogen defense [22]	AKL>	Leaves [3, 4] Cell cultures [5]		
At5g24400	6PGL	6-Phosphogluconolactonase	Unknown function	SKL>	Leaves [3]	EYFP fusion [3]	
At5g25760	PEX4	Peroxin 4	Peroxisome protein import and degradation [11, 40, 92]	-			
At5g27520	PNC2	Peroxisomal adenine nucleotide carrier 2	Counter-exchange of ATP with ADP or AMP [38, 81]	-	Leaves [3] Cell cultures [5]	RFP fusion [81] GFP fusion [5] EYFP fusion [38]	
At5g27600	LACS7	Long-chain acyl-CoA synthetase 7	Core fatty acid β -oxidation [82]	SKL>	Leaves [3, 4] Cell cultures [5]	GFP fusion [122]	
At5g37670	Hsp15.7	Heat shock protein similar to 17.6 kDa class I	Chaperone [21]	SKL>		EYFP fusion [21]	
At5g41210	GSTT1	Glutathione S-transferase θ isoform 1	Detoxification [123] Pathogen defense [22]	SKI>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [3] GFP fusion [123]	
At5g41220	GSTT3	Glutathione S-transferase θ isoform 3	Detoxification [123]	SKM>		GFP fusion [123]	Nucleus

At5g41240	GSTT2	Glutathione S-transferase θ isoform 2	Detoxification [123]	SKM>		GFP fusion [123]	
At5g42890	SCP-2	Sterol carrier protein 2	Transfer of lipids between membranes [124, 125]	SKL>	Leaves [3, 4] Cell cultures [5]	GFP fusion [124]	
At5g43280	DCI1	$\Delta^{3,5}$ - $\Delta^{2,4}$ -enoyl-CoA-isomerase	Auxiliary β -oxidation enzyme [126] Pathogen defense [22]	AKL>	Leaves [3, 4] Cell cultures [5]	EYFP fusion [126]	
At5g44250	UP5	Unknown protein	Unknown function	SRL>	Leaves [4]	EYFP fusion [4]	
At5g47040	Lon2	Lon protease homolog 2	Unknown function	SKL>	Leaves [4]	GFP fusion [127] <i>in vitro</i> import ^b	
At5g47720	ACAT1.3	Acetoacetyl-CoA thiolase 1.3	Isoprenoid mevalonic acid pathway [13]	-		GFP fusion [13]	
At5g48545	HIT2	Histidine triad family protein 2	Unknown function	RLX ₅ HL	Leaves [4]	EYFP fusion [4]	
At5g48880	KAT5/ PKT2	3-Ketoacyl-CoA thiolase 5/ Peroxisomal 3-Ketoacyl-CoA thiolase 2	β -oxidation of FAs and JA [12, 63]	RQX ₅ HL	Leaves [3, 4]	GFP fusion [13]	
At5g56290	PEX5	Peroxin 5	Peroxisome matrix protein receptor [11, 36, 37]	-			Cytosol
At5g58220	TLP	Transthyretin-like protein	Putative ureide pathway Brassinolide signaling	RLX ₅ HL	Leaves [3, 4] Cell cultures [5]	GFP fusion and immunodetection in cell fractions [128] EYFP fusion [3]	Plasma membrane
At5g62810	PEX14/ PED2	Peroxin 14/ Peroxisome defective 2	Peroxisome protein import [129, 130]	-	Leaves [3, 4] Cell cultures [5]	Immunodetection in cell fractions [129]	
At5g63380	4CLP2	4-coumarate:CoA ligase 2	JA biosynthesis [24, 104]	SKL>	Leaves [4]	YFP fusion [104]	
At5g65110	ACX2	Acyl-CoA oxidase 2	Core fatty acid β -oxidation [18, 106]	RIX ₅ HL	Leaves [4] Cell cultures [5]		
At5g65400	UP7	Unknown protein	Unknown function	SLM>	Leaves [4]	EYFP fusion [4]	
At5g65940	CHY1	3-hydroxyisobutyryl-CoA hydrolase	Branched-chain amino acid metabolism [131, 132]	AKL>	Leaves [4] Cell cultures [5]		

References:

- [1] G. Tilton, J. Shockey, J. Browse, Two families of acyl-CoA thioesterases in Arabidopsis, *Biochemical Society Transactions* 28 (2000) 946-947.
- [2] G.B. Tilton, J.M. Shockey, J. Browse, Biochemical and Molecular Characterization of ACH2, an Acyl-CoA Thioesterase from Arabidopsis thaliana, *J. Biol. Chem.* 279 (2004) 7487-7494.

- [3] S. Reumann, L. Babujee, C. Ma, S. Wienkoop, T. Siemsen, G.E. Antonicelli, N. Rasche, F. Luder, W. Weckwerth, O. Jahn, Proteome analysis of Arabidopsis leaf peroxisomes reveals novel targeting peptides, metabolic pathways, and defense mechanisms, *Plant Cell* 19 (2007) 3170-3193.
- [4] S. Reumann, S. Quan, K. Aung, P. Yang, K. Manandhar-Shrestha, D. Holbrook, N. Linka, R. Switzenberg, C.G. Wilkerson, A.P.M. Weber, L.J. Olsen, J. Hu, In-Depth Proteome Analysis of Arabidopsis Leaf Peroxisomes Combined with in Vivo Subcellular Targeting Verification Indicates Novel Metabolic and Regulatory Functions of Peroxisomes, *Plant Physiol.* 150 (2009) 125-143.
- [5] H. Eubel, E.H. Meyer, N.L. Taylor, J.D. Bussell, N. O'Toole, J.L. Heazlewood, I. Castleden, I.D. Small, S.M. Smith, A.H. Millar, Novel proteins, putative membrane transporters, and an integrated metabolic network are revealed by quantitative proteomic analysis of Arabidopsis cell culture peroxisomes, *Plant Physiol* 148 (2008) 1809-1829.
- [6] M.J. Lingard, R.N. Trelease, Five Arabidopsis peroxin 11 homologs individually promote peroxisome elongation, duplication or aggregation, *J Cell Sci* 119 (2006) 1961-1972.
- [7] T. Orth, S. Reumann, X. Zhang, J. Fan, D. Wenzel, S. Quan, J. Hu, The PEROXIN11 Protein Family Controls Peroxisome Proliferation in Arabidopsis, *Plant Cell* 19 (2007) 333-350.
- [8] M.J. Lingard, S.K. Gidda, S. Bingham, S.J. Rothstein, R.T. Mullen, R.N. Trelease, Arabidopsis PEROXIN11c-e, FISSION1b, and DYNAMIN-RELATED PROTEIN3A Cooperate in Cell Cycle-Associated Replication of Peroxisomes, *Plant Cell* 20 (2008) 1567-1585.
- [9] B.K. Zolman, B. Bartel, An Arabidopsis indole-3-butyric acid-response mutant defective in PEROXIN6, an apparent ATPase implicated in peroxisomal function, *Proc. Natl. Acad. Sci. U. S. A.* 101 (2004) 1786-1791.
- [10] C. Delker, B.K. Zolman, O. Miersch, C. Wasternack, Jasmonate biosynthesis in Arabidopsis thaliana requires peroxisomal [beta]-oxidation enzymes - Additional proof by properties of pex6 and aim1, *Phytochemistry* 68 (2007) 1642-1650.
- [11] M.J. Lingard, M. Monroe-Augustus, B. Bartel, Peroxisome-associated matrix protein degradation in Arabidopsis, *Proceedings of the National Academy of Sciences* 106 (2009) 4561-4566.
- [12] V. Germain, E.L. Rylott, T.R. Larson, S.M. Sherson, N. Bechtold, J.-P. Carde, J.H. Bryce, I.A. Graham, S.M. Smith, Requirement for 3-ketoacyl-CoA thiolase-2 in peroxisome development, fatty acid β -oxidation and breakdown of triacylglycerol in lipid bodies of *Arabidopsis* seedlings, *The Plant Journal* 28 (2001) 1-12.
- [13] C. Carrie, M. Murcha, A. Millar, S. Smith, J. Whelan, Nine 3-ketoacyl-CoA thiolases (KATs) and acetoacetyl-CoA thiolases (ACATs) encoded by five genes in Arabidopsis thaliana are targeted either to peroxisomes or cytosol but not to mitochondria, *Plant Mol.Biol.* 63 (2007) 97-108.
- [14] P.J. Eastmond, M.A. Hooks, D. Williams, P. Lange, N. Bechtold, C. Sarrobert, L. Nussaume, I.A. Graham, Promoter Trapping of a Novel Medium-chain Acyl-CoA Oxidase, Which Is Induced Transcriptionally during Arabidopsis Seed Germination, *J. Biol. Chem.* 275 (2000) 34375-34381.
- [15] B.E. Froman, P.C. Edwards, A.G. Bursch, K. Dehesh, ACX3, a Novel Medium-Chain Acyl-Coenzyme A Oxidase from Arabidopsis, *Plant Physiol.* 123 (2000) 733-742.
- [16] B.K. Zolman, A. Yoder, B. Bartel, Genetic Analysis of Indole-3-butyric Acid Responses in Arabidopsis thaliana Reveals Four Mutant Classes, *Genetics* 156 (2000) 1323-1337.
- [17] E.L. Rylott, C.A. Rogers, A.D. Gilday, T. Edgell, T.R. Larson, I.A. Graham, Arabidopsis Mutants in Short- and Medium-chain Acyl-CoA Oxidase Activities Accumulate Acyl-CoAs and Reveal That Fatty Acid β -Oxidation Is Essential for Embryo Development, *J. Biol. Chem.* 278 (2003) 21370-21377.
- [18] A.R. Adham, B.K. Zolman, A. Millius, B. Bartel, Mutations in Arabidopsis acyl-CoA oxidase genes reveal distinct and overlapping roles in beta-oxidation, *The Plant Journal* 41 (2005) 859-874.
- [19] S. Goepfert, Y. Poirier, β -Oxidation in fatty acid degradation and beyond, *Current Opinion in Plant Biology* 10 (2007) 245-251.

- [20] J.W. Chandler, S. Melzer, An α -crystallin gene, ACD31.2 from *Arabidopsis* is negatively regulated by FPF1 overexpression, floral induction, gibberellins, and long days, *J. Exp. Bot.* 55 (2004) 1433-1435.
- [21] C. Ma, M. Haslbeck, L. Babujee, O. Jahn, S. Reumann, Identification and Characterization of a Stress-Inducible and a Constitutive Small Heat-Shock Protein Targeted to the Matrix of Plant Peroxisomes, *Plant Physiol.* 141 (2006) 47-60.
- [22] J.T. Ascencio-Ibanez, R. Sozzani, T.-J. Lee, T.-M. Chu, R.D. Wolfinger, R. Cella, L. Hanley-Bowdoin, Global Analysis of *Arabidopsis* Gene Expression Uncovers a Complex Array of Changes Impacting Pathogen Response and Cell Cycle during Geminivirus Infection, *Plant Physiol.* 148 (2008) 436-454.
- [23] A.J.K. Koo, H.S. Chung, Y. Kobayashi, G.A. Howe, Identification of a Peroxisomal Acyl-activating Enzyme Involved in the Biosynthesis of Jasmonic Acid in *Arabidopsis*, *J. Biol. Chem.* 281 (2006) 33511-33520.
- [24] L. Kienow, K. Schneider, M. Bartsch, H.-P. Stuible, H. Weng, O. Miersch, C. Wasternack, E. Kombrink, Jasmonates meet fatty acids: functional analysis of a new acyl-coenzyme A synthetase family from *Arabidopsis thaliana*, *J. Exp. Bot.* 59 (2008) 403-419.
- [25] J.M. Shockey, M.S. Fulda, J. Browse, *Arabidopsis* Contains a Large Superfamily of Acyl-Activating Enzymes. Phylogenetic and Biochemical Analysis Reveals a New Class of Acyl-Coenzyme A Synthetases, *Plant Physiol.* 132 (2003) 1065-1076.
- [26] S.E. Frederick, E.H. Newcomb, Cytochemical localization of catalase in leaf microbodies (peroxisomes), *J. Cell Biol.* 43 (1969) 343-353.
- [27] J.A. Frugoli, H.H. Zhong, M.L. Nuccio, P. McCourt, M.A. McPeck, T.L. Thomas, C.R. McClung, Catalase Is Encoded by a Multigene Family in *Arabidopsis thaliana* (L.) Heynh, *Plant Physiol.* 112 (1996) 327-336.
- [28] P. Zimmermann, C. Heinlein, G. Orendi, U. Zentgraf, Senescence-specific regulation of catalases in *Arabidopsis thaliana* (L.) Heynh, *Plant, Cell and Environment* 29 (2006) 1049-1060.
- [29] Y.-Y. Du, P.-C. Wang, J. Chen, C.-P. Song, Comprehensive Functional Analysis of the Catalase Gene Family in *Arabidopsis thaliana*, *J. Integr. Plant Biol.* 50 (2008) 1318-1326.
- [30] Y. Fukao, M. Hayashi, M. Nishimura, Proteomic Analysis of Leaf Peroxisomal Proteins in Greening Cotyledons of *Arabidopsis thaliana*, *Plant Cell Physiol.* 43 (2002) 689-696.
- [31] Y. Fukao, M. Hayashi, I. Hara-Nishimura, M. Nishimura, Novel Glyoxysomal Protein Kinase, GPK1, Identified by Proteomic Analysis of Glyoxysomes in Etiolated Cotyledons of *Arabidopsis thaliana*, *Plant Cell Physiol.* 44 (2003) 1002-1012.
- [32] R.C. Tyler, E. Bitto, C.E. Berndsen, C.A. Bingman, S. Singh, M.S. Lee, G.E. Wesenberg, J.M. Denu, G.N.J. Phillips, J.L. Markley, Structure of *Arabidopsis thaliana* At1g77540 Protein, a Minimal Acetyltransferase from the COG2388 Family, *Biochemistry* 45 (2006) 14325-14336.
- [33] D. Igarashi, T. Miwa, M. Seki, M. Kobayashi, T. Kato, S. Tabata, K. Shinozaki, C. Ohsumi, Identification of photorespiratory glutamate:glyoxylate aminotransferase (GGAT) gene in *Arabidopsis*, *The Plant Journal* 33 (2003) 975-987.
- [34] A.H. Liepman, L.J. Olsen, Alanine Aminotransferase Homologs Catalyze the Glutamate:Glyoxylate Aminotransferase Reaction in Peroxisomes of *Arabidopsis*, *Plant Physiol.* 131 (2003) 215-227.
- [35] H. Schuhmann, P.F. Huesgen, C. Gietl, I. Adamska, The DEG15 Serine Protease Cleaves Peroxisomal Targeting Signal 2-Containing Proteins in *Arabidopsis*, *PLANT PHYSIOLOGY* 148 (2008) 1847-1856.
- [36] M. Hayashi, M. Yagi, K. Nito, T. Kamada, M. Nishimura, Differential Contribution of Two Peroxisomal Protein Receptors to the Maintenance of Peroxisomal Functions in *Arabidopsis*, *J. Biol. Chem.* 280 (2005) 14829-14835.

- [37] A.W. Woodward, B. Bartel, The Arabidopsis Peroxisomal Targeting Signal Type 2 Receptor PEX7 Is Necessary for Peroxisome Function and Dependent on PEX5, *Mol. Biol. Cell* 16 (2005) 573-583.
- [38] N. Linka, F.L. Theodoulou, R.P. Haslam, M. Linka, J.A. Napier, H.E. Neuhaus, A.P.M. Weber, Peroxisomal ATP Import Is Essential for Seedling Development in *Arabidopsis thaliana*, *Plant Cell* 20 (2008) 3241-3257.
- [39] J.E. Hunt, R.N. Trelease, Sorting pathway and molecular targeting signals for the Arabidopsis peroxin 3, *Biochemical and Biophysical Research Communications* 314 (2004) 586-596.
- [40] K. Nito, A. Kamigaki, M. Kondo, M. Hayashi, M. Nishimura, Functional Classification of Arabidopsis Peroxisome Biogenesis Factors Proposed from Analyses of Knockdown Mutants, *Plant Cell Physiol.* 48 (2007) 763-774.
- [41] A.A.G. Wiszniewski, W. Zhou, S.M. Smith, J.D. Bussell, Identification of two Arabidopsis genes encoding a peroxisomal oxidoreductase-like protein and an acyl-CoA synthetase-like protein that are required for responses to pro-auxins *Plant Mol.Biol.* 69 (2009) 503-515.
- [42] S. Goepfert, C. Vidoudez, C. Tellgren-Roth, S. Delessert, J.K. Hiltunen, Y. Poirier, Peroxisomal delta(3), delta(2)-enoyl CoA isomerases and evolution of cytosolic paralogues in embryophytes, *The Plant Journal* 56 (2008) 728-742.
- [43] T. Kamada-Nobusada, M. Hayashi, M. Fukazawa, H. Sakakibara, M. Nishimura, A Putative Peroxisomal Polyamine Oxidase, AtPAO4, is Involved in Polyamine Catabolism in *Arabidopsis thaliana*, *Plant Cell Physiol.* 49 (2008) 1272-1282.
- [44] S. Mano, M. Hayashi, M. Kondo, M. Nishimura, Hydroxypyruvate Reductase with a Carboxy-Terminal Targeting Signal to Microbodies is Expressed in Arabidopsis, *Plant Cell Physiol.* 38 (1997) 449-455.
- [45] S. Goepfert, J.K. Hiltunen, Y. Poirier, Identification and Functional Characterization of a Monofunctional Peroxisomal Enoyl-CoA Hydratase 2 That Participates in the Degradation of Even cis-Unsaturated Fatty Acids in *Arabidopsis thaliana*, *J. Biol. Chem.* 281 (2006) 35894-35903.
- [46] J. Hu, M. Aguirre, C. Peto, J. Alonso, J. Ecker, J. Chory, A Role for Peroxisomes in Photomorphogenesis and Development of Arabidopsis, *Science* 297 (2002) 405-409.
- [47] I.A. Sparkes, C. Hawes, A. Baker, AtPEX2 and AtPEX10 Are Targeted to Peroxisomes Independently of Known Endoplasmic Reticulum Trafficking Routes, *Plant Physiol.* 139 (2005) 690-700.
- [48] P.M. Sanders, P.Y. Lee, C. Biesgen, J.D. Boone, T.P. Beals, E.W. Weiler, R.B. Goldberg, The Arabidopsis DELAYED DEHISCENCE1 Gene Encodes an Enzyme in the Jasmonic Acid Synthesis Pathway, *THE PLANT CELL* 12 (2000) 1041-1062.
- [49] F. Schaller, C. Biesgen, C. Müssig, T. Altmann, E.W. Weiler, 12-Oxophytodienoate reductase 3 (OPR3) is the isoenzyme involved in jasmonate biosynthesis, *Planta* 210 (2000) 979-984.
- [50] A. Stintzi, J. Browse, The Arabidopsis male-sterile mutant, opr3, lacks the 12-oxophytodienoic acid reductase required for jasmonate synthesis, *Proc. Natl. Acad. Sci. U. S. A.* 97 (2000) 10625-10630.
- [51] J. Strassner, F. Schaller, U.B. Frick, G.A. Howe, E.W. Weiler, N. Amrhein, P. Macheroux, A. Schaller, Characterization and cDNA-microarray expression analysis of 12-oxophytodienoate reductases reveals differential roles for octadecanoid biosynthesis in the local versus the systemic wound response, *The Plant Journal* 32 (2002) 585-601.
- [52] S.-i. Arimura, N. Tsutsumi, A dynamin-like protein (ADL2b), rather than FtsZ, is involved in Arabidopsis mitochondrial division, *Proc. Natl. Acad. Sci. U. S. A.* 99 (2002) 5727-5731.

- [53] S.-i. Arimura, G.P. Aida, M. Fujimoto, M. Nakazono, N. Tsutsumi, Arabidopsis Dynamin-Like Protein 2a (ADL2a), Like ADL2b, is Involved in Plant Mitochondrial Division, *Plant Cell Physiol.* 45 (2004) 236-242.
- [54] M. Fujimoto, S.-i. Arimura, S. Mano, M. Kondo, C. Saito, T. Ueda, M. Nakazono, A. Nakano, M. Nishimura, N. Tsutsumi, Arabidopsis dynamin-related proteins DRP3A and DRP3B are functionally redundant in mitochondrial fission, but have distinct roles in peroxisomal fission, *The Plant Journal* 58 (2009) 388-400.
- [55] X.C. Zhang, J.P. Hu, Two small protein families, DYNAMIN-RELATED PROTEIN3 and FISSION1, are required for peroxisome fission in Arabidopsis, *Plant J.* 57 (2009) 146-159.
- [56] I. Pracharoenwattana, J.E. Cornah, S.M. Smith, Arabidopsis peroxisomal malate dehydrogenase functions in β -oxidation but not in the glyoxylate cycle, *The Plant Journal* 50 (2007) 381-390.
- [57] A. Goyer, T.L. Johnson, L.J. Olsen, E. Collakova, Y. Shachar-Hill, D. Rhodes, A.D. Hanson, Characterization and Metabolic Function of a Peroxisomal Sarcosine and Pipecolate Oxidase from Arabidopsis, *J. Biol. Chem.* 279 (2004) 16947-16953.
- [58] U. Schumann, G. Wanner, M. Veenhuis, M. Schmid, C. Gietl, AthPEX10, a nuclear gene essential for peroxisome and storage organelle formation during Arabidopsis embryogenesis, *Proc. Natl. Acad. Sci. U. S. A.* 100 (2003) 9626-9631.
- [59] I.A. Sparkes, F. Brandizzi, S.P. Slocombe, M. El-Shami, C. Hawes, A. Baker, An Arabidopsis pex10 Null Mutant Is Embryo Lethal, Implicating Peroxisomes in an Essential Role during Plant Embryogenesis, *Plant Physiol.* 133 (2003) 1809-1819.
- [60] C.R. Flynn, M. Heinze, U. Schumann, C. Gietl, R.N. Trelease, Compartmentalization of the plant peroxin, AtPex10p, within subdomain(s) of ER, *Plant Science* 168 (2005) 635-652.
- [61] U. Schumann, J. Prestele, H. O'Geen, R. Brueggeman, G. Wanner, C. Gietl, Requirement of the C3HC4 zinc RING finger of the Arabidopsis PEX10 for photorespiration and leaf peroxisome contact with chloroplasts, *Proceedings of the National Academy of Sciences* 104 (2007) 1069-1074.
- [62] M. Hayashi, K. Toriyama, M. Kondo, M. Nishimura, 2,4-Dichlorophenoxybutyric Acid-Resistant Mutants of Arabidopsis Have Defects in Glyoxysomal Fatty Acid β -Oxidation, *Plant Cell* 10 (1998) 183-196.
- [63] M.C. Castillo, C. Martinez, A. Buchala, J.-P. Metraux, J. Leon, Gene-Specific Involvement of β -Oxidation in Wound-Activated Responses in Arabidopsis, *Plant Physiol.* 135 (2004) 85-94.
- [64] M.M. Afithile, H. Fukushige, M. Nishimura, D.F. Hildebrand, A defect in glyoxysomal fatty acid β -oxidation reduces jasmonic acid accumulation in Arabidopsis, *Plant Physiology and Biochemistry* 43 (2005) 603-609.
- [65] S. Footitt, J.E. Cornah, I. Pracharoenwattana, J.H. Bryce, S.M. Smith, The Arabidopsis 3-ketoacyl-CoA thiolase-2 (kat2-1) mutant exhibits increased flowering but reduced reproductive success, *J. Exp. Bot.* 58 (2007) 2959-2968.
- [66] A.L. Schillmiller, A.J.K. Koo, G.A. Howe, Functional Diversification of Acyl-Coenzyme A Oxidases in Jasmonic Acid Biosynthesis and Action, *Plant Physiol.* 143 (2007) 812-824.
- [67] I. Pracharoenwattana, J.E. Cornah, S.M. Smith, Arabidopsis Peroxisomal Citrate Synthase Is Required for Fatty Acid Respiration and Seed Germination, *Plant Cell* 17 (2005) 2037-2048.
- [68] V. Lipka, J. Dittgen, P. Bednarek, R. Bhat, M. Wiermer, M. Stein, J. Landtag, W. Brandt, S. Rosahl, D. Scheel, F. Llorente, A. Molina, J. Parker, S. Somerville, P. Schulze-Lefert, Pre- and Postinvasion Defenses Both Contribute to Nonhost Resistance in Arabidopsis, *Science* 310 (2005) 1180-1183.
- [69] L. Westphal, D. Scheel, S. Rosahl, The coi1-16 Mutant Harbors a Second Site Mutation Rendering PEN2 Nonfunctional, *Plant Cell* 20 (2008) 824-826.

- [70] N.K. Clay, A.M. Adio, C. Denoux, G. Jander, F.M. Ausubel, Glucosinolate Metabolites Required for an Arabidopsis Innate Immune Response, *Science* 323 (2009) 95-101.
- [71] Y. Lin, L. Sun, L.V. Nguyen, R.A. Rachubinski, H.M. Goodman, The Pex16p Homolog SSE1 and Storage Organelle Formation in Arabidopsis Seeds, *Science* 284 (1999) 328-330.
- [72] Y. Lin, J.E. Cluette-Brown, H.M. Goodman, The Peroxisome Deficient Arabidopsis Mutant sse1 Exhibits Impaired Fatty Acid Synthesis, *Plant Physiol.* 135 (2004) 814-827.
- [73] S.K. Karnik, R.N. Trelease, Arabidopsis Peroxin 16 Coexists at Steady State in Peroxisomes and Endoplasmic Reticulum, *Plant Physiol.* 138 (2005) 1967-1981.
- [74] S.K. Karnik, R.N. Trelease, Arabidopsis peroxin 16 trafficks through the ER and an intermediate compartment to pre-existing peroxisomes via overlapping molecular targeting signals, *J. Exp. Bot.* 58 (2007) 1677-1693.
- [75] T. Eilers, G. Schwarz, H. Brinkmann, C. Witt, T. Richter, J. Nieder, B. Koch, R. Hille, R. Hansch, R.R. Mendel, Identification and Biochemical Characterization of Arabidopsis thaliana Sulfite Oxidase. A NEW PLAYER IN PLANT SULFUR METABOLISM, *J. Biol. Chem.* 276 (2001) 46989-46994.
- [76] C. Lang, J. Popko, M. Wirtz, R. Hell, C. Herschbach, J. Kreuzwieser, H. Rennenberg, R.R. Mendel, R. Hänsch, Sulphite oxidase as key enzyme for protecting plants against sulphur dioxide, *Plant, Cell and Environment* 30 (2007) 447-455.
- [77] K. Nowak, N. Luniak, C. Witt, Y. Wustefeld, A. Wachter, R.R. Mendel, R. Hansch, Peroxisomal Localization of Sulfite Oxidase Separates it from Chloroplast-based Sulfur Assimilation, *Plant Cell Physiol.* 45 (2004) 1889-1894.
- [78] D.A. Hadden, B.A. Phillipson, K.A. Johnston, L.-A. Brown, I.W. Manfield, M. El-Shami, I.A. Sparkes, A. Baker, *Arabidopsis* PEX19 is a dimeric protein that binds the peroxin PEX10, *Mol. Membr. Biol.* 23 (2006) 325-336.
- [79] J. Fan, S. Quan, T. Orth, C. Awai, J. Chory, J. Hu, The Arabidopsis PEX12 Gene Is Required for Peroxisome Biogenesis and Is Essential for Development, *Plant Physiol.* 139 (2005) 231-239.
- [80] S. Mano, C. Nakamori, K. Nito, M. Kondo, M. Nishimura, The Arabidopsis *pex12* and *pex13* mutants are defective in both PTS1- and PTS2-dependent protein transport to peroxisomes, *The Plant Journal* 47 (2006) 604-618.
- [81] Y. Arai, M. Hayashi, M. Nishimura, Proteomic Identification and Characterization of a Novel Peroxisomal Adenine Nucleotide Transporter Supplying ATP for Fatty Acid {beta}-Oxidation in Soybean and Arabidopsis, *Plant Cell* 20 (2008) 3227-3240.
- [82] M. Fulda, J. Schnurr, A. Abbadi, E. Heinz, J. Browse, Peroxisomal Acyl-CoA Synthetase Activity Is Essential for Seedling Development in Arabidopsis thaliana, *Plant Cell* 16 (2004) 394-405.
- [83] B. Zolman, M. Nyberg, B. Bartel, IBR3, a novel peroxisomal acyl-CoA dehydrogenase-like protein required for indole-3-butyric acid response, *Plant Mol.Biol.* 64 (2007) 59-72.
- [84] B.K. Zolman, N. Martinez, A. Millius, A.R. Adham, B. Bartel, Identification and Characterization of Arabidopsis Indole-3-Butyric Acid Response Mutants Defective in Novel Peroxisomal Enzymes, *Genetics* 180 (2008) 237-251.
- [85] T.A. Richmond, A.B. Bleecker, A Defect in {beta}-Oxidation Causes Abnormal Inflorescence Development in Arabidopsis, *Plant Cell* 11 (1999) 1911-1924.
- [86] P.J. Eastmond, I.A. Graham, The multifunctional protein AtMFP2 is co-ordinately expressed with other genes of fatty acid beta-oxidation during seed germination in Arabidopsis thaliana (L.) Heynh, *Biochem. Soc. Trans.* 28 (2000) 95-99.

- [87] E.L. Rylott, P.J. Eastmond, A.D. Gilday, S.P. Slocombe, T.R. Larson, A. Baker, I.A. Graham, The *Arabidopsis thaliana* multifunctional protein gene (*MFP2*) of peroxisomal β -oxidation is essential for seedling establishment, *The Plant Journal* 45 (2006) 930-941.
- [88] S.R. Cutler, D.W. Ehrhardt, J.S. Griffiths, C.R. Somerville, Random GFP cDNA fusions enable visualization of subcellular structures in cells of *Arabidopsis* at a high frequency, *Proc. Natl. Acad. Sci. U. S. A.* 97 (2000) 3718-3723.
- [89] J.E. Turner, K. Greville, E.C. Murphy, M.A. Hooks, Characterization of *Arabidopsis* Fluoroacetate-resistant Mutants Reveals the Principal Mechanism of Acetate Activation for Entry into the Glyoxylate Cycle, *J. Biol. Chem.* 280 (2005) 2780-2787.
- [90] L.J. Olsen, W.F. Ettinger, B. Damsz, K. Matsudaira, M.A. Webb, J.J. Harada, Targeting of Glyoxysomal Proteins to Peroxisomes in Leaves and Roots of a Higher Plant, *Plant Cell* 5 (1993) 941-952.
- [91] P.J. Eastmond, V. Germain, P.R. Lange, J.H. Bryce, S.M. Smith, I.A. Graham, Postgerminative growth and lipid catabolism in oilseeds lacking the glyoxylate cycle, *Proc. Natl. Acad. Sci. U. S. A.* 97 (2000) 5669-5674.
- [92] B.K. Zolman, M. Monroe-Augustus, I.D. Silva, B. Bartel, Identification and Functional Characterization of *Arabidopsis* PEROXIN4 and the Interacting Protein PEROXIN22, *Plant Cell* 17 (2005) 3422-3435.
- [93] C.S. Lisenbee, M.J. Lingard, R.N. Trelease, *Arabidopsis* peroxisomes possess functionally redundant membrane and matrix isoforms of monodehydroascorbate reductase, *The Plant Journal* 43 (2005) 900-914.
- [94] P.J. Eastmond, MONODEHYROASCORBATE REDUCTASE4 Is Required for Seed Storage Oil Hydrolysis and Postgerminative Growth in *Arabidopsis*, *Plant Cell* 19 (2007) 1376-1387.
- [95] M. Desai, J. Hu, Light Induces Peroxisome Proliferation in *Arabidopsis* Seedlings through the Photoreceptor Phytochrome A, the Transcription Factor HY5 HOMOLOG, and the Peroxisomal Protein PEROXIN11b, *Plant Physiol.* 146 (2008) 1117-1127.
- [96] H. Hayashi, L. De Bellis, A. Ciurli, M. Kondo, M. Hayashi, M. Nishimura, A Novel Acyl-CoA Oxidase That Can Oxidize Short-chain Acyl-CoA in Plant Peroxisomes, *J. Biol. Chem.* 274 (1999) 12715-12721.
- [97] A.H. Millar, J.L. Heazlewood, Genomic and Proteomic Analysis of Mitochondrial Carrier Proteins in *Arabidopsis*, *Plant Physiol.* 131 (2003) 443-453.
- [98] C. Carrie, E. Giraud, J. Whelan, Protein transport in organelles: Dual targeting of proteins to mitochondria and chloroplasts, *FEBS Journal* 276 (2009) 1187-1195.
- [99] F. Cartieaux, M.-C. Thibaud, L. Zimmerli, P. Lessard, C. Sarrobert, P. David, A. Gerbaud, C. Robaglia, S. Somerville, L. Nussaume, Transcriptome analysis of *Arabidopsis* colonized by a plant-growth promoting rhizobacterium reveals a general effect on disease resistance, *The Plant Journal* 36 (2003) 177-188.
- [100] X. Zhang, J. Hu, FISSION1A and FISSION1B proteins mediate the fission of peroxisomes and mitochondria in *Arabidopsis*, *Molecular Plant* 1 (2008) 1036-1047.
- [101] P.N. Moschou, M. Sanmartin, A.H. Andriopoulou, E. Rojo, J.J. Sanchez-Serrano, K.A. Roubelakis-Angelakis, Bridging the Gap between Plant and Mammalian Polyamine Catabolism: A Novel Peroxisomal Polyamine Oxidase Responsible for a Full Back-Conversion Pathway in *Arabidopsis*, *Plant Physiol.* 147 (2008) 1845-1857.
- [102] H.B. Tugal, M. Pool, A. Baker, *Arabidopsis* 22-Kilodalton Peroxisomal Membrane Protein. Nucleotide Sequence Analysis and Biochemical Characterization, *Plant Physiol.* 120 (1999) 309-320.
- [103] M.A. Murphy, B.A. Phillipson, A. Baker, R.T. Mullen, Characterization of the Targeting Signal of the *Arabidopsis* 22-kD Integral Peroxisomal Membrane Protein, *Plant Physiol.* 133 (2003) 813-828.

- [104] K. Schneider, L. Kienow, E. Schmelzer, T. Colby, M. Bartsch, O. Miersch, C. Wasternack, E. Kombrink, H.-P. Stuible, A New Type of Peroxisomal Acyl-Coenzyme A Synthetase from *Arabidopsis thaliana* Has the Catalytic Capacity to Activate Biosynthetic Precursors of Jasmonic Acid, *J. Biol. Chem.* 280 (2005) 13962-13972.
- [105] Y. Miao, T. Laun, P. Zimmermann, U. Zentgraf, Targets of the WRKY53 transcription factor and its role during leaf senescence in *Arabidopsis*, *Plant Mol. Biol.* 55 (2004) 853-867.
- [106] M.A. Hooks, F. Kellas, I.A. Graham, Long-chain acyl-CoA oxidases of *Arabidopsis*, *The Plant Journal* 20 (1999) 1-13.
- [107] H. Pinfield-Wells, E.L. Rylott, A.D. Gilday, S. Graham, K. Job, T.R. Larson, I.A. Graham, Sucrose rescues seedling establishment but not germination of *Arabidopsis* mutants disrupted in peroxisomal fatty acid catabolism, *The Plant Journal* 43 (2005) 861-872.
- [108] S. Mano, C. Nakamori, M. Kondo, M. Hayashi, M. Nishimura, An *Arabidopsis* dynamin-related protein, DRP3A, controls both peroxisomal and mitochondrial division, *The Plant Journal* 38 (2004) 487-498.
- [109] C.S. Lisenbee, M. Heinze, R.N. Trelease, Peroxisomal Ascorbate Peroxidase Resides within a Subdomain of Rough Endoplasmic Reticulum in Wild-Type *Arabidopsis* Cells, *Plant Physiol.* 132 (2003) 870-882.
- [110] S. Narendra, S. Venkataramani, G. Shen, J. Wang, V. Pasapula, Y. Lin, D. Korniyev, A.S. Holaday, H. Zhang, The *Arabidopsis* ascorbate peroxidase 3 is a peroxisomal membrane-bound antioxidant enzyme and is dispensable for *Arabidopsis* growth and development, *J. Exp. Bot.* 57 (2006) 3033-3042.
- [111] B.K. Zolman, I.D. Silva, B. Bartel, The *Arabidopsis* pxa1 Mutant Is Defective in an ATP-Binding Cassette Transporter-Like Protein Required for Peroxisomal Fatty Acid beta -Oxidation, *Plant Physiol.* 127 (2001) 1266-1278.
- [112] S. Footitt, S. Slocombe, V. Larner, S. Kurup, Y. Wu, T. Larson, I. Graham, A. Baker, H. M., Control of germination and lipid mobilization by COMATOSE, the *Arabidopsis* homologue of human ALDP, *EMBO Journal* 21 (2002) 2912-2922.
- [113] M. Hayashi, K. Nito, R. Takei-Hoshi, M. Yagi, M. Kondo, A. Suenaga, T. Yamaya, M. Nishimura, Ped3p is a Peroxisomal ATP-Binding Cassette Transporter that might Supply Substrates for Fatty Acid {beta}-Oxidation, *Plant Cell Physiol.* 43 (2002) 1-11.
- [114] F.L. Theodoulou, K. Job, S.P. Slocombe, S. Footitt, M. Holdsworth, A. Baker, T.R. Larson, I.A. Graham, Jasmonic Acid Levels Are Reduced in COMATOSE ATP-Binding Cassette Transporter Mutants. Implications for Transport of Jasmonate Precursors into Peroxisomes, *Plant Physiol.* 137 (2005) 835-840.
- [115] M.A. Hooks, J.E. Turner, E.C. Murphy, K.A. Johnston, S. Burr, S. Jaros=Çawski, The *Arabidopsis* ALDP protein homologue COMATOSE is instrumental in peroxisomal acetate metabolism, *Biochemical Journal* 406 (2007) 399-406.
- [116] J.E. Cornah, V. Germain, J.L. Ward, M.H. Beale, S.M. Smith, Lipid Utilization, Gluconeogenesis, and Seedling Growth in *Arabidopsis* Mutants Lacking the Glyoxylate Cycle Enzyme Malate Synthase, *J. Biol. Chem.* 279 (2004) 42916-42923.
- [117] C. Dammann, A. Ichida, B. Hong, S.M. Romanowsky, E.M. Hrabak, A.C. Harmon, B.G. Pickard, J.F. Harper, Subcellular Targeting of Nine Calcium-Dependent Protein Kinase Isoforms from *Arabidopsis*, *Plant Physiol.* 132 (2003) 1840-1848.
- [118] W.L. Charlton, B. Johnson, I.A. Graham, A. Baker, Non-coordinate expression of peroxisome biogenesis, β -oxidation and glyoxylate cycle genes in mature *Arabidopsis* plants, *Plant Cell Reports* 23 (2005) 647-653.
- [119] I.J. Mettler, H. Beevers, Oxidation of NADH in Glyoxysomes by a Malate-Aspartate Shuttle, *Plant Physiol.* 66 (1980) 555-560.
- [120] C.J. Schultz, G.M. Coruzzi, The aspartate aminotransferase gene family of *Arabidopsis* encodes isoenzymes localized to three distinct subcellular compartments, *The Plant Journal* 7 (1995) 61-75.

- [121] D.J. Kliebenstein, R.-A. Monde, R.L. Last, Superoxide Dismutase in Arabidopsis: An Eclectic Enzyme Family with Disparate Regulation and Protein Localization, *Plant Physiol.* 118 (1998) 637-650.
- [122] M. Fulda, J. Shockey, M. Werber, F.P. Wolter, E. Heinz, Two long-chain acyl-CoA synthetases from *Arabidopsis thaliana* involved in peroxisomal fatty acid β -oxidation, *The Plant Journal* 32 (2002) 93-103.
- [123] D.P. Dixon, T. Hawkins, P.J. Hussey, R. Edwards, Enzyme activities and subcellular localization of members of the Arabidopsis glutathione transferase superfamily, *J. Exp. Bot.* 60 (2009) 1207-1218.
- [124] J. Edqvist, E. Ronnberg, S. Rosenquist, K. Blomqvist, L. Viitanen, T.A. Salminen, M. Nylund, J. Tuuf, P. Mattjus, Plants Express a Lipid Transfer Protein with High Similarity to Mammalian Sterol Carrier Protein-2, *J. Biol. Chem.* 279 (2004) 53544-53553.
- [125] B. Zheng, E. Rönnerberg, L. Viitanen, T. Salminen, K. Lundgren, T. Moritz, E. J, Arabidopsis sterol carrier protein-2 is required for normal development of seeds and seedlings., *J Exp Bot* 59 (2008) 3485-3499.
- [126] S. Goepfert, C. Vidoudez, E. Rezzonico, J.K. Hiltunen, Y. Poirier, Molecular Identification and Characterization of the Arabidopsis $\Delta^3,5,\Delta^2,4$ -Dienoyl-Coenzyme A Isomerase, a Peroxisomal Enzyme Participating in the β -Oxidation Cycle of Unsaturated Fatty Acids, *Plant Physiol.* 138 (2005) 1947-1956.
- [127] O. Ostersetzer, Y. Kato, Z. Adam, W. Sakamoto, Multiple Intracellular Locations of Lon Protease in Arabidopsis: Evidence for the Localization of AtLon4 to Chloroplasts, *Plant Cell Physiol.* 48 (2007) 881-885.
- [128] K.H. Nam, J. Li, The Arabidopsis Transthyretin-Like Protein Is a Potential Substrate of BRASSINOSTEROID-INSENSITIVE 1, *Plant Cell* 16 (2004) 2406-2417.
- [129] M. Hayashi, K. Nito, K. Toriyama-Kato, M. Kondo, T. Yamaya, M. Nishimura, AtPex14p maintains peroxisomal functions by determining protein targeting to three kinds of plant peroxisomes, *EMBO Journal* 19 (2000) 5701-5710.
- [130] K. Nito, M. Hayashi, M. Nishimura, Direct Interaction and Determination of Binding Domains among Peroxisomal Import Factors in Arabidopsis thaliana, *Plant and Cell Physiology* 43 (2002) 355-366.
- [131] B.K. Zolman, M. Monroe-Augustus, B. Thompson, J.W. Hawes, K.A. Krukenberg, S.P.T. Matsuda, B. Bartel, *chy1*, an Arabidopsis Mutant with Impaired β -Oxidation, Is Defective in a Peroxisomal β -Hydroxyisobutyryl-CoA Hydrolase, *J. Biol. Chem.* 276 (2001) 31037-31046.
- [132] P.R. Lange, P.J. Eastmond, K. Madagan, I.A. Graham, An Arabidopsis mutant disrupted in valine catabolism is also compromised in peroxisomal fatty acid β -oxidation, *FEBS Letters* 571 (2004) 147-153.