

- Aarssen LW, Irwin DL (1991) What selection: herbivory or competition? *Oikos* 60: 261-262.
- Abdelkhalik AF, Shishido R, Nomura K, Ikehashi H (2005) QTL-based analysis of leaf senescence in an indica/japonica hybrid in rice (*Oryza sativa* L.). *Theoretical and Applied Genetics* 110: 1226-1235.
- Abe J, Guan GP, Shimamoto Y (1997) A gene complex for annual habit in sugar beet (*Beta vulgaris* L.). *Euphytica* 94: 129-135.
- Abe Y, Shirane K, Yokosawa H, Matsushita H, Mitta M, Kato I, Ishii S (1993) Asparaginyl endopeptidase of jack bean-seeds - purification, characterization, and high utility in protein-sequence analysis. *Journal of Biological Chemistry* 268: 3525-3529.
- Abu-Shakra SS, Phillips DA, Huffaker RC (1978) Nitrogen fixation and delayed leaf senescence in soybeans. *Science* 199: 973-975.
- Ackerly D (1999) Self-shading, carbon gain and leaf dynamics: a test of alternative optimality models. *Oecologia* 119: 300-310.
- Adachi M, Nakabayashi K, Azuma R, Kurata H, Takahashi Y, Shimokawa K (1999) The ethylene-induced chlorophyll catabolism of radish (*Raphanus sativus* L.) cotyledons: production of colorless fluorescent chlorophyll catabolite (FCC) in vitro. *Journal of the Japanese Society for Horticultural Science* 68: 1139-1145.
- Adam Z, Clarke AK (2002) Cutting edge of chloroplast proteolysis. *Trends in Plant Science* 7: 451-456.
- Adamson HY, Hiller RG, Walmsley J (1997) Protochlorophyllide reduction and greening in angiosperms: an evolutionary perspective. *Journal of Photochemistry and Photobiology B: Biology* 41: 201-221.
- Aerts R (1989) The effect of increased nutrient availability on leaf turnover and aboveground productivity of two evergreen ericaceous shrubs. *Oecologia* 78: 115-120.
- Aerts R, Chapin FS (2000) Mineral nutrition of wild plants revisited: a re-evaluation of processes and patterns. *Advances in Ecological Research* 30: 1-67.
- Afithile MM, Dent RM, Cowan AK (1993) Changes in carotenoid composition in senescing leaves of *Hordeum-vulgare* L Cv Dyan. *Journal of Plant Physiology* 142: 43-49.
- Akhtar MS, Goldschmidt EE, John I, Rodoni S, Matile P, Grierson D (1999) Altered patterns of senescence and ripening in gf, a stay-green mutant of tomato (*Lycopersicon esculentum* Mill.). *Journal of Experimental Botany* 50: 1115-1122.
- Alexander KG, Miller MH, Beauchamp EG (1991) The effect of an NH_4^+ -enhanced nitrogen-source on the growth and yield of hydroponically grown maize (*Zea-mays* L). *Journal of Plant Nutrition* 14: 31-44.
- Alfenito MR, Souer E, Goodman CD, Buell R, Mol J, Koes R, Walbot V (1998) Functional complementation of anthocyanin sequestration in the vacuole by widely divergent glutathione S-transferases. *Plant Cell* 10: 1135-1149.

Allen EJ, Scott RK (1980) An analysis of growth of the potato crop. *Journal of Agricultural Science* 94: 583-606.

Allen JF, Forsberg J (2001) Molecular recognition in thylakoid structure and function. *Trends in Plant Science* 6: 317-326.

Alm V, Fang C, Busso CS, Devos KM, Vollan K, Grieg Z, Rognli OA (2003) A linkage map of meadow fescue (*Festuca pratensis* Huds.) and comparative mapping with other Poaceae species. *Theoretical and Applied Genetics* 108: 25-40.

Alonso JM, Granell A (1995) A putative vacuolar processing protease is regulated by ethylene and also during fruit ripening in citrus-fruit. *Plant Physiology* 109: 541-547.

Amir-Shapira D, Goldschmidt E E, Altman A (1987) Chlorophyll catabolism in senescing plant tissues: In vivo breakdown intermediates suggest different degradative pathways for Citrus fruit and parsley leaves. *Proceedings of the National Academy of Sciences, USA* 84: 1901-1905.

Amthor JS (1998) Perspective on the relative insignificance of increasing atmospheric CO₂ concentration to crop yield. *Field Crops Research* 58: 109-127.

Anderson JM, Chow WS, Goodchild DJ (1988) Thylakoid membrane organisation in sun/shade acclimation. *Australian Journal of Plant Physiology* 15: 11-26.

Andersson A, Keskitalo J, Sjödin A, Bhalerao R, Sterky F, Wissel K, Tandre K, Aspeborg H, Moyle R, Ohmiya Y, Bhalerao R, Brunner A, Gustafsson P, Karlsson J, Lundeberg J, Nilsson O, Sandberg G, Strauss S, Sundberg B, Uhlen M, Jansson S, Nilsson P (2004) A transcriptional timetable of autumn senescence. *Genome Biology* 5: R24.

Anslow RC, Green JO (1967) The seasonal growth of pasture grasses. *Journal of Agricultural Science* 68: 109-122.

Aoki SM, Matsuka M, Hase E (1965) De- and re-generation of chloroplasts in the cells of *Chlorella protothecoides*. V. Degeneration of chloroplasts induced by different carbon sources, and effects of some antimetabolites upon the process induced by glucose. *Plant and Cell Physiology* 6: 487-497.

Arber A (1950) *The natural philosophy of plant form*. Cambridge University Press.

Archetti M (2000) The origin of autumn colours by coevolution. *Journal of Theoretical Biology* 205: 625-630.

Archetti M, Leather SR (2005) A test of the coevolution theory of autumn colours: colour preference of *Rhopalosiphum padi* on *Prunus padus*. *Oikos* 110: 339-343.

Armstead I, Donnison I, Aubry S, Harper J, Hörtensteiner S, James C, Mani J, Moffet M, Ougham H, Roberts L, Thomas A, Weeden N, Thomas H, King I (2006) From crop to model to crop: identifying the genetic basis of the staygreen mutation in the *Lolium/Festuca* forage and amenity grasses. *New Phytologist* 172: 592-597.

Armstead I, Donnison I, Aubry S, Harper J, Hörtensteiner S, James C, Mani J, Moffet M, Ougham H, Roberts L, Thomas A, Weeden N, Thomas H, King I (2007) Cross-species identification of Mendel's I locus. *Science* 315: 73.

Armstrong G.A, Runge S, Frick G, Sperling U, Apel K (1995) Identification of NADPH-protochlorophyllide oxidoreductase A and B, a branched pathway for light dependent chlorophyll biosynthesis in *Arabidopsis thaliana*. *Plant Physiology* 108: 1505-1517.

Armstrong J, Armstrong W (1994) Chlorophyll development in mature lysigenous and schizogenous root aerenchymas provides evidence of continuing cortical cell viability. *New Phytologist* 126: 493-497.

Asaeda T, Lan NK, Manatunge J (2005) Effects of self-thinning of shoots on the nutrient budgets of *Zizania latifolia*. *Hydrobiologia* 537: 47-52.

Attenborough D (1995) *The Private Life of Plants*. London: BBC.

Austin RB, Flavell RB, Henson IE, Lowe HJB (1986) *Molecular Biology and Crop Improvement*. Cambridge University Press.

Axelrod DI (1966) Origin of deciduous and evergreen habits in temperate forests. *Evolution* 20: 1-15.

Bachmann A, Fernández-López J, Ginsburg S, Thomas H, Bouwkamp JC, Solomos T, Matile P (1994) Stay-green genotypes of *Phaseolus vulgaris*. Chloroplast proteins and chlorophyll catabolites during foliar senescence. *New Phytologist* 126: 593-600.

Bailly C, Corbineau F, van Doorn WG (2001) Free radical scavenging and senescence in *Iris* petals. *Plant Physiology and Biochemistry* 39: 649-656.

Balk J, Leaver CJ (2001) The PET1-CMS mitochondrial mutation in sunflower is associated with premature programmed cell death and cytochrome c release. *Plant Cell* 13: 1803-1818.

Banowitz G (1977) Cultivars of hexaploid wheat of contrasting stature and chlorophyll retention differ in cytokinin content and responsiveness. *Annals of Botany* 79: 185-190.

Barratt DHP, Domoney C, Wang TL (1989) Purification and partial characterisation of two abscisic-acid-responsive proteins induced in cultured embryos of *Pisum sativum* L. *Planta* 180: 16-23.

Barthélémy D, Caraglio Y (2007) Plant architecture: a dynamic, multilevel and comprehensive approach to plant form, structure and ontogeny. *Annals of Botany* 99: 375-407.

Barton R (1966) Fine structure of mesophyll cells in senescing leaves of *Phaseolus*. *Planta* 71: 314-325.

Bassham DC, Raikhel NV (2000) Unique features of the plant vacuolar sorting machinery. *Current Opinion in Cell Biology* 12: 491-495.

- Bate NJ, Rothstein SJ, Thompson JE (1991) Expression of nuclear and chloroplast photosynthesis-specific genes during leaf senescence. *Journal of Experimental Botany* 42: 801-811.
- Batten GD, Wardlaw IF (1987) Senescence of the flag leaf and grain yield following late foliar and root applications of phosphate on plants of differing phosphorus status. *Journal of Plant Nutrition* 10: 735-748.
- Batley NH, Lyndon RF (1990) Reversion of flowering. *Botanical Review* 56: 162-189.
- Bauer H, Gallmetzer C, Sato T (1991) Phenology and photosynthetic activity in sterile and fertile sporophytes of *Dryopteris filix-mas* (L) Schott. *Oecologia* 86:159-162.
- Baxter R, Knell VC, Somerville HJ, Swain HJ, Weeks DP (1973) Effect of MDMP on protein synthesis in wheat and bacteria. *Nature New Biology* 243: 139-142.
- Beavis WD, Smith OS, Grant D, Fincher R (1994) Identification of quantitative trait loci using a small sample of topcrossed and F4 progeny from maize. *Crop Science* 34: 882-896.
- Becker C, Shutov AD, Nong VH, Senyuk VI, Jung R, Horstmann C, Fischer J, Nielsen NC, Muntz K (1995) Purification, cDNA cloning and characterization of Proteinase-B, an asparagine-specific endopeptidase from germinating vetch (*Vicia sativa* L.) seeds. *European Journal of Biochemistry* 228: 456-462.
- Beerling DJ (2005) Leaf evolution: gases, genes and geochemistry. *Annals of Botany* 96: 345-352.
- Beerling DJ, Fleming AJ (2007) Zimmermann's telome theory of megaphyll leaf evolution: a molecular and cellular critique. *Current Opinion in Plant Biology* 10: 4-12.
- Beers EP (1997) Programmed cell death during plant growth and development. *Cell Death and Differentiation* 4: 649-661.
- Behera YN, Biswal B (1990) Differential response of fern leaves to senescence modulating agents of angiospermic plants. *Journal of Plant Physiology* 136: 480-483.
- Bena G, Lejeune B, Prosperi JM, Olivieri I (1998) Molecular phylogenetic approach for studying life-history evolution: the ambiguous example of the genus *Medicago* L. *Proceedings of the Royal Society, London Series B-Biological Sciences* 265: 1141-1151.
- Benbella M, Paulsen GM (1998) Efficacy of treatments for delaying senescence of wheat leaves: I. Senescence under controlled conditions. *Agronomy Journal* 90: 329-332.
- Benedetti CE, Costa CL, Turcinelli SR, Arruda P (1998) Differential expression of a novel gene in response to coronatine, methyl jasmonate, and wounding in the *coi1* mutant of *Arabidopsis*. *Plant Physiology* 116: 1027-1042.
- Benedetti CE, Costa CL, Turcinelli SR, Arruda P (1998) Differential expression of a novel gene in response to coronatine, methyl jasmonate, and wounding in the *Coi1* mutant of *Arabidopsis*. *Plant Physiology* 116: 1037-1042.

Berger F, Grini PE, Schnittger A (2006) Endosperm: an integrator of seed growth and development. *Current Opinion in Plant Biology* 9: 664-670.

Bert PF; Jouan I; de Labrouhe DT; Serre F; Philippon J; Nicolas P; Vear F (2003) Comparative genetic analysis of quantitative traits in sunflower (*Helianthus annuus* L.). 2. Characterisation of QTL involved in developmental and agronomic traits. *Theoretical and Applied Genetics* 107: 181-189.

Bezant JH, Laurie DA, Pratchett N, Chojecki J, Kearsey MJ (1997) Mapping of QTL controlling NIR predicted hot water extract and grain nitrogen content in a spring barley cross using marker-regression. *Plant Breeding* 116: 141-145.

Bhalerao R, Keskitalo J, Sterky JF, Erlandsson R, Björkbacka H, Birve SJ, Karlsson J, Gardeström P, Gustafsson P, Lundeberg J, Jansson S (2003) Gene expression in autumn leaves. *Plant Physiology* 131: 430-442.

Bhattacharya D, Medlin L (1998) Algal phylogeny and the origin of land plants. *Plant Physiology* 116: 9-15.

Bianchi TS, Johansson B, Elmgren R (2000) Breakdown of phytoplankton pigments in Baltic sediments: effects of anoxia and loss of deposit-feeding macrofauna. *Journal of Experimental Marine Biology and Ecology* 251: 161-183.

Bird SM, Gray JE (2003) Signals from the cuticle affect epidermal cell differentiation. *New Phytologist* 157: 9-23.

Bishop CM (2006) *Pattern Recognition and Machine Learning*. New York: Springer.

Biswal B (1995) Carotenoid catabolism during leaf senescence and its control by light. *Journal of Photochemistry and Photobiology B* 30: 3-13.

Biswal B, Choudhury NK, Prativa S, Biswal UC (1983) Senescence of detached fern leaves. *Plant and Cell Physiology* 24: 1203-1208.

Biswal B, Rogers LJ, Smith AL, Thomas H (1994) Carotenoid composition and its relationship to chlorophyll and D1 protein during leaf development in a normally senescing cultivar and a stay-green mutant of *Festuca pratensis*. *Phytochemistry* 37: 1257-1262.

Biswal UC, Biswal B (1988) Ultrastructural modifications and biochemical changes during senescence of chloroplasts. *International Review of Cytology* 113: 271-321.

Bittman S, Simpson GM, Mir Z (1988) Leaf senescence and seasonal decline in nutritional quality of three temperate forage grasses as influenced by drought. *Crop Science* 28: 546-552.

Blanco A, Pasqualone A, Troccoli A, Di Fonzo N, Simeone R (2002) Detection of grain protein content QTLs across environments in tetraploid wheats. *Plant Molecular Biology* 48: 615-623.

Bleecker AB, Patterson SE (1997) Last exit: senescence, abscission, and meristem arrest in *Arabidopsis*. *Plant Cell* 9, 1169-1179.

- Boller T, Kende H (1979) Hydrolytic enzymes in the central vacuole of plant cells. *Plant Physiology* 63: 1123–1132.
- Bollivar DW, Wang S, Allen JP, Bauer CE (1994) Molecular genetic analysis of terminal steps in bacteriochlorophyll a biosynthesis: characterisation of a *Rhodobacter capsulatus* strain that synthesizes geranylgeraniol-esterified bacteriochlorophyll a. *Biochemistry* 33: 12763-12768.
- Bopp M (1996) The origin of developmental physiology of plants in Germany. *International Journal of Developmental Biology* 40: 89-92.
- Borojevic S, Cupina T, Krsmanovic M (1980) Green area parameters in relation to grain yield of different wheat genotypes. *Zeitschrift für Pflanzenzüchtung* 84: 265-283.
- Borras L, Slafer GA, Otegui ME (2004) Seed dry weight response to source-sink manipulations in wheat, maize and soybean: a quantitative reappraisal. *Field Crops Research* 86: 131-146.
- Borrell AK, Bidinger FR, Tao YZ, McIntyre CL, Douglas ACL (2001) Physiological and molecular aspects of stay-green in sorghum. In: *Proceedings from the Fourth Australian Sorghum Conference, Kooralbyn* (eds Borrell AK, Henzell RG) pp 5-8. Range Media Pty Ltd (CD-rom format ISBN:0-7242-2163-8).
- Borrell AK, Douglas ACL (1996) Maintaining green leaf area in grain sorghum increases yield in a water-limited environment. In: *Proceedings of the Third Australian Sorghum Conference*. Melbourne: Australian Institute of Agricultural Science, Occasional Publication No.93 (eds Foale MA, Henzell RG, Kneipp JF).
- Borrell AK, Hammer GL, Douglas ACL (2000a) Does maintaining green leaf area in sorghum improve yield under drought? I. Leaf growth and senescence. *Crop Science* 40: 1026-1037.
- Borrell AK, Hammer GL, Henzell RG (2000b) Does maintaining green leaf area in sorghum improve yield under drought? II. Dry matter production and yield. *Crop Science* 40: 1037-1048.
- Borrell AK, Van Oosterom E, Hammer GL, Jordan D, Douglas ACL (2003) The physiology of “stay-green” in sorghum. In: *Solutions for a better environment. Proceedings of the 11th Australian Agronomy Conference, 2-6 Feb. 2003, Geelong, Victoria*. Australian Society of Agronomy. <http://www.regional.org.au/au/asa/2003/c/1/borrell.htm>
- Bortlik K, Gut H, Matile P (1987) Yellowing and non-yellowing trees: a comparison of protein- and chlorophyll-loss in senescent leaves. *Botanica Helvetica* 97: 323-328.
- Bortlik K, Peisker C, Matile P (1990) A novel type of chlorophyll catabolite in senescent barley leaves. *Journal of Plant Physiology* 136: 161-165.
- Bozhkov PV, Filonova LH, Suarez MF (2005) Programmed cell death in plant embryogenesis. *Current Topics in Developmental Biology* 67: 135-179.
- Brandis A, Vainstein A, Goldschmidt EE (1996) Distribution of chlorophyllase among components of chloroplast membranes in *Citrus sinensis* organs. *Plant Physiology and Biochemistry* 34: 49-54.

- Breese EL, Mather K (1957) The organization of polygenic activity within a chromosome of *Drosophila*. I. Hair characters. *Heredity* 11: 373-395.
- Brehelin C, Kessler F, van Wijk KJ (2007) Plastoglobules: versatile lipoprotein particles in plastids. *Trends in Plant Science* 12: 260-266.
- Brummell DA (2006) Cell wall disassembly in ripening fruit. *Functional Plant Biology* 33: 103–119.
- Brychkova G, Alikulov Z, Fluhr R, Sagi M (2008) A critical role for ureides in dark and senescence-induced purine remobilization is unmasked in the *Atxdh1* *Arabidopsis* mutant. *Plant Journal* 54: 496–509.
- Buchanan-Wollaston V (1997) The molecular biology of leaf senescence. *Journal of Experimental Botany* 48: 181-199.
- Buchanan-Wollaston V, Ainsworth C (1997) Leaf senescence in *Brassica napus*: cloning of senescence-related genes by subtractive hybridization. *Plant Molecular Biology* 33: 821-834.
- Buchanan-Wollaston V, Earl S, Harrison E, Mathas E, Navabpour S, Page T, Pink D (2003) The molecular analysis of leaf senescence - a genomics approach. *Plant Biotechnology Journal* 1: 3-22.
- Buchanan-Wollaston V, Page T, Harrison E, Breeze E, Lim PO, Nam HG, Lin JF, Wu SH, Swidzinski J, Ishizaki K, Leaver CJ (2005) Comparative transcriptome analysis reveals significant differences in gene expression and signalling pathways between developmental and dark/starvation-induced senescence in *Arabidopsis*. *Plant Journal* 42: 567-585.
- Buckner B, Janick-Buckner D, Gray J, Johal GS (1998) Cell-death mechanisms in maize. *Trends in Plant Science* 3: 218-223.
- Büsches R, Holricher K, Panstruga R, Simons G, Wolter M, Frijters A, van Daelen R, van der Lee T, Diergaarde P, Groenendijk J, Töpsch S, Vos P, Salamini F, Schulze-Lefert P (1997) The barley *Mlo* gene: a novel control element of plant pathogen resistance. *Cell* 88: 695-705.
- Bunning E (1986) Evolution der circadianen Rhythmik und ihrer Nutzung zur Tageslängenmessung. *Naturwissenschaften* 73: 70-77.
- Burger JC, Louda SM (1994) Indirect versus direct effects of grasses on growth of a cactus (*Opuntia fragilis*): Insect herbivory versus competition. *Oecologia* 99: 79-87.
- Calderon-Urrea A, Dellaporta SL (1999) Cell death and cell protection genes determine the fate of pistils in maize. *Development* 126: 435-441.
- Caldwell MM (1987) Competition between roots in natural communities. In: *Root Development and Function* (eds PJ Gregory, JV Lake, DA Rose), pp 167-185. NY: Cambridge University Press.
- Camara B, Hugueney P, Bouvier F, Kuntz M, Moneger R (1995) Biochemistry and molecular biology of chromoplast development. *International Review of Cytology* 163: 175-247.

- Campbell BD, Grime JP, Mackey JML (1991) A trade-off between scale and precision in resource foraging. *Oecologia* 87: 532-538.
- Caprio JM (1956) An analysis of the relation between regreening of Valencia oranges and mean monthly temperatures in southern California. *Proceedings of the American Society for Horticultural Science* 67: 222-235.
- Carol CM, Davies JP (2001) Cytokinins in the ball gall of *Solidago altissima* and in the gall forming larvae of *Eurosta solidiginis*. *New Phytologist* 151: 203–212.
- Carter C, Pan S, Zouhar J, Avila EL, Girke T, Raikhel NV (2004) The vegetative vacuole proteome of *Arabidopsis thaliana* reveals predicted and unexpected proteins. *Plant Cell* 16: 3285-3303.
- Ceppi D, Sala M, Gentinetta E, Verderio A, Motto M (1987) Genotype dependent leaf senescence in maize: inheritance and effects of pollination prevention. *Plant Physiology* 85: 720-725.
- Cha KW, Lee YJ, Koh HJ, Lee BM, Nam YW, Paek NC (2002) Isolation, characterization, and mapping of the stay green mutant in rice. *Theoretical and Applied Genetics* 104: 526-532.
- Chabot BF, Hicks DJ (1982) The ecology of leaf life spans. *Annual Review of Ecology and Systematics* 13: 229-259.
- Chalker-Scott L (2002) Do anthocyanins function as osmoregulators in leaf tissues? *Advances in Botanical Research* 37: 103-127.
- Chanasut U, Wagstaff C, Leverentz M, Griffiths G, Thomas B, Rogers HJ, Stead, AD (2003) Post-harvest treatments to increase floral vase life in *Alstroemeria*. *Post-Harvest Biology and Technology* 29: 325-333.
- Chandlee JM (2001) Current molecular understanding of the genetically programmed process of leaf senescence. *Physiologia Plantarum* 113: 1-8.
- Chaparro JX, Werner D, Whetten R, O'Malley D (1995) Characterization of an unstable anthocyanin phenotype and estimation of somatic mutation rates in peach. *Journal of Heredity* 86: 186-193.
- Chapin FS, van Cleve K (1989) Resorption of biomass and nutrients during autumn senescence. In: *Plant Physiological Ecology. Field Methods and Instrumentation.* (ed RW Pearcy, JR Ehleringer, HA Mooney, PW Rundel), pp. 186-207. London: Chapman and Hall.
- Charles-Edwards DA (1982) *Physiological Determinants of Crop Growth*. Sydney: Academic Press.
- Charnov EL, Schaffer WM (1973) Life-history consequences of natural selection: Cole's result revisited. *American Naturalist* 107: 791-793.
- Chazdon RL (1988) Sunflecks and their importance to forest understorey plants. *Advances in Ecological Research* 18: 1-63.

Chee PW, Elias EM, Anderson JA, Kianian SF (2001) Evaluation of a high grain protein QTL from *Triticum turgidum* L. var. *dicoccoides* in an adapted durum wheat background. *Crop Science* 41: 295–301.

Chen HC, Klein A, Xiang MH, Backhaus RA, Kuntz M (1998) Drought- and wound-induced expression in leaves of a gene encoding a chromoplast carotenoid-associated protein. *Plant Journal* 14: 317-326.

Chen J, Reynolds J, Harley P, Tenhunen J (1993) Coordination theory of leaf nitrogen distribution in a canopy. *Oecologia* 93: 63-69.

Cheung AY, McNellis T, Piekos B (1993) Maintenance of chloroplast components during chromoplast differentiation in the tomato mutant green flesh. *Plant Physiology* 101: 1223-1229.

Cheverud JM (1982) Relationships among ontogenetic, static, and evolutionary allometry. *American Journal of Physical Anthropology* 59: 139-149.

Chiba A, Ishida H, Nishizawa NK, Makino A, Mae T (2003) Exclusion of ribulose-1,5-bisphosphate carboxylase/oxygenase from chloroplasts by specific bodies in naturally senescing leaves of wheat. *Plant and Cell Physiology* 44: 914-921.

Chittka L, Döring TF (2007) Are autumn foliage colors red signals to aphids? *PLoS Biology* 5: 1640-1644.

Choquet Y, Vallon O (2000) Synthesis, assembly and degradation of thylakoid membrane proteins. *Biochimie* 82: 615-634.

Christensen LE, Below FE, Hageman RH (1981) The effects of ear removal on senescence and metabolism of maize. *Plant Physiology* 68: 1180-1185.

Cogdell RJ, Lindsay JG (2000) The structure of photosynthetic complexes in bacteria and plants: an illustration of the importance of protein structure to the future development of plant science. *New Phytologist* 145: 167-196.

Colbert KA, Beever JE (1981) Effect of disbudding on root cytokinin export and leaf senescence in tomato and tobacco. *Journal of Experimental Botany* 32: 121-127.

Cole LC (1954) The population consequences of life history phenomena. *Quarterly Review of Biology* 29: 103-137.

Connor DJ, Sadras VO (1992) Physiology of yield expression in sunflower. *Field Crops Research* 30: 333-89.

Connor EF, Taverner MP (1997) The evolution and adaptive significance of the leaf-mining habit. *Oikos* 79: 6–25.

Corner EJH (1964) *The Life of Plants*. London: Weidenfeld and Nicolson.

Cots J, Fargeix C, Gindro K, Widmer F (2002) Pathogenic attack and carbon reallocation in soybean leaves (*Glycine max* L.): reinitiation of the glyoxylate cycle as a defence reaction. *Journal of Plant Physiology* 159: 91-96.

Coupe SA, Watson LM, Ryan DJ, Pinkney TT, Eason JR (2003) Molecular analysis of programmed cell death during senescence in *Arabidopsis thaliana* and *Brassica oleracea*: cloning broccoli LSD1, Bax inhibitor and serine palmitoyltransferase homologues. *Journal of Experimental Botany* 55: 59-68.

Crafts-Brandner SJ (1991) Nonstructural carbohydrate metabolism during leaf ageing in tobacco (*Nicotiana tabacum*). *Physiologia Plantarum* 82: 299-305.

Crasta OR, Xu WW, Rosenow DT, Mullet J, Nguyen HT (1999) Mapping of post-flowering drought resistance traits in grain sorghum: association between QTLs influencing premature senescence and maturity. *Molecular and General Genetics* 262: 579-588.

Crepet WL, Friis EM, Nixon KC (1991) Fossil evidence for the evolution of biotic pollination. *Philosophical Transactions of the Royal Society, London B* 333: 187-195.

Cukadar-Olmedo B, Miller JF, Hammond JJ (1997) Combining ability of the stay green trait and seed moisture content in sunflower. *Crop Science* 37: 378-382.

Curtis JT (1943) An unusual pollen reaction in *Phalenopsis*. *American Orchid Society Bulletin* 11: 259-260.

Curty C, Engel N (1996) Detection, isolation and structure elucidation of a chlorophyll a catabolite from autumnal senescent leaves of *Cercidiphyllum japonicum*. *Phytochemistry* 42: 1531-1536.

Curty C, Engel N (1997) Chlorophyll catabolism: high stereoselectivity in the last step of the ring cleaving process. *Plant Physiology and Biochemistry* 35: 707-711.

Curty C, Engel N, Gossauer A (1995) Evidence for a monooxygenase-catalyzed primary process in the catabolism of chlorophyll. *FEBS Letters* 364: 41-44.

Dai N, Schaffer A, Petreikov M, Shahak Y, Giller Y, Ratner K, Levine A and Granot D (1999) Overexpression of *Arabidopsis* hexokinase in tomato plants inhibits growth, reduces photosynthesis, and induces rapid senescence. *Plant Cell* 11: 1253-1266.

Dangl JL, Dietrich RA, Thomas H (2000) Senescence and programmed cell death. In *Biochemistry and Molecular Biology of Plants* (Ed. B Buchanan, W Gruissem, R Jones), pp. 1044-1100. Rockville: ASPP.

Davies K M, Grierson D (1989) Identification of cDNA clones for tomato (*Lycopersicon esculentum* Mill.) mRNAs that accumulate during fruit ripening and leaf senescence in response to ethylene. *Planta* 179: 73-80.

Davies TGE, Thomas H, Thomas BJ, Rogers LJ (1990) Leaf senescence in a non yellowing mutant of *Festuca pratensis*: metabolism of cytochrome f. *Plant Physiology* 93: 588-595.

de Gouw JA, Howard CJ, Custer TG, Fall R (1999) Emissions of volatile organic compounds from cut grass and clover are enhanced during the drying process. *Geophysical Research Letters* 26: 811-814.

De Greef JA, Butler WL, Roth TF, Fredericq H (1971) Control of senescence in *Marchantia* by phytochrome. *Plant Physiology* 48: 407-412.

- del Rio LA, Pastori GM, Palma JM, Sandalio LM, Sevilla F, Corpas FJ, Jiménez A, López-Huertas E, Hernández JA (1998) The activated oxygen role of peroxisomes in senescence. *Plant Physiology* 116:1195-1200.
- DellaPenna D, Barry J, Pogson BJ (2006) Vitamin synthesis in plants: tocopherols and carotenoids. *Annual Review of Plant Biology* 57: 711-738.
- DeLong A, Caldero-Urrea A, Dellaporta SL (1993) Sex determination gene TASSELSEED2 of maize encodes a short-chain alcohol dehydrogenase required for stage-specific floral organ abortion. *Cell* 74: 757-768.
- Devidé Z, Ljubescic N (1974) The reversion of chromoplasts to chloroplasts in pumpkin fruits. *Zeitschrift für Pflanzenphysiologie* 73S: 296-306.
- Diaz C, Purdy S, Christ A, Morot-Gaudry J-F, Wingler A, Masclaux-Daubresse C (2005) Characterization of markers to determine the extent and variability of leaf senescence in *Arabidopsis*. A metabolic profiling approach. *Plant Physiology* 138: 898-908.
- Diaz C, Saliba-Colombani V, Loudet O, Belluomo P, Moreau L, Daniel-Vedele F, Morot-Gaudry J-F, Masclaux-Daubresse C (2006) Leaf yellowing and anthocyanin accumulation are two genetically independent strategies in response to nitrogen limitation in *Arabidopsis thaliana*. *Plant and Cell Physiology* 47: 74–83.
- Dickman MB, Park YK, Oltersdorf T, Li W, Clemente T, French R (2001) Abrogation of disease development in plants expressing animal antiapoptotic genes. *Proceedings of the National Academy of Sciences* 98: 6957-6962.
- Dietrich RA, Delaney TP, Uknes SJ, Ward EJ, Ryals JA, Dangl JL (1994) *Arabidopsis* mutants simulating disease resistance response. *Cell* 77:565-578.
- Dietrich RA, Richberg MH, Schmidt R, Dean C, Dangl JL (1997) A novel zinc finger protein is encoded by the *Arabidopsis* LSD1 gene and functions as a negative regulator of plant cell death. *Cell* 88: 685-694.
- Distelfeld A, Uauy C, Olmos S, Schlatter AR, Dubcovsky J, Fahima T (2004) Microcolinearity between a 2 cM region encompassing the grain protein content locus Gpc-6B1 on wheat chromosome 6B and a 350 kb region on rice chromosome 2. *Functional and Integrative Genomics* 4: 59–66.
- Diz DA, Schank SC (1993) Characterization of seed producing pearl millet x elephantgrass hexaploid hybrids. *Euphytica* 67: 143-149.
- do Rego ER, Finger FL, Casali VWD, Cardoso AA (1999) Inheritance of fruit color and pigment changes in a yellow tomato (*Lycopersicon esculentum* Mill.) mutant. *Genetics and Molecular Biology* 22: 101-104.
- Doi M, Shima S, Egashira T, Nakamura K, Okayama S (1997) New bile pigment excreted by a *Chlamydomonas reinhardtii* mutant: a possible breakdown catabolite of chlorophyll a. *Journal of Plant Physiology* 150: 504-508.
- Doust JL, Doust LL, eds (1988) *Plant Reproductive Ecology: Patterns and Strategies*. Oxford University Press.

Downing WL, Mauxion F, Fauvarque M-O, Reviron M-P, de Vienne D, Vartanian N, Giraudat J (1992) Brassica napus transcript encoding a protein related to the Kunitz protease inhibitor family accumulates upon water stress in leaves, not in seeds. *Plant Journal* 2: 685–693.

Doyle JA (1998) Phylogeny of vascular plants. *Annual Review of Ecology and Systematics* 29: 567-599.

Drake BG, González-Meler MA, Long SP (1997) More efficient plants: a consequence of rising atmospheric CO₂? *Annual Review of Plant Physiology and Plant Molecular Biology* 48: 609-639.

Drake R, John I, Farrell A, Cooper W, Schuch W, Grierson D (1996) Isolation and analysis of cDNAs encoding tomato cysteine proteases expressed during leaf senescence. *Plant Molecular Biology* 30: 755-767.

Drury R, Hörtensteiner S, Donnison I, Bird CR, Seymour GB (1999) Gene expression and chlorophyll catabolism in the peel of ripening banana fruits. *Physiologia Plantarum* 107: 32-38.

Düggelin T, Bortlik K-H, Gut H, Matile P, Thomas H (1988) Leaf senescence in a non-yellowing mutant of *Festuca pratensis*: accumulation of lipofuscin-like compounds. *Physiologia Plantarum* 74: 131-136.

Dumpty H (1872) When I use a word...it means just what I choose it to mean - neither more nor less. In: Carroll L. *Alice through the looking-glass*.

Duncan RR (1996) Breeding and improvement of forage sorghums for the tropics. *Advances in Agronomy* 57: 161-185.

Duncan RR, Bockholt AJ, Miller FR (1981) Descriptive comparison of senescent and nonsenescent sorghum genotypes. *Agronomy Journal* 73: 849-853.

Durand LZ, Goldstein G (2001) Growth, leaf characteristics, and spore production in native and invasive tree ferns in Hawaii. *American Fern Journal* 91: 25-35.

Duru M, Ducrocq H (2000) Growth and senescence of the successive grass leaves on a tiller. Ontogenic development and effect of temperature. *Annals of Botany* 85: 635-643.

Dyer TA, Osborne DJ (1971) Leaf nucleic acids. II. Metabolism during senescence and the effect of kinetin. *Journal of Experimental Botany* 22: 552-560.

Eckstein RL, Karlsson PS (1999) Recycling of nitrogen among segments of *Hylocomium splendens* as compared with *Polytrichum commune*: implications for clonal integration in an ectohydric bryophyte. *Oikos* 86: 87-96.

Edwards D (1993) Cells and tissues in the vegetative sporophytes of early land plants. *New Phytologist* 125: 225-247.

Edwards DP, Yu DW (2007) The roles of sensory traps in the origin, maintenance, and breakdown of mutualism. *Behavioral Ecology and Sociobiology* 61: 1321-1327.

- Eissenstat DM Yanai RD (1997) The ecology of root lifespan. *Advances in Ecological Research* 27: 1-60.
- el Meanawy MA, Aji T, Phillips NF, Davis RE, Salata RA, Malhotra I, McClain D, Aikawa M, Davis AH (1990) Definition of the complete *Schistosoma mansoni* hemoglobinase mRNA sequence and gene expression in developing parasites. *American Journal of Tropical Medicine and Hygiene* 43: 67-78.
- Ellis CM, Nagpal P, Young JC, Hagen G, Guilfoyle TJ, Reed JW (2005) AUXIN RESPONSE FACTOR1 and AUXIN RESPONSE FACTOR2 regulate senescence and floral organ abscission in *Arabidopsis thaliana*. *Development* 132: 4563-4574.
- Endler JA, McLellan T (1988) The process of evolution: toward a new synthesis. *Annual Review of Ecology and Systematics* 19: 395-421.
- Engel N, Curty C, Gossauer A (1996) Chlorophyll catabolism in *Chlorella protothecoides*. 8. Facts and artefacts. *Plant Physiology and Biochemistry* 34: 77-83.
- Engel N, Jenny TA, Mooser V, Gossauer A (1991) Chlorophyll catabolism in *Chlorella protothecoides*. Isolation and structural elucidation of a red bilin derivative. *FEBS Letters* 293: 131-133.
- Engvild KC (1989) The death hormone hypothesis. *Physiologia Plantarum* 77: 282-285.
- Enquist BJ, Tiffney BH, Niklas KJ (2007) Metabolic scaling and the evolutionary dynamics of plant size, form, and diversity: toward a synthesis of ecology, evolution, and paleontology. *International Journal of Plant Sciences* 168: 729-749.
- Erikson RO (1959) Integration of Plant Growth Processes. *American Naturalist* 93: 225-235.
- Esau K (1977) *Anatomy of Seed Plants*, 2nd Ed. NY: Wiley
- Escalada RG, Plucknett DL (1975) Ratoon cropping of sorghum. I. Origin, time of appearance, and fate of tillers. *Agronomy Journal* 67: 473-478.
- Espineda CE, Linford AS, Devine D, Brusslan JA (1999) The AtCAO gene, encoding chlorophyll a oxygenase, is required for chlorophyll b synthesis in *Arabidopsis thaliana*. *Proceedings of the National Academy of Sciences, USA* 96: 10507-10511.
- Evans JR (1989) Photosynthesis and nitrogen relationships in leaves of C-3 plants. *Oecologia* 78: 9-19.
- Evans LT (1993) *Crop Evolution, Adaptation and Yield*. Cambridge University Press.
- Evans LT, Dunstone RL (1970) Some physiological aspects of evolution in wheat. *Australian Journal of Biological Science* 23: 725-741.
- Evans LT, Wardlaw JF, Fischer RA (1975) In: *Crop Physiology: some Case Histories* (Evans LT ed), pp 101-150. Cambridge University Press.
- Ewers FW, Schmid R (1981) Longevity of needle fascicles of *Pinus longaeva* (bristlecone pine) and other North American pines. *Oecologia* 51: 107-115.

- Faeth SH, Connor EF, Simberloff D (1981) Early leaf abscission: a neglected source of mortality for folivores. *American Naturalist* 117: 409–415.
- Fahnenstich H, Saigo M, Niessen M, Zanol MI, Andreo CS, Fernie AR, Drincovich MF, Flügge U-I, Maurino VG (2007) Alteration of organic acid metabolism in *Arabidopsis* overexpressing the maize C4 NADP-malic enzyme causes accelerated senescence during extended darkness. *Plant Physiology* 145: 640-652.
- Fall R, Karl T, Hansel A, Jordan A, Lindinger W (1999) Volatile organic compounds emitted after leaf wounding: On-line analysis by proton-transfer-reaction mass spectrometry. *Journal of Geophysical Research - Atmosphere* 104: 15963-15974.
- Fang ZY, Bouwkamp JC, Solomos T (1998) Chlorophyllase activities and chlorophyll degradation during leaf senescence in non-yellowing mutant and wild type of *Phaseolus vulgaris* L. *Journal of Experimental Botany* 49: 503-510
- Farnsworth KD, Niklas KJ (1995) Theories of optimization, form and function in branching architecture. *Functional Ecology* 9: 355-363.
- Feild TS, Lee DW, Holbrook NM (2001) Why leaves turn red in autumn. The role of anthocyanins in senescing leaves of red-osier dogwood. *Plant Physiology* 127: 566-74.
- Feller U, Anders I, Mae T (2007) Rubiscolytics: fate of Rubisco after its enzymatic function in a cell is terminated. *Journal of Experimental Botany* doi:10.1093/jxb/erm242.
- Feller U, Fischer A (1994) Nitrogen metabolism in senescing leaves. *Critical Reviews in Plant Science* 13: 241-273.
- Feller UK, Soong T-ST, Hageman RH (1977) Leaf proteolytic activities and senescence during grain development of field-grown corn (*Zea mays* L). *Plant Physiology* 59: 290-294.
- Fiedor L, Rosenbach-Belkin V, Scherz A (1992) The stereospecific interaction between chlorophylls and chlorophyllase. Possible implication for chlorophyll biosynthesis and degradation. *Journal of Biological Chemistry* 267: 22043-22047.
- Firman DM, Allen EJ (1989) Relationship between light interception, ground cover and leaf area index in potatoes. *Journal of Agricultural Science* 113: 355-359.
- Folley P, Engel N (1999) Chlorophyll b to chlorophyll a conversion precedes chlorophyll degradation in *Hordeum vulgare* L. *Journal of Biological Chemistry* 274: 21811-21816.
- Forbes JC, Watson RD (1992) *Plants in Agriculture*. Cambridge University Press.
- Ford BJ (1986) Even plants excrete. *Nature* 323: 763.
- Forsberg J, Strom J, Kieselbach T, Larsson H, Alexciev K, Engstrom A, Akerlund HE (2005) Protease activities in the chloroplast capable of cleaving an LHCII N-terminal peptide. *Physiologia Plantarum* 123: 21-29.
- Foyer CH, Spencer C (1986) The relationship between phosphate status and photosynthesis in leaves. *Planta* 167: 369-375.

- Friedman WE, Moore RC, Purugganan MD (2004) The evolution of plant development. *American Journal of Botany* 91: 1726-1741.
- Fukuda H (1996) Xylogenesis: initiation, progression, and cell death. *Annual Review of Plant Physiology and Plant Molecular Biology* 47: 299-325.
- Gallagher JA, Volenec JJ, Turner LB, Pollock CJ (1997) Starch hydrolytic enzyme activities following defoliation of white clover. *Crop Science* 37: 1812-1818.
- Gallais A, Hirel B (2004) An approach to the genetics of nitrogen use efficiency in maize. *Journal of Experimental Botany* 55: 295-306.
- Gan S, Amasino RM (1995) Inhibition of leaf senescence by autoregulated production of cytokinin. *Science* 270: 1986-1988.
- Gan S, Amasino RM (1997) Making sense of senescence. *Plant Physiology* 113: 313-319.
- Garcia R, Hanway JJ (1976) Foliar fertilization of soybeans during the seed-filling period. *Agronomy Journal* 68: 653-657.
- Garcia-Plazaola J, Becerril JM (2001) Seasonal changes in photosynthetic pigments and antioxidants in beech (*Fagus sylvatica*) in a Mediterranean climate: implications for tree decline diagnosis. *Australian Journal of Plant Physiology* 28: 225-232.
- Garcia-Plazaola J, Hernandez A, Becerril JM (2003) Antioxidant and pigment composition during autumnal leaf senescence in woody deciduous species differing in their ecological traits. *Plant Biology* 5: 557-566.
- Gaut BS, Doebley JF (1997) DNA Sequence evidence for the segmental allotetraploid origin of maize. *Proceedings of the National Academy of Sciences USA* 94: 6809-6814.
- Gay A, Thomas H, Roca M, James C, Taylor J, Rowland J, Ougham H (2008) Non-destructive analysis of senescence in mesophyll cells by spectral resolution of protein synthesis-dependent pigment metabolism. *New Phytologist* (in press).
- Gay AP, Hauck BD (1994) Acclimation of *Lolium temulentum* to enhanced carbon dioxide concentration. *Journal of Experimental Botany* 45: 1133-1141.
- Gay AP, Thomas H (1995) Leaf development in *Lolium temulentum*: photosynthesis in relation to growth and senescence. *New Phytologist* 130: 159-168
- Geigenberger P, Stitt M (1991) A futile cycle of sucrose synthesis and degradation is involved in regulating partitioning between sucrose, starch and respiration in cotyledons of germinating *Ricinus communis* L seedlings when phloem transport is inhibited. *Planta* 185: 81-90.
- Gentinetta E, Ceppi D, Lepori C, Perico G, Motto M, Salamini F (1986) A major gene for delayed senescence in maize. Pattern of photosynthates accumulation and inheritance. *Plant Breeding* 97: 193-203.
- Gerdol R, Bonora A, Poli F (1994) The vertical pattern of pigment concentrations in chloroplasts of *Sphagnum capillifolium*. *Bryologist* 97: 158-161.

- Getz WM (1993) Metaphysiological and evolutionary dynamics of populations exploiting constant and interactive resources - r-K selection revisited. *Evolutionary Ecology* 7: 287-305.
- Gill DE, Chao L, Perkins SL, Wolf JB (1995) Genetic mosaicism in plants and clonal animals. *Annual Review of Ecology and Systematics* 26: 423-444.
- Gillet B, Beyly A, Peltier G, Rey P (1998) Molecular characterization of CDSP34, a chloroplastic protein induced by water deficit in *Solanum tuberosum* L. plants, and regulation of CDSP34 expression by ABA and high illumination. *Plant Journal* 16: 257-262.
- Ginsburg S, Matile P (1993) Identification of catabolites of chlorophyll porphyrin in senescent rape cotyledons. *Plant Physiology* 102: 521-527.
- Ginsburg S, Schellenberg M, Matile P (1994) Cleavage of chlorophyll-porphyrin. Requirement for reduced ferredoxin and oxygen. *Plant Physiology* 105: 545-554.
- Giron D, Kaiser W, Imbault N, Casas J (2007) Cytokinin-mediated leaf manipulation by a leafminer caterpillar. *Biology Letters* 3: 340-343.
- Goff SA, Ricke D, many other authors (2002) A draft sequence of the rice genome (*Oryza sativa* L. ssp. *japonica*). *Science* 296: 92-100.
- Goodwin TW, Mercer EI (1972) *Introduction to Plant Biochemistry*. Oxford: Pergamon.
- Gordon AJ, Mitchell DF, Ryle GJA, Powell CE (1987) Diurnal production and utilization of photosynthate in nodulated white clover. *Journal of Experimental Botany* 38: 84-98.
- Gordon JE (1978) *Structures*. Harmondsworth: Penguin.
- Goto T (1987) Structure, stability, and color variation of natural anthocyanins. *Progress in the Chemistry of Organic Natural Products* 52: 113-158.
- Goudriaan J (1988) The bare bones of leaf-angle distribution in radiation models for canopy photosynthesis and energy exchange. *Agricultural and Forest Meteorology* 43: 155-170.
- Grafen A (1990) Biological signals as handicaps. *Journal of Theoretical Biology* 144: 517-546.
- Gray J, Close PS, Briggs SP, Johal GS (1997) A novel suppressor of cell death in plants encoded by the *l1s1* gene of maize. *Cell* 89: 25-31.
- Gray J, Janick-Bruckner D, Bruckner B, Close PS, Johal GS (2002) Light-dependent death of maize *l1s1* cells is mediated by mature chloroplasts. *Plant Physiol.* 130: 1894-1907.
- Grbic V (2003) SAG2 and SAG12 protein expression in senescing *Arabidopsis* plants. *Physiologia Plantarum* 119: 263-269.
- Green DR, Reed JC (1998) Mitochondria and apoptosis. *Science* 281: 1309-1312.
- Greenberg JT, Ausubel FM (1993) *Arabidopsis* mutants compromised for the control of cellular damage during pathogenesis and aging. *Plant Journal* 4: 327-341.

Greenberg JT, Guo A, Klessig DF, Ausubel FM (1994) Programmed cell death in plants: a pathogen-triggered response activated coordinately with multiple defense functions. *Cell* 77: 551-563.

Greenwood AD, Leech RM, Williams JP (1963) The osmiophilic globules of chloroplasts. I. Osmiophilic globules as a normal component of chloroplasts and their isolation and composition in *Vicia faba* L. *Biochimica et Biophysica Acta* 78: 148-162.

Griffiths CM, Hosken SE, Oliver D, Chojecki J, Thomas H (1997) Sequencing, expression pattern and RFLP mapping of a senescence-enhanced cDNA from *Zea mays* with high homology to oryzain gamma and aleurain. *Plant Molecular Biology* 34: 815-821.

Grime JP (1974) Vegetation classification by reference to strategies. *Nature* 250: 26-31.

Grime JP (1977) Evidence for the existence of three primary strategies in plants and its relevance to ecological and evolutionary theory. *American Naturalist* 111: 1169-1194.

Grime JP (2001) *Plant Strategies, Vegetation Processes and Ecosystem Properties*. 2nd edition. Chichester: Wiley.

Grime JP, Cornelissen JHC, Thompson K, Hodgson JG (1996) Evidence of a causal connection between anti-herbivore defence and the decomposition rate of leaves. *Oikos* 77: 489-494.

Grime JP, Hodgson JG (1987) Botanical contributions to contemporary ecological theory. *New Phytologist* 106 (suppl): 283-295.

Grimm B (1998) Novel insights in the control of tetrapyrrole metabolism of higher plants. *Current Opinion in Plant Biology* 1: 245-250.

Grönegress P (1971) The greening of chromoplasts in *Daucus carota* L. *Planta* 98: 274-278.

Grönegress P (1974) The structure of chromoplasts and their conversion to chloroplasts. *Journal of Microscopy* 19: 183-192.

Guiamét JJ, Giannibelli MC (1996) Nuclear and cytoplasmic stay-green mutations of soybean alter the loss of leaf soluble proteins during senescence. *Physiologia Plantarum* 96: 665-661.

Guiamét JJ, Pichersky E, Noodén LD (1999) Mass exodus from senescing soybean chloroplasts. *Plant and Cell Physiology* 40: 986-992.

Guiamét JJ, Schwartz E, Pichersky E, Noodén LD (1991) Characterization of cytoplasmic and nuclear mutations affecting chlorophyll and chlorophyll-binding proteins during senescence in soybean. *Plant Physiology* 96: 227-231.

Guiamét JJ, Willemoes JG, Montaldi ER (1989) Modulation of progressive leaf senescence by the Red:Far-Red ratio of incident light. *Botanical Gazette* 150: 148-151.

Guinel FC; Bown AW (1951) Mechanically isolated photosynthetic cells from asparagus cladophylls originate from two distinct tissue locations. *Canadian Journal of Botany* 72: 1051-1056.

- Gundermann E (1985) Untersuchungen über die Anwendbarkeit der elementaren Katastrophentheorie auf das Phänomen "Waldsterben". *Forstarchiv* 56: 211-215.
- Gunning BES, Steer MW (1996) *Plant Cell Biology: Structure and Function*. London: Jones and Bartlett.
- Guo Y, Cai Z, Gan S (2004) Transcriptome of Arabidopsis leaf senescence. *Plant Cell and Environment* 27: 521-549.
- Haase P, Pugnaire FI, Clark SC, Incoll LD (1999) Diurnal and seasonal changes in cladode photosynthetic rate in relation to canopy age structure in the leguminous shrub *Retama sphaerocarpa*. *Functional Ecology* 13: 640-649.
- Hadacek F (2002) Secondary metabolites as plant traits: Current assessment and future perspectives. *Critical Reviews in Plant Sciences* 21: 273-322.
- Hafsi M, Mechmeche W, Bouamama L, Djekoune A, Zaharieva M, Monneveux P (2000) Flag leaf senescence, as evaluated by numerical image analysis, and its relationship with yield under drought in durum wheat. *Journal of Agronomy and Crop Science* 185: 275-280.
- Hagemann W (1999) Towards an organismic concept of land plants: the marginal blastozone and the development of the vegetation body of selected frondose gametophytes of liverworts and ferns. *Plant Systematics and Evolution* 216: 81-133.
- Hagen SB, Folstad I, Jakobsen SW (2003) Autumn colouration and herbivore resistance in mountain birch (*Betula pubescens*). *Ecology Letters* 6: 807-811.
- Hagen-Thorn A, Varnagiryte I, Nihlgard B, Armolaitis K (2006) Autumn nutrient resorption and losses in four deciduous forest tree species. *Forest Ecology and Management* 228: 33-39.
- Haidl H, Knödlmayer K, Rüdiger W, Scheer H, Schoch S, Ulrich J (1985) Degradation of bacteriochlorophyll a in *Rhodospseudomonas sphaeroides* R26. *Zeitschrift für Naturforschung* 40c: 685-692.
- Hakala K, Sewon P (1992) Reserve lipid-accumulation and translocation of C¹⁴ in the photosynthetically active and senescent shoot parts of *Dicranum elongatum*. *Physiologia Plantarum* 85: 111-119.
- Hall AJ, Brady C (1977) *Australian Journal of Plant Physiology* 4: 771-783.
- Hamilton WD, Brown SP (2001) Autumn tree colours as a handicap signal. *Proceedings of the Royal Society of London. B. Biology* 268: 1489-1493.
- Hanfrey C, Fife M, Buchanan-Wollaston V (1996) Leaf senescence in *Brassica napus*: Expression of genes encoding pathogenesis-related proteins. *Plant Molecular Biology* 30: 597-609.
- Hansen DM, Olesen JM, Mione T, Johnson SD, Müller CB (2007) Coloured nectar: distribution, ecology, and evolution of an enigmatic floral trait. *Biological Reviews* 82: 83-111.

- Hara-Nishimura I, Inoue K, Nishimura M (1991) A unique vacuolar processing enzyme responsible for conversion of several proprotein precursors into the mature forms. *FEBS Letters* 294: 89-93.
- Hara-Nishimura I, Kinoshita T, Hiraiwa N, Nishimura M (1998) Vacuolar processing enzymes in protein-storage vacuoles and lytic vacuoles. *Journal of Plant Physiology* 152: 668-674.
- Hara-Nishimura I, Shimada T, Hiraiwa N, Nishimura M (1995) Vacuolar processing enzyme responsible for maturation of seed proteins. *Journal of Plant Physiology* 145: 632-640.
- Hara-Nishimura I, Takeuchi Y, Nishimura M (1993) Molecular characterization of a vacuolar processing enzyme related to a putative cysteine proteinase of *Schistosoma-mansoni*. *Plant Cell* 5: 1651-1659.
- Harder HJ, Carlson RE, Shaw RH (1982) Corn grain yield and nutrient response to foliar fertilizer applied during grain fill. *Agronomy Journal* 74: 106-110.
- Harding SA, Guikema JA, Paulsen GM (1990) Photosynthetic decline from high temperature stress during maturation of wheat. I. Interaction with senescence processes. *Plant Physiology* 92: 648-653.
- Harikrishna K, Darby R, Draper J (1992) Chloroplast dedifferentiation in mechanically isolated asparagus cells during culture initiation. *Plant Physiology* 100: 1177-1183.
- Harper F, Crompton IJ (1980) Sowing date, harvest date and the yield of forage brassica crops. *Grass and Forage Science* 35: 147-157.
- Harper JL (1977) *The population biology of plants*. London: Academic Press.
- Harper JL (1989) The value of a leaf. *Oecologia* 80: 53-58.
- Hash C.T, Bhasker Raj AG, Lindup S, Sharma A, Beniwal CR, Folkertsma RT, Mahalakshmi V, Zerbini E, Blümmel M (2003) Opportunities for marker-assisted selection (MAS) to improve the feed quality of crop residues in pearl millet and sorghum. *Field Crops Research* 84: 79-88.
- Hashimoto H, Kura-Hotta M, Katoh S (1989) Changes in protein content and in the structure and number of chloroplasts during leaf senescence in rice seedlings. *Plant and Cell Physiology* 30: 707-715.
- Hasselt PR, van Strikwerda JT (1976) Pigment degradation in discs of the thermophilic *Cucumis sativus* as affected by light, temperature, sugar application and inhibitors. *Physiologia Plantarum* 37: 253-257.
- Hauck B, Gay AP, Macduff J, Griffiths CM, Thomas H (1997) Leaf senescence in a non-yellowing mutant of *Festuca pratensis*: implications of the stay-green mutation for photosynthesis, growth and nitrogen nutrition. *Plant Cell and Environment* 20: 1007-1018.
- Hausmann BIG, Mahalakshmi V, Reddy BVS, Seetharama N, Hash CT, Geiger HH (2002) QTL mapping of stay-green in two sorghum recombinant inbred populations. *Theoretical and Applied Genetics* 106: 133-142.

- Hayashi Y, Yamada K, Shimada T, Matsushima R, Nishizawa NK, Nishimura M, Hara-Nishimura I (2001) A proteinase-storing body that prepares for cell death or stresses in the epidermal cells of Arabidopsis. *Plant and Cell Physiology* 42: 894-899.
- He P, Osaki M, Takebe M, Shinano T (2003) Comparison of whole system of carbon and nitrogen accumulation between two maize hybrids differing in leaf senescence. *Photosynthetica* 41: 399-405.
- Heath MC (1998) Apoptosis, programmed cell death and the hypersensitive response. *European Journal of Plant Pathology* 104: 117-124.
- Heath OVS, Gregory FG (1938) The constancy of the mean net assimilation rate and its ecological importance. *Annals of Botany* 2: 811-818.
- Hedley CL, Stoddart JL (1972) Patterns of protein synthesis in *Lolium temulentum* (L.) L. Changes occurring during leaf development. *Journal of Experimental Botany* 23: 490-501.
- Heide OM, Prestrud AK (2005) Low temperature, but not photoperiod, controls growth cessation and dormancy induction and release in apple and pear. *Tree Physiology* 25:109–114.
- Heilmeyer H, Schultze ED, Whale DM (1986) Carbon and nitrogen partitioning in the biennial monocarp *Arctium tomentosum* Mill. *Oecologia* 70: 466-474.
- Heintz D, Erxleben A, High AA, Wurtz V, Reski R, Van Dorsselaer A, Sarnighausen E (2006) Rapid alteration of the phosphoproteome in the moss *Physcomitrella patens* after cytokinin treatment. *Journal of Proteome Research* 5: 2283-93.
- Helsel DB, Frey KJ (1978) Grain yield variations in oats associated with differences in leaf area duration among oat lines. *Crop Science* 18: 765-769.
- Hendry GAF, Houghton JD, Brown SB (1987) The degradation of chlorophyll - a biological enigma. *New Phytologist* 107: 255-302.
- Hengartner MO, Bryant JA (2000) Apoptotic cell death: from worms to wombats...but what about the weeds? In: *Programmed Cell Death in Animals and Plants* (ed Bryant JA, Hughes SG, Garland JM), pp. 1-12. Oxford: BIOS.
- Hensel LL, Grbić V, Baumgarten DA, Bleecker AB (1993) Developmental and age-related processes that influence the longevity and senescence of photosynthetic tissues in Arabidopsis. *Plant Cell* 5: 553-564.
- Henson IE, Wareing PF (1977) Cytokinins in *Xanthium strumarium* L.: The metabolism of cytokinins in detached leaves and buds in relation to photoperiod. *New Phytologist* 78: 27-33.
- Henzell RG, Dodman RL, Done AA, Brengman KL, Mayers PE (1984) Lodging stalk rot, and root rot in sorghum in Australia. In: *Sorghum Root and Stalk Rots, a Critical Review. Proceedings of Workshop held in Bellagio, Italy* (ed Mughogho LK, Rosenberg, G) pp. 225-236. ICRISAT, Patancheru, AP, India.

- Herold A (1980) Regulation of photosynthesis by sink activity - the missing link. *New Phytologist* 86: 131-144.
- Hidema J, Makino A, Mae T, Ojima K (1991) Photosynthetic characteristics of rice leaves aged under different irradiances from full expansion through senescence. *Plant Physiology* 97: 1287–1293.
- Higgins CF (1992) ABC transporters: from microorganisms to man. *Annual Review of Cell Biology* 8: 67-113.
- Hikosaka K (2005) Leaf canopy as a dynamic system: ecophysiology and optimality in leaf turnover. *Annals of Botany* 95: 521-533.
- Hikosaka K, Terashima I, Kato S (1994) Effects of leaf age, nitrogen nutrition and photon flux density on the distribution of nitrogen among leaves of a vine (*Ipomoea tricolor-Cav*) grown horizontally to avoid mutual shading of leaves. *Oecologia* 97: 451-457.
- Hilditch P, Thomas H, Lucas K (1989) Kinetic implications of structural modification in protein turnover. *BioSystems* 22: 241-248.
- Hilditch PI, Thomas H, Thomas BJ, Rogers LJ (1989) Leaf senescence in a non-yellowing mutant of *Festuca pratensis*. *Proteins of PhotosystemII. Planta* 177: 265-272.
- Hill J (1980) The remobilization of nutrients from leaves. *Journal of Plant Nutrition* 2,: 407-444.
- Himelblau E, Amasino RM (2001) Nutrients mobilized from leaves of *Arabidopsis thaliana* during leaf senescence. *Journal of Plant Physiology* 158: 1317-1323.
- Hinchliffe JR (1982) Cell death in vertebrate limb morphogenesis. *Progress in Anatomy* 2: 1-17.
- Hinder B, Schellenberg M, Rodoni S, Ginsburg S, Vogt E, Martinoia E, Matile P, Hörtensteiner S (1996) How plants dispose of chlorophyll catabolites. Directly energized uptake of tetrapyrrolic breakdown products into isolated vacuoles. *Journal of Biological Chemistry* 271: 27233-27236.
- Hinderhofer K, Zentgraf U (2001) Identification of a transcription factor specifically expressed at the onset of leaf senescence. *Planta* 213: 469-473.
- Hiraiwa N, Nishimura M, Hara-Nishimura I (1999) Vacuolar processing enzyme is self-catalytically activated by sequential removal of the C-terminal and N-terminal propeptides. *FEBS Letters* 447: 213-216.
- Hiraiwa N, Takeuchi Y, Nishimura M, Hara-Nishimura I (1993) A vacuolar processing enzyme in maturing and germinating-seeds - its distribution and associated changes during development. *Plant and Cell Physiology* 34: 1197-1204.
- Hirel B, Bertin P, Quillere I, Bourdoncle W, Attagnant C, Dellay C, Gouy A, Cadiou S, Retailiau C, Falque M, Gallais A (2001) Towards a better understanding of the genetic and physiological basis for nitrogen use efficiency in maize. *Plant Physiology* 125: 1258-1270.

- Hjelm U, Ogren E (2003) Is photosynthetic acclimation to low temperature controlled by capacities for storage and growth at low temperature? Results from comparative studies of grasses and trees. *Physiol. Plantarum* 119: 113-120.
- Ho I, Below FE (1989) Whole plant senescence of sunflower following seedhead removal. *Plant Physiology* 91: 85-90.
- Hoballah MEF, Turlings TCJ (2001) Experimental evidence that plants under caterpillar attack may benefit from attracting parasitoids. *Evolutionary Ecology Research* 3: 553-565.
- Hoch WA, Singaas EL, McCown BH (2003) Resorption protection. anthocyanins facilitate nutrient recovery in autumn by shielding leaves from potentially damaging light levels. *Plant Physiology*, November 133: 1-10.
- Hoch WA, Zeldin EL, McCown BH (2001) Physiological significance of anthocyanins during autumnal leaf senescence. *Tree Physiology* 21: 1-8.
- Hoefnagel MHN, Wiskich JT (1996) Alternative oxidase activity and the ubiquinone redox level in soybean cotyledon and Arum spadix mitochondria during NADH and succinate oxidation. *Plant Physiology* 110: 1329-1335.
- Holden M (1961) The breakdown of chlorophyll by chlorophyllase. *Biochemical Journal* 78: 359-364.
- Holden M (1972) Effects of EDTA and other compounds on chlorophyll breakdown in detached leaves. *Phytochemistry* 11: 2393-2402.
- Holopainen JK, Peltonen P (2002) Bright autumn colours of deciduous trees attract aphids: nutrient retranslocation hypothesis. *Oikos* 99: 184-188.
- Hondo T, Yoshida K, Nakagawa A, Kawai T, Tamura H, Goto T (1992) Structural basis of blue-colour development in flower petals from *Commelina communis*. *Nature* 358: 515-518.
- Hooper JK, Eggink LL (1999) Assembly of light-harvesting complex II and biogenesis of thylakoid membranes in chloroplasts. *Photosynthesis Research* 61: 197-215.
- Hopkins M, Taylor C, Liu Z, Ma F, McNamara L, Wang T-W, Thompson JE (2007) Regulation and execution of molecular disassembly and catabolism during senescence. *New Phytologist* 175: 201-214.
- Hormaetxe K, Hernandez A, Becerril JM, Garcia-Plazaola JI (2004) Role of red carotenoids in photoprotection during winter acclimation in *Buxus sempervirens* leaves. *Plant Biol.* 6: 325-332.
- Horner HT, Healy RA, Ren G, Fritz D, Klyne A, Seames C, Thornburg RW (2007) Amyloplast to chromoplast conversion in developing ornamental tobacco floral nectaries provides sugar for nectar and antioxidants for protection. *American Journal of Botany* 94:12-24.
- Hörtensteiner S (1998) NCC malonyltransferase catalyses the final step of chlorophyll breakdown in rape (*Brassica napus*). *Phytochemistry* 49: 953-956.

- Hörtensteiner S (1999) Chlorophyll breakdown in higher plants and algae. *Cellular and Molecular Life Sciences* 56: 330-347.
- Hörtensteiner S (2004) The loss of green color during chlorophyll degradation - a prerequisite to prevent cell death? *Planta* 219: 191-194.
- Hörtensteiner S (2006) Chlorophyll degradation during senescence. *Annual Review of Plant Biology* 57: 55-77.
- Hörtensteiner S, Chinner J, Matile P, Thomas H, Donnison IS (2000) Chlorophyll breakdown in *Chlorella protothecoides*: characterization of degreening and cloning of degreening-related genes. *Plant Molecular Biology* 42: 439-450.
- Hörtensteiner S, Feller U (2002) Nitrogen metabolism and remobilization during senescence. *Journal of Experimental Botany* 53: 927-937.
- Hörtensteiner S, Rodoni S, Schellenberg M, Vicentini F, Nandi OI, Qiu Y-L, Matile P (2000) Evolution of chlorophyll degradation: the significance of RCC reductase. *Plant Biology* 2: 63-67.
- Hörtensteiner S, Vicentini F, Matile P (1995) Chlorophyll breakdown in senescent cotyledons of rape, *Brassica napus* L.: enzymatic cleavage of phaeophorbide a in vitro. *New Phytologist* 129: 237-246.
- Hörtensteiner S, Vogt E, Hagenbuch B, Meier PJ, Amrhein N, Martinoia E (1993) Direct energization of bile acid transport into plant vacuoles. *Journal of Biological Chemistry* 268: 18446-18449.
- Hörtensteiner S, Wüthrich KL, Matile P (1998a) New aspects on the catabolic pathway of chlorophyll in senescent rape cotyledons. *Journal of Experimental Botany* 49 suppl: 65.
- Hörtensteiner S, Wüthrich KL, Matile P, Ongania K-H, Kräutler B (1998b) The key step in chlorophyll breakdown in higher plants. Cleavage of phaeophorbide a macrocycle by a monooxygenase. *Journal of Biological Chemistry* 273: 15335-15339.
- Horton P (1983) Relations between electron transport and carbon assimilation; simultaneous measurement of chlorophyll fluorescence, transthylakoid pH gradient and O₂ evolution in isolated chloroplasts. *Proceedings of the Royal Society, London (Biology)* 217: 405-416.
- Hotelling H (1933) Analysis of complex statistical variables into principal components. *Journal of Educational Psychology* 24: 417-441.
- Howarth CJ, Cavan GP, Skøt KP, Layton RHW, Hash CT, Witcombe JR. 1994. Mapping QTLs (quantitative trait loci) for heat tolerance in pearl millet. In: Witcombe, JR, Duncan RR (eds). *Use of Molecular Markers in Sorghum and Pearl Millet Breeding for Developing Countries*, Proceedings of and ODA Plant Sciences Research Programme Conference, Norwich. Overseas Development Administration.
- Howitt CA, Pogson BJ (2006) Carotenoid accumulation and function in seeds and non-green tissues. *Plant, Cell and Environment* 29: 435-445.

- Hu G, Richter TE, Hulbert SH, Pryor T (1996) Disease lesion mimicry caused by mutations in the rust resistance gene *rp1*. *Plant Cell* 8: 1367-1376.
- Hu,G, Yalpani N, Briggs SP, Johal GS (1998) A porphyrin pathway impairment is responsible for the phenotype of a dominant disease lesion mimic mutant of maize. *Plant Cell* 10: 1095-1105.
- Huang Y-J, To K-Y, Yap M-N, Chiang W-J, Suen D-F, Chen S-CG (2001) Cloning and characterization of leaf senescence up-regulated genes in sweet potato. *Physiologia Plantarum* 113: 384-391.
- Hubank M, Schatz DG (1999) cDNA representational difference analysis: A sensitive and flexible method for identification of differentially expressed genes. *Methods in Enzymology* 303: 325-349.
- Huber DJ, Newman DW (1976). Relationships between lipid changes and plastid ultrastructural changes in senescing and regreening soybean cotyledons. *Journal of Experimental Botany* 27: 490-511.
- Huff A (1983) Nutritional control of regreening and degreening in citrus peel segments. *Plant Physiology* 73: 243-249.
- Hughes NM, Neufeld HS, Burkey KO (2005) Functional role of anthocyanins in high-light winter leaves of the evergreen herb *Galax urceolata*. *New Phytologist* 168: 575-587.
- Hukmani P, Tripathy BC (1994) Chlorophyll biosynthetic reactions during senescence of excised barley (*Hordeum vulgare* L. cv IB65) leaves. *Plant Physiology* 105: 1295-1300.
- Humphreys MW, Pasakinskiene I (1996) Chromosome painting to locate genes for drought resistance transferred from *Festuca arundinacea* into *Lolium multiflorum*. *Heredity* 77: 530-534.
- Humphreys MW, Pasakinskiene I, James AR, Thomas H (1998) Physically mapping quantitative traits for stress resistance in forage grasses. *Journal of Experimental Botany* 49: 1611-1618.
- Hunt R (1982) *Plant Growth Curves: the Functional Approach to Plant Growth Analysis*. London: Edward Arnold.
- Hutchinson TC (1967) Comparative studies of the ability of species to withstand prolonged periods of darkness. *Journal of Ecology* 55: 291-299.
- Huxley JS (1924) Constant differential growth-ratios and their significance. *Nature* 114: 895-896.
- Hynninen, PH (1991) Chemistry of chlorophylls: modifications. In: *Chlorophylls* (Scheer H ed) pp 145-209. Boca Raton: CRC Press.
- Imai K, Suzuki Y, Mae T, Makino A (2008) Changes in the synthesis of rubisco in rice leaves in relation to senescence and N influx. *Annals of Botany*. 101: 135-144.

- Inada N, Sakai A, Kuroiwa H, Kuroiwa T (1998) Three-dimensional analysis of the senescence program in rice (*Oryza sativa* L.) coleoptiles. *Planta* 206: 585-597.
- Irani NG, Grotewold E (2005) Light-induced morphological alteration in anthocyanin-accumulating vacuoles of maize cells. *BMC Plant Biology* 5: 7 (<http://www.biomedcentral.com/1471-2229/5/7>)
- Ishikura N (1972) Autumnal reddening of leaves .1. Anthocyanins and other phenolics in autumn Leaves. *Phytochemistry* 11: 2555-2558.
- Ishimaru K, Yano M, Aoki N, Ono K, Hirose T, Lin SY, Monna L, Sasaki T, Ohsugi R (2001) Toward the mapping of physiological and agronomic characters on a rice function map: QTL analysis and comparison between QTLs and expressed sequence tags. *Theoretical and Applied Genetics* 102: 793-800.
- Ito H, Ohysuka T, Tanaka A (1996) Conversion of chlorophyll b to chlorophyll a via 7-hydroxymethyl chlorophyll. *Journal of Biological Chemistry* 271: 1475-1479.
- Ito H, Takaichi S, Tsuji H, Tanaka, A (1994) Properties of synthesis of chlorophyll a from chlorophyll b in cucumber etioplasts. *Journal of Biological Chemistry* 269: 22034-22038.
- Ito H, Tanaka Y, Tsuji H, Tanaka A (1993) Conversion of chlorophyll b to chlorophyll a by isolated cucumber etioplasts. *Archives of Biochemistry and Biophysics* 306: 148-151.
- Iturraspe J, Engel N, Gossauer A (1994) Chlorophyll catabolism. Isolation and structure elucidation of chlorophyll b catabolites in *Chlorella protothecoides*. *Phytochemistry* 35: 1387-1390.
- Iturraspe J, Moyano N, Frydman B (1995) A new 5-formylbilinone as the major chlorophyll a catabolite in tree senescent leaves. *Journal of Organic Chemistry* 60: 6664-6665.
- Jackson MB, Ram PC (2003) Physiological and molecular basis of susceptibility and tolerance of rice plants to complete submergence. *Annals of Botany* 91: 227-241.
- Jakob-Wilk D, Holland D, Goldschmidt EE, Riov J, Eyal Y (1999) Chlorophyll breakdown by chlorophyllase: isolation and functional expression of the Chlase1 gene from ethylene-treated Citrus fruit and its regulation during development. *Plant Journal* 20: 653-661.
- Janave MT (1997) Enzymic degradation of chlorophyll in cavendish bananas: in vitro evidence for two independent degradative pathways. *Plant Physiology and Biochemistry* 35: 837-846.
- Jansson S, Thomas H (2007) Senescence – developmental program or timetable? *New Phytologist*.
- Jeanneau M, Gerentes D, Foueillassar X, Zivy M, Vidal J, Toppan A, Perez P (2002) Improvement of drought tolerance in maize: towards the functional validation of the Zm-Asr1 gene and increase of water use efficiency by over-expressing C4-PEPC. *Biochimie* 84: 1127-1135.
- Ji SB, Yokoi M, Saito N, Mao LS (1992) Distribution of anthocyanins in Aceraceae leaves. *Biochemical and Systematic Ecology* 20: 771-781.

- Jiang C-Z, Rodermel SR, Shibles RM (1993) Photosynthesis, Rubisco activity and amount, and their regulation by transcription in senescing soybean leaves. *Plant Physiology* 101: 105-112.
- Jiang GH, He YQ, Xu CG, Li XH, Zhang Q (2004) The genetic basis of stay-green in rice analyzed in a population of doubled haploid lines derived from an indica by japonica cross. *Theoretical and Applied Genetics* 108: 688-698.
- Jiang H, Li M, Liang N, Yan H, Wei Y, Xu X, Liu J, Xu Z, Chen F, Wu G (2007) Molecular cloning and function analysis of the stay green gene in rice. *Plant Journal* 52: 197-209.
- Jiang L, Rogers JC (2001) Compartmentation of proteins in the protein storage vacuole: a compound organelle in plant cells. *Advances in Botanical Research* 35: 139-170.
- Jin YK, Bennetzen JL (1994) Integration and nonrandom mutation of a plasma-membrane proton ATPase gene fragment within the bs1 retroelement of maize. *Plant Cell* 6: 1177-1186.
- Jing H-C, Hille J, Dijkwel PP (2003) Ageing in plants: conserved strategies and novel pathways. *Plant Biology* 5: 455-464.
- Jing H-C, Schippers JHM, Hille J, Dijkwel PP (2005) Ethylene-induced leaf senescence depends on age-related changes and OLD genes in Arabidopsis. *Journal of Experimental Botany* 56: 2915-2923.
- John I, Drake R, Farrell A, Cooper W, Lee P, Horton P, Grierson D (1995) Delayed leaf senescence in ethylene-deficient ACC-oxidase antisense tomato plants: molecular and physiological analysis. *Plant Journal* 7: 483-490.
- John I, Drake R, Farrell A, Cooper W, Lee P, Horton P, Grierson D (1995) Delayed leaf senescence in ethylene-deficient ACC-oxidase antisense tomato plants. *Molecular and physiological analysis. Plant Journal* 7: 483-490
- John I, Hackett R, Cooper W, Drake R, Farrell A, Grierson D (1997) Cloning and characterization of tomato leaf senescence-related cDNAs. *Plant Molecular Biology* 33: 641-651.
- Johnson IR, Thornley JHM (1983) Vegetative crop growth model incorporating leaf area expansion and senescence, and applied to grass. *Plant Cell and Environment* 6: 721-729.
- Johnson-Flanagan AM, Spencer MS (1996) Chlorophyllase and peroxidase activity during degreening of maturing canola (*Brassica napus*) and mustard (*Brassica juncea*) seed. *Physiologia Plantarum* 97: 353-359.
- Jonasson S (1989) Implications of leaf longevity, leaf nutrient re-absorption and translocation for the resource economy of five evergreen plant species. *Oikos* 56: 121-131.
- Jones AM, Dangl JL (1996) Logjam at the Styx: programmed cell death in plants. *Trends in Plant Science* 1: 114-119.
- Jones AM, Dangl JL (1996) Logjam at the Styx: programmed cell death in plants. *Trends in Plant Science* 1: 114-119.

- Jones ES, Mahoney NL, Hayward MD, Armstead IP, Jones JG, Humphreys MO, King IP, Kishida T, Yamada T, Balfourier F, Charmet G, Forster JW (2002) An enhanced molecular marker based genetic map of perennial ryegrass (*Lolium perenne*) reveals comparative relationships with other Poaceae genomes. *Genome* 45: 282-295.
- Jones N, Ougham H, Thomas H (1997) Markers and mapping: we are all geneticists now. *New Phytologist* 137: 165-177.
- Jones PG, Laing DR (1978) Effects of phenological and meteorological factors on soybean yield. *Agricultural Meteorology* 19: 485-495.
- Jones TA, Zhang XY, Wang RRC (1999) Genome characterization of MT-2 perennial and OK-906 annual wheat x intermediate wheatgrass hybrids. *Crop Science* 39: 1041-1043.
- Jones TWA, Stoddart JL (1971) Enzyme changes in roots of healthy and phyllody-infected white clover *Trifolium repens* L. *Physiological Plant Pathology* 1: 385-396.
- Joppa LR, Du C, Hart GE, Hareland GA (1997) Mapping a QTL for grain protein in tetraploid wheat (*Triticum turgidum* L.) using a population of recombinant inbred chromosome lines. *Crop Science* 37: 1586-1589.
- Jun W, Shujun W, Yong Z, Lihui Z, Jiefen X, Jing H, Fang Yunxia F, Minghong G, Guohua L (2006) Genetic analysis and molecular mapping of a presenescing leaf gene *psl1* in rice (*Oryza sativa* L.). *Chinese Science Bulletin* 51: 2986-2992.
- Justin SHFW, Armstrong W (1987) The anatomical characteristics of roots and plant response to soil flooding. *New Phytologist* 106: 465-495
- Kamachi K, Yamaya T, Hayakawa T, Mae T, Ojima K (1992) Vascular bundle-specific localization of cytosolic glutamine-synthetase in rice leaves. *Plant Physiology* 99: 1481-1486.
- Kamara AY, Menkir A, Badu-Apraku B, Ibikunle O (2003) Reproductive and stay-green trait responses of maize hybrids, improved open-pollinated varieties and farmers' local varieties to terminal drought stress. *Maydica* 48: 29-37.
- Kang S-M, Titus JS (1980) Qualitative and quantitative changes in nitrogenous compounds in senescing leaf and bark tissues of the apple. *Physiologia Plantarum* 50: 285-290.
- Kannangara CG, Hansson M (1998) Arrest of chlorophyll accumulation prior to anthocyanin formation in *Euphorbia pulcherrima*. *Plant Physiology and Biochemistry* 36: 843-848.
- Kao CH (1980) Retardation of senescence by low temperature and benzyladenine in intact primary leaves of soybean. *Plant and Cell Physiology* 21: 339-344.
- Kaplan DR (2001) The science of plant morphology: definition, history, and role in modern biology. *American Journal of Botany* 88: 1711-1741.
- Kaplan DR, Dengler NG, Dengler RE (1982) The mechanism of plication inception in palm leaves: histogenic observations on the palmate leaf of *Rhapis excelsa*. *Canadian Journal of Botany* 60: 2999-3016.

- Kaplan JM, Pigliucci M (2001) Genes 'for' phenotypes: a modern history view. *Biology and Philosophy* 16: 189-213.
- Kariola T, Brader G, Li J, Palva ET (2005) Chlorophyllase 1, a damage control enzyme, affects the balance between defense pathways in plants. *Plant Cell* 17: 282-294.
- Karunen P, Kalviainen E (1985) Senescence and post-mortem changes in the ultrastructure of *Sphagnum fuscum* (Klinggr.) Schleich leaf cells. *New Phytologist* 100: 419-427.
- Kato H, Sutoh K, Minamikawa T (2003) Identification, cDNA cloning and possible roles of seed-specific rice asparaginyl endopeptidase, REP-2. *Planta* 217: 676-685.
- Kaufmann MR (1996) To live fast or not: growth, vigor, and longevity of old-growth ponderosa pine and lodgepole pine trees. *Tree Physiology* 16: 139-144.
- Kawai M, Pan L, Reed JC, Uchimiya H (1999) Evolutionally conserved plant homologue of the Bax Inhibitor-1 (BI-1) gene capable of suppressing Bax-induced cell death in yeast. *FEBS Letters* 464: 143-147.
- Kawai M, Uchimiya H (2000) Coleoptile senescence in Rice (*Oryza sativa* L.) *Annals of Botany* 86: 405-414.
- Kebede H, Subudhi PK, Rosenow DT, Nguyen HT (2001) Quantitative trait loci influencing drought tolerance in grain sorghum (*Sorghum bicolor* L. Moench). *Theoretical and Applied Genetics* 103: 266-276.
- Keech O, Pesquet E, Ahad A, Askne A, Nordvall D, Vodnala SM, Tuominen H, Hurry V, Dizengremel P, Gardeström P (2007) The different fates of mitochondria and chloroplasts during dark-induced senescence in *Arabidopsis* leaves. *Plant, Cell and Environment* 30: 1523-1534.
- Kefalas P, Yupsanis T (1995) Properties and specificity of a calcium-dependent endonuclease from germinated lentil (*Lens culinaris*). *Journal of Plant Physiology* 146: 1-9.
- Kelly TG, Parthasarathy Rao P, Walker TS (1991) The relative value of cereal straw fodder in the semi-arid tropics of India: implications for cereal breeding programmes at ICRISAT. In: Dvorak K (ed). *Social Science Research for Agricultural Technology Development*. CABI.
- Kenfield D, Bunkers G, Wu YH, Strobel G, Sugawara F, Hallock Y, Clardy J (1989) Giganantenone, a novel sesquiterpene phytohormone mimic. *Experientia* 45: 900-902.
- Kerr JFR, Wyllie AH, Currie AR (1972) Apoptosis: a basic biological phenomenon with wide-ranging implications in tissue kinetics. *British Journal of Cancer* 26: 239-257.
- Keskitalo J, Bergquist G, Gardeström P, Jansson S (2005) A cellular timetable of autumn senescence. *Plant Physiology* 139: 1635-1648.
- Kessler F, Schnell D, Blobel G (1999) Identification of proteins associated with plastoglobules isolated from pea (*Pisum sativum* L.) chloroplasts. *Planta* 208: 107-113.
- Keys AJ, Bird IF, Cornelius MJ, Lea PJ, Wallsgrave RM, Mifflin BJ (1978) Photorespiratory nitrogen cycle. *Nature* 275: 228-234.

Khan IA, Procnier JD, Humphreys DG, Tranquilli G, Schlatter AR, Marcucci-Poltri S, Froberg R, Dubcovsky J (2000) Development of PCR based markers for a high grain protein content gene from *Triticum turgidum* ssp. *dicoccoides* transferred to bread wheat. *Crop Science* 40: 518–524.

Kidder JT (1981) *The Soul of a New Machine*. London: Allen Lane.

Kim J-S, Klein PE, Klein RR, Price HJ, Mullet JE, Stelly DM (2005) Chromosome identification and nomenclature of *Sorghum bicolor*. *Genetics* 169: 1169-1173.

King IP, Morgan WG, Armstead IP, Harper JA, Hayward MD, Bollard A, Nash JV, Forster JW, Thomas HM (1998) Introgression mapping in the grasses. I. Introgression of *Festuca pratensis* chromosomes and chromosome segments into *Lolium perenne*. *Heredity* 81: 462-467.

King J, Armstead IP, Donnison IS, Harper JA, Roberts LA, Thomas H, Ougham HJ, Thomas A, Huang L, King IP (2007a) Introgression mapping in the grasses. *Chromosome Research* 15: 105-113.

King J, Armstead IP, Donnison IS, Roberts LA, Harper JA, Skøt K, Elborough K, King IP (2007b) Comparative analyses between *Lolium/Festuca* introgression lines and rice reveal the major fraction of functional annotated gene models are located in recombination poor/very poor regions of the genome. *Genetics* (in press).

King J, Armstead IP, Donnison IS, Thomas HM, Jones RN, Kearsey MJ, Roberts LA, Jones A, King IP (2002) Physical and genetic mapping in the grasses *Lolium perenne* and *Festuca pratensis*. *Genetics* 161: 307-314.

Kingston-Smith AH, Thomas H, Foyer CH (1997) Chlorophyll a fluorescence, enzyme and antioxidant analyses provide evidence for the operation of alternative electron sinks during leaf senescence in a stay-green mutant of *Festuca pratensis*. *Plant Cell and Environment* 20: 1323-1337.

Kinoshita T, Nishimura M, Hara-Nishimura I (1995) The sequence and expression of the gamma-VPE gene, one member of a family of three genes for vacuolar processing enzymes in *Arabidopsis thaliana*. *Plant and Cell Physiology* 36: 1555-1562.

Kirchoff BK (2001) From Agnes Arber to new explanatory models for vascular plant development. *Annals of Botany* 88: 1103-1104.

Kirk JTO, Tilney-Bassett RAE (1978) *The Plastids: Their Chemistry, Structure, Growth and Inheritance*. Amsterdam: Elsevier.

Kirsten W (1983) *Organic elemental analysis: Ultramicro, micro, and trace methods*. New York: Academic Press-Harcourt Brace Jovanovich.

Kiss HG, Koning RE (1989) Endogenous levels and transport of 1-aminocyclopropane-1-carboxylic acid in stamens of *Ipomoea Nil* (Convolvulaceae). *Plant Physiology* 90: 157-161.

Kivimäenpää M, Sutinen S (2007) Microscopic structure of Scots pine (*Pinus sylvestris* (L.)) needles during ageing and autumnal senescence. *Trees - Structure and Function* 21: 645-659.

- Kleber-Janke T, Krupinska K (1997) Isolation of cDNA clones for genes showing enhanced expression in barley leaves during dark-induced senescence as well as during senescence under field conditions. *Planta* 203: 332-340.
- Klee HJ (2002) Control of ethylene-mediated processes in tomato at the level of receptors. *Journal of Experimental Botany* 53: 2057-2063.
- Klekowski EJ (1988) Progressive cross- and self-sterility associated with aging in fern clones and perhaps other plants. *Heredity* 61: 247-253.
- Klinkert MQ, Felleisen R, Link G, Ruppel A, Beck E (1989) Primary structures of Sm31/32 diagnostic proteins of *Schistosoma mansoni* and their identification as proteases. *Molecular and Biochemical Parasitology* 33: 113-22.
- Klionsky DJ, Emr SD (2000) Autophagy as a regulated pathway of cellular degradation. *Science* 290: 1717.
- Koeberl MJ, Maravolo NC (2006) The influence of spermine and 6-benzylaminopurine on putative caspase activity during senescence in *Marchantia polymorpha* thalli. *International Journal of Plant Sciences* 167: 1115-1122.
- Koes RE, Quattrocchio F, Mol JNM (1994) The flavonoid biosynthetic-pathway in plants - function and evolution. *BioEssays* 16: 123-132.
- Koiwa H Ikeda T, Yoshida Y (1986) Reversal of chromoplasts to chloroplasts in *Buxus* leaves. *Botanical Magazine of Tokyo* 99: 233-240.
- Koornneef M, Alonso-Blanco C, Vreugdenhil D (2004) Naturally occurring genetic variation in *Arabidopsis thaliana*. *Annual Review of Plant Biology* 55: 141-72.
- Kozela C, Regan S (2003) How plants make tubes. *Trends in Plant Science* 8: 159-164.
- Kräutler B (2002) Unravelling chlorophyll catabolism in higher plants. *Biochemical Society Transactions* 30: 625-630.
- Kräutler B, Hörtensteiner S (2006) Chlorophyll catabolites and the biochemistry of chlorophyll breakdown. In: *Chlorophylls and Bacteriochlorophylls: Biochemistry, Biophysics, Functions and Applications*. (Grimm B, Porra R, Rüdiger W, Scheer H, eds) pp. 237-260. Dordrecht: Springer.
- Kräutler B, Jaun B, Bortlik K.-H, Schellenberg M, Matile P (1991) On the enigma of chlorophyll degradation: the constitution of a secoporphanoid catabolite. *Angewandte Chemie International Edition in English* 30: 1315-1318.
- Kräutler B, Matile P (1999) Solving the riddle of chlorophyll breakdown. *Accounts of Chemical Research* 32: 35-43.
- Kräutler B, Mühlecker W, Anderl M, Gerlach B (1997) Breakdown of chlorophyll: partial synthesis of a putative intermediary catabolite. *Helvetica Chimica Acta* 80: 1355-1362.
- Kreuz K, Tommasini R, Martinoia E (1996) Old enzymes for a new job. Herbicide detoxification in plants. *Plant Physiology* 111: 349-353.

- Kruijt B (1989) Estimating canopy structure of an oak forest at several scales. *Forestry* 62: 269-284
- Kulaeva O (1962) The effect of roots on leaf metabolism in relation to the action of kinetin on leaves. *Soviet Plant Physiology* 9: 182-189.
- Kumari M, Singh VP, Tripathi R, Joshi AK (2005) Variation for staygreen trait and its association with canopy temperature depression and yield traits under terminal heat stress in wheat. In: *Wheat Production in Stressed Environments. Proceedings of the 7th International Wheat Conference, 27 November–2 December 2005, Mar del Plata, Argentina* (ed Buck HT, Nisi JE, Salomón N) pp 357-363. Netherlands: Springer.
- Kundu R, Dixon AFG (1995) Evolution of complex life cycles in aphids. *Journal of Animal Ecology* 64: 245-255.
- Kura-Hotta M, Hashimoto H, Satoh, Katoh S (1990) Quantitative determinations of changes in the number and size of chloroplasts in naturally senescing leaves of rice seedlings. *Plant and Cell Physiology* 31: 33-38.
- Kuriyama H, Fukuda H (2002) Developmental programmed cell death in plants. *Current Opinion in Plant Biology* 5: 568-573.
- Kuroda M, Ozawa T, Imagawa H (1990) Changes in chloroplast peroxidase activities in relation to chlorophyll loss in barley leaf segments. *Physiologia Plantarum* 80: 555-560.
- Kusaba M, Ito H, Morita R, Iida S, Sato Y, Fujimoto M, Kawasaki S, Tanaka R, Hirochika H, Nishimura M, Tanaka A (2007) Rice NON-YELLOW COLORING1 is involved in light-harvesting complex II and grana degradation during leaf senescence. *Plant Cell* 19: 1362-1375.
- Kytridis V-P, Manetas Y (2006) Mesophyll versus epidermal anthocyanins as potential in vivo antioxidants: evidence linking the putative antioxidant role to the proximity of oxy-radical source. *Journal of Experimental Botany* 57: 2203-2210.
- Lachmann M, Szamado S, Bergstrom CT (2001) Cost and conflict in animal signals and human language. *Proceedings of the National Academy of Sciences, USA* 98: 13189-13194.
- Laemmli UK (1970) Cleavage of structural proteins during the assembly of the head of bacteriophage T4. *Nature* 227: 681-685.
- Lajtha K, Whitford WG (1989) Effect of water and nitrogen amendments on photosynthesis, leaf demography, and resource-use efficiency in *Larrea tridentata*, a desert evergreen shrub. *Oecologia* 80: 341-348.
- Langmeier M, Ginsburg S, Matile P (1993) Chlorophyll breakdown in senescent leaves - demonstration of Mg-dechelataase activity. *Physiologia Plantarum* 89: 347-353.
- Lauer D (1982) Foliar fertilization of dry beans with zinc and NPKS. *Agronomy Journal* 74: 339-344.
- Lawn RJ, Brun WA (1974) Symbiotic nitrogen fixation in soybeans. I. Effect of photosynthetic source-sink manipulations. *Crop Science* 14: 11-16.

- Lebreton C, Lazicjancic V, Steed A, Pekic S, Quarrie SA (1995) Identification of QTL for drought responses in maize and their use in testing causal relationships between traits. *Journal of Experimental Botany* 46: 853-865.
- Lee D (2007) *Nature's Palette. The Science of Plant Color*. Chicago University Press.
- Lee DW (2002) Anthocyanins in autumn leaf senescence. *Advances In Botanical Research* 37: 147-165 .
- Lee DW, Gould KS (2002) Anthocyanins in leaves and other vegetative organs: An introduction. *Advances in Botanical Research* 37: 1-16.
- Lee DW, Gould KS (2002) Why leaves turn red. *American Scientist* 90: 524-531.
- Lee DW, O'Keefe J, Holbrook NM, Feild TS (2003) Pigment dynamics and autumn leaf senescence in a New England deciduous forest, eastern USA. *Ecological Research* 18: 677-694.
- Lee JA, Caporn SJM (1998) Ecological effects of atmospheric reactive nitrogen deposition on semi-natural terrestrial ecosystems. *New Phytologist* 139: 127-134.
- Lee R-H, Chen S-CG (2002) Programmed cell death during rice leaf senescence is nonapoptotic. *New Phytologist* 155: 25-32.
- Leishman MR, Westoby M, Jurado E (1995) Correlates of seed size variation - a comparison among 5 temperate floras. *Journal of Ecology* 83: 517-529.
- Lemon ER, Wright JL (1969) Photosynthesis under field conditions. XA. Assessing sources and sinks of carbon dioxide in a corn (*Zea mays* L.) crop using a momentum balance approach. *Agronomy Journal* 61: 405-411.
- Leopold AC (1961) Senescence in plant development. *Science* 134: 1727-1732.
- Leopold AC (1975) Aging, senescence, and turnover in plants. *Bioscience* 25: 659-662.
- Leopold AC, Niedergang-Kamien E, Janick J (1959) Experimental modification of plant senescence. *Plant Physiology* 34: 570-573.
- Lers A, Sonogo L, Green PJ, Burd S (2006) Suppression of LX ribonuclease in tomato results in a delay of leaf senescence and abscission. *Plant Physiology* 142: 710-721.
- Lersten NR, Czapinski AR, Curtis JD, Freckmann R, Horner HT (2006) Oil bodies in leaf mesophyll cells of angiosperms: overview and a selected survey. *American Journal of Botany* 93: 1731-1739.
- Levey S, Wingler A (2005) Natural variation in the regulation of leaf senescence and relation to other traits in *Arabidopsis*. *Plant, Cell and Environment* 28: 223-231.
- Lev-Yadun S (2001) Intrusive growth - the plant analog of dendrite and axon growth in animals. *New Phytologist* 150: 508-512.
- Lev-Yadun S (2005) Shade avoidance and Zahavi's handicap principle in dense plant populations. *Biological Journal of the Linnean Society* 84: 313-319.

- Lev-Yadun S, Dafni A, Flaishman MA, Inbar M, Izhaki I, Katzir G, Ne'eman G (2004) Plant coloration undermines herbivorous insect camouflage. *BioEssays* 26: 1126-1130.
- Lev-Yadun S, Gould KS (2007) What do red and yellow autumn leaves signal? *Botanical Review* 73: 279–289.
- Li FZ, Hu GC, Fu YP, Si HM, Bai XM, Sun ZX (2005) Genetic analysis and high-resolution mapping a premature senescence gene 'Pse(t)' in rice (*Oryza sativa* L.). *Genome* 48: 738–746.
- Li J, Wang DY, Li Q, Xu YJ, Cui KM, Zhu YX (2004) PPF1 inhibits programmed cell death in apical meristems of both G2 pea and transgenic *Arabidopsis* plants possibly by delaying cytosolic Ca²⁺ elevation. *Cell Calcium* 35: 71-77.
- Li Q, Bettany AJE, Donnison I, Griffiths CM, Thomas H, Scott IM (2000) Characterisation of a cysteine protease cDNA from *Lolium multiflorum* leaves and its expression during senescence and cytokinin treatment. *Biochimica et Biophysica Acta - Gene Structure and Expression* 1492: 233-236.
- Li Q, Robson PRH, Bettany AJE, Donnison IS, Thomas H, Scott IM (2004) Modification of senescence in ryegrass transformed with IPT under the control of a monocot senescence-enhanced promoter. *Plant Cell Reports* 22: 816 - 821.
- Li W, Ruf S, Bock R (2006) Constancy of organellar genome copy numbers during leaf development and senescence in higher plants. *Molecular Genetics and Genomics* 275: 185-192.
- Li Y, Walton DC (1987) Xanthophylls and abscisic acid biosynthesis in water-stressed bean leaves. *Plant Physiology* 85: 910-915.
- Lichtenthaler, H.K (1985) In: *Control of Leaf Growth* (Baker NR, Davies WJ, Ong CK eds), pp 201-221. Cambridge University Press.
- Lim PO, Kim HJ, Nam HG (2006) Leaf senescence. *Annual Review of Plant Biology* 58: 115-136.
- Lim PO, Kim Y, Breeze E, Koo JC, Woo HR, Ryu JS, Park DH, Beynon J, Tabrett A, Buchanan-Wollaston V, Nam HG (2007) Overexpression of a chromatin architecture-controlling AT-hook protein extends leaf longevity and increases the post-harvest storage life of plants. *Plant Journal* 52: 1140-1153.
- Lim PO, Woo HR, Nam HG (2003) Molecular genetics of leaf senescence in *Arabidopsis*. *Trends in Plant Science* 8: 272-8.
- Lin J-F, Wu S-H (2004) Molecular events in senescing *Arabidopsis* leaves. *Plant Journal* 39: 612–628.
- Lindoo SJ, Noodén LD (1977) Studies on the behaviour of the senescence signal in Anoka soybeans. *Plant Physiology* 59: 1136-1140.
- Lindoo SJ, Noodén LD (1978) Correlation of cytokinins and abscisic acid with monocarpic senescence in soybeans. *Plant and Cell Physiology* 19: 997-1006.

- Linnestad C, Doan DNP, Brown RC, Lemmon BE, Meyer DJ, Jung R, Olsen OA (1998) Nucellain, a barley homolog of the dicot vacuolar-processing protease, is localized in nucellar cell walls. *Plant Physiology* 118: 1169-1180.
- Lisch D, Carey CC, Dorweiler JE, Chandler VL (2002) A mutation that prevents paramutation in maize also reverses Mutator transposon methylation and silencing. *Proceedings of the National Academy of Sciences USA* 99: 6130-6135.
- Lisitsyn N, Lisitsyn N, Wigler M (1993) Cloning the differences between 2 complex genomes. *Science* 259: 946-951.
- Ljubešić N (1968) Feinbau der Chloroplasten während der Vergilbung und Wiedergrünung der Blätter. *Protoplasma* 66: 369-379.
- Lloyd JC, Zakhleniuk OV (2004) Responses of primary and secondary metabolism to sugar accumulation revealed by microarray expression analysis of the Arabidopsis mutant, pho3. *Journal of Experimental Botany* 55: 1221-1230.
- Lockhart JA; Gottschall V (1961) Fruit-induced and apical senescence in *Pisum sativum* L. *Plant Physiology* 36: 389–398.
- Lohman KN, Gan SS, John MC, Amasino RM (1994) Molecular analysis of natural leaf senescence in *Arabidopsis thaliana*. *Physiologia Plantarum* 92: 322-328.
- Lombardi L, Ceccarelli N, Picciarelli P, Lorenzi R (2007a) DNA degradation during programmed cell death in *Phaseolus coccineus* suspensor. *Plant Physiology and Biochemistry* 45: 221-227.
- Lombardi L, Ceccarelli N, Picciarelli P, Lorenzi R (2007b) Caspase-like proteases involvement in programmed cell death of *Phaseolus coccineus* suspensor. *Plant Science* 172: 573-578.
- Longman KA, Jenik J (1987) *Tropical Forest and its Environment*. 2nd edition. London: Longman.
- Lord E (2000), Adhesion and cell movement during pollination: cherchez la femme, *Trends in Plant Science* 5: 368-373.
- Louda J W, Li J, Liu L, Winfree MN, Baker EW (1998) Chlorophyll a degradation during cellular senescence and death. *Organic Geochemistry* 29: 1233-1251.
- Lu Y-P, Li Z-S, Drozdowicz Y-M, Hörtensteiner S, Martinoia E, Rea PA (1998) AtMRP2, an Arabidopsis ATP binding cassette transporter able to transport glutathione S-conjugates and chlorophyll catabolites: functional comparisons with AtMRP1. *Plant Cell* 10: 267-282.
- Lu Y-P, Li Z-S, Rea PA (1997) AtMRP1 of *Arabidopsis thaliana* encodes a glutathione S-conjugate pump: isolation and functional definition of a plant ATP-binding cassette transporter gene. *Proceedings of the National Academy of Science USA* 94: 42-47.
- Ludlow MM, Ng TT (1974) Water stress suspends leaf ageing. *Plant Science Letters* 3: 235-240.

Luehrsen KR, Walbot V (1992) Insertion of non-intron sequence into maize introns interferes with splicing. *Nucleic Acids Research* 20: 5181-5187.

Lüthy B, Matile P, Thomas H (1986) Properties of linolenic acid-dependent chlorophyll oxidation activity in thylakoid membranes. *Journal of Plant Physiology* 123: 169-180.

Lüthy B, Thomas H, Matile P (1985) Linolenic acid-dependent "chlorophyll oxidase" activity: a property of photosystems I and II. *Journal of Plant Physiology* 123: 203-209.

Luquez VMC, Sasal Y, Medrano M, Martin MI, Mujica M, Guiamet JJ (2006) Quantitative trait loci analysis of leaf and plant longevity in *Arabidopsis thaliana*. *Journal of Experimental Botany* 57: 1363-1372.

Lynch AJJ, Barnes RW, Cambecèdes J, Vaillancourt RE (1998) Genetic evidence that *Lomatia tasmanica* (Proteaceae) is an ancient clone. *Australian Journal of Botany* 46: 25-33.

Ma BL, Dwyer LM (1998) Nitrogen uptake and use of two contrasting maize hybrids differing in leaf senescence. *Plant and Soil* 199: 283-291.

Ma C-X, Casella G, Wu RL (2002) Functional mapping of quantitative trait loci underlying the character process: a theoretical framework. *Genetics* 161: 1751-1762.

Mach JM, Castillo AR, Hoogstraten R, Greenberg JT (2001) The *Arabidopsis*-accelerated cell death gene *ACD2* encodes red chlorophyll catabolite reductase and suppresses the spread of disease symptoms. *Proceedings of the National Academy of Sciences, USA* 98: 771-776.

Mae T, Thomas H, Gay AP, Makino A, Hidema J (1993) Leaf development in *Lolium temulentum*: photosynthesis and photosynthetic proteins in leaves senescing under different irradiances. *Plant and Cell Physiology* 34: 391-399.

Mahalakshmi V, Bidinger FR (2002) Evaluation of putative stay-green sorghum germplasm lines. *Crop Science* 42: 965-974.

Makino A, Mae T, Ohira K (1985) Photosynthesis and ribulose-1,5-bisphosphate carboxylase/oxygenase in rice leaves from emergence through senescence. Quantitative analysis by carboxylation/oxygenation and regeneration of ribulose 1,5-bisphosphate. *Planta* 166: 414-420.

Makino A, Mae T, Ohira K (1984) Changes in photosynthetic capacity in rice leaves from emergence through senescence. Analysis from ribulose-1,5-bisphosphate carboxylase and leaf conductance. *Plant and Cell Physiology* 25: 429-437.

Makino A, Osmond B (1991) Effect of nitrogen nutrition on nitrogen partitioning between chloroplasts and mitochondria in pea and wheat. *Plant Physiology* 96: 355-362.

Malik NSA (1987) Senescence in oat leaves: changes in translatable mRNAs. *Physiologia Plantarum* 70: 438-446.

Manetas Y (2006) Why some leaves are anthocyanic and why most anthocyanic leaves are red? *Flora - Morphology, Distribution, Functional Ecology of Plants* 201: 163-177.

Manetas Y (2006) Why some leaves are anthocyanic and why most anthocyanic leaves are red? *Flora - Morphology, Distribution, Functional Ecology of Plants* 201: 163-177.

Manly BFJ (2000) *Multivariate Statistical Methods A Primer*. Boca Raton: CRC Press.

Maravolo NC (1980) Control of development in hepatics. *Bulletin of the Torrey Botanical Club* 107: 308-324.

Marbà N, Duarte CM, Agustí S (2007) Allometric scaling of plant life history. *Proceedings of the National Academy of Sciences, USA* 104: 15777–15780.

Marchoux G (1987) Interactions entre virus chez un hôte commun. 1. Interférences négatives, antagonisme, prémunition, résistance induite. *Agronomie* 7: 149-162.

Marder JB, Barber J (1989) The molecular anatomy and function of thylakoid proteins. *Plant Cell and Environment* 12: 595-614.

Marquardt J (1998) Effects of carotenoid depletion on the photosynthetic apparatus of a *Galdieria sulphuraria* (Rhodophyta) strain that retains its photosynthetic apparatus in the dark. *Journal of Plant Physiology* 152: 372-380.

Martin A, Belastegui-Macadam X, Quillere I, Floriot M, Valadier MH, Pommel B, Andrieu B, Donnison I, Hirel B (2005) Nitrogen management and senescence in two maize hybrids differing in the persistence of leaf greenness: agronomic, physiological and molecular aspects. *New Phytologist* 167: 483-492.

Martin A, Belastegui-Macadam X, Quilleré I, Floriot M, Valadier M-H, Pommel B, Andrieu B, Donnison I, Hirel B (2005) Physiological and molecular characterization of the stay-green phenotype in a maize hybrid. *New Phytologist* 167: 483-492.

Martínez-Alonso C, Valladares F, Camarero JJ, Arias ML, Serrano M, Rodríguez JA (2007) The uncoupling of secondary growth, cone and litter production by intradecadal climatic variability in a mediterranean scots pine forest. *Forest Ecology and Management* 253: 19-29.

Martinoia E, Grill E, Tommasini R, Kreuz K, Amrhein N (1993) An ATP-dependent glutathione S-conjugate 'export' pump in the vacuolar membrane of plants. *Nature* 364: 247-249.

Martinoia E, Heck U, Dalling MJ, Matile P (1983) Changes in chloroplast number and chloroplast constituents in senescing barley leaves. *Biochemie und Physiologie der Pflanzen* 178: 147-155.

Martinoia E, Klein M, Geisler M, Sánchez-Fernández R, Rea P A (2000) Vacuolar transport of secondary metabolites and xenobiotics. *Annual Plant Reviews* 5: 221-253.

Marx GA (1983) Developmental mutants in some annual seed plants. *Annual Review of Plant Physiology* 34: 389-417.

Masclaux C, Quillere I, Gallais A, Hirel B (2001) The challenge of remobilisation in plant nitrogen economy. A survey of physio-agronomic and molecular approaches. *Annals of Applied Biology* 138: 69-81.

- Mason HS, Mullet JE (1990) Expression of two soybean vegetative storage protein genes during development and in response to water deficit, wounding, and jasmonic acid. *Plant Cell* 2: 569-579.
- Mathur J, Szabados L, Schäfer S, Grunenberg B, Lossow A, Jonas-Straube E, Schell J, Koncz C, Koncz-Kalman Z (1998) Gene identification with sequenced T-DNA tags generated by transformation of Arabidopsis cell suspension. *Plant Journal* 13: 707-716.
- Matile P (1992) Chloroplast senescence. In: *Crop Photosynthesis: Spatial and Temporal Determinants* (Baker NR, Thomas H eds.) pp. 413-440. Amsterdam: Elsevier.
- Matile P (1994) Fluorescent idioblasts in autumn leaves of Ginkgo-biloba. *Botanica Helvetica* 104: 87-92.
- Matile P (2000) Biochemistry of Indian summer: physiology of autumnal leaf coloration. *Experimental Gerontology* 35: 145-158.
- Matile P, Flach B, Eller B (1992) Spectral optical properties, pigments and optical brighteners in autumn leaves of Ginkgo biloba L. *Botanica Acta* 105: 13-17.
- Matile P, Ginsburg S, Schellenberg M, Thomas H (1987) Catabolites of chlorophyll in senescent leaves. *Journal of Plant Physiology* 129: 219-228.
- Matile P, Ginsburg S, Schellenberg M, Thomas H (1988) Catabolites of chlorophyll in senescing barley leaves are localized in the vacuoles of mesophyll cells. *Proceedings of the National Academy of Sciences, USA* 85: 9529-9532.
- Matile P, Hörtensteiner S, Thomas H (1999) Chlorophyll degradation. *Annual Review of Plant Physiology and Plant Molecular Biology* 50: 67-95.
- Matile P, Hörtensteiner S, Thomas H, Kräutler B (1996) Chlorophyll breakdown in senescent leaves. *Plant Physiology* 112: 1403-1409.
- Matile P, Schellenberg M (1996) The cleavage of phaeophorbide a is located in the envelope of barley gerontoplasts. *Plant Physiology and Biochemistry* 34: 55-59.
- Matile P, Schellenberg M, Peisker C (1992) Production and release of a chlorophyll catabolite in isolated senescent chloroplasts. *Planta* 187: 2320-235.
- Matile P, Schellenberg M, Vicentini F (1997) Localization of chlorophyllase in the chloroplast envelope. *Planta* 201: 96-99.
- Matin A, Nadeau JH (2001) Sensitized polygenic trait analysis. *Trends in Genetics* 17: 727-731.
- Maunder MJ, Brown SB, Woolhouse HW (1983) The appearance of chlorophyll derivatives in senescing tissue. *Phytochemistry* 22: 2443-2446.
- Maxwell K, Johnson GN (2000) Chlorophyll fluorescence—a practical guide. *Journal of Experimental Botany* 51: 659-668.

Mayfield S, Huff A (1986) Accumulation of chlorophyll, chloroplastic proteins and thylakoid membranes during reversion of chromoplasts to chloroplasts in *Citrus sinensis* epicarp. *Plant Physiology* 81: 30-35.

Maynard-Smith J, Harper D (2003) *Animal Signals*. Oxford University Press, Oxford.

McBee GG, Waskom RM, Miller FR, Creelman RA (1983) Effect of senescence and nonsenescence on carbohydrates in sorghum during late kernel maturity states. *Crop Science* 23: 372-376.

McConnaughay KDM, Coleman JS (1999) Biomass allocation in plants: Ontogeny or optimality? A test along three resource gradients. *Ecology* 80: 2581-2593.

McCormick S (2004) Control of male gametophyte development. *Plant Cell*, 16(Suppl.): S142–S153.

McCullagh P, Nelder JA (1989) *Generalized Linear Models*, 2nd edition. London: Chapman and Hall.

McFeeters RF (1975) Substrate specificity of chlorophyllase. *Plant Physiology* 55: 377-381.

McIntosh L (1994) Molecular biology of the alternative oxidase. *Plant Physiology* 105: 781-786.

Meeuse BJD (1975) Thermogenic respiration in aroids. *Annual Review of Plant Physiology* 26: 117-126.

Merckelbach A, Hasse S, Dell R, Eschlbeck A, Ruppel A (1994) cDNA sequences of *Schistosoma japonicum* coding for two cathepsin B-like proteins and Sj32. *Tropical Medicine and Parasitology* 45: 193-8.

Mergemann H, Sauter M (2000) ethylene induces epidermal cell death at the site of adventitious root emergence in rice. *Plant Physiology* 124: 609–614.

Merzlyak MN, Gitelson A (1995) Why and what for the leaves are yellow in autumn - on the interpretation of optical-spectra of senescing leaves (*Acer platanoides* L). *Journal of Plant Physiology* 145: 315-320.

Merzlyak MN, Gitelson AA, Chivkunova OB, Rakitin VYU (1999) Non-destructive optical detection of pigment changes during leaf senescence and fruit ripening. *Physiologia Plantarum* 106: 135-141.

Mesfin A, Froberg RC, Anderson JA (1999) RFLP markers associated with high grain protein from *Triticum turgidum* L. var. *dicoccoides* introgressed into hard red spring wheat. *Crop Science* 39: 508–513.

Meyerowitz EM (1997) Genetic control of cell division patterns in developing plants. *Cell* 88: 299-308.

Miao Y, Laun T, Zimmermann P, Zentgraf U (2004) Targets of the WRKY53 transcription factor and its role during leaf senescence in *Arabidopsis*. *Plant Molecular Biology* 55: 853-867.

- Michellini FJ (1958) *American Journal of Botany* 45: 525-533.
- Mickelson S, See D, Meyer FD, Garner JP, Foster CR, Blake TK, Fischer AM (2003) Mapping of QTL associated with nitrogen storage and remobilization in barley (*Hordeum vulgare* L.) leaves. *Journal of Experimental Botany* 54: 801–812.
- Milla R, Castro-Díez P, Maestro-Martínez M, Montserrat-Martí G (2005) Relationships between phenology and the remobilization of nitrogen, phosphorus and potassium in branches of eight Mediterranean evergreens. *New Phytologist* 168: 167–178.
- Millard P, Thompson CM (1989) *Journal of Experimental Botany* 40 1285-1289.
- Miller LS, Holt SC (1977) Effect of carbon dioxide on pigment and membrane content in *Synechococcus lividus*. *Archives of Microbiology* 115: 185-198.
- Mishina TE, Lamb C, Zeier J(2007) Expression of a nitric oxide degrading enzyme induces a senescence programme in *Arabidopsis*. *Plant Cell and Environment* 30: 39–52.
- Mitchell TM (1997) *Machine Learning*. New York: McGraw-Hill.
- Mittelheuser CJ, van Steveninck RFM (1971) The ultrastructure of wheat leaves. I. Changes due to natural senescence and effects of kinetin and ABA on detached leaves incubated in the dark. *Protoplasma* 73: 239-252.
- Miyake K, Ohtomi M, Yoshizawa H, Sakamoto Y, Nakayama K, Okada M (1995) Water soluble pigments containing xylose and glucose in gametangia of the green alga *Bryopsis maxima*. *Plant and Cell Physiology* 36: 109-113.
- Mjaaseth RR, Hagen SB, Yoccoz NG, Ims RA (2005) Phenology and abundance in relation to climatic variation in a sub-arctic insect herbivore–mountain birch system. *Oecologia* 145: 53-65.
- Mock HP, Keetman U, Kruse E, Rank B, Grimm B (1998) Defense responses to tetrapyrrole-induced oxidative stress in transgenic plants with reduced uroporphyrinogen decarboxylase or coproporphyrinogen oxidase activity. *Plant Physiology* 116: 107-116.
- Mol J, Grotewold E, Koes R (1998) How genes paint flowers and seeds. *Trends in Plant Science* 3: 212-217.
- Molisch H (1938) *The Longevity of Plants*. Lancaster, PA: Science Press.
- Monk CD (1966) An ecological significance of evergreenness. *Ecology* 47: 504-505.
- Moore BJ, Donnison I, Harper JA, Armstead I, King J, Thomas H, Jones RN, Jones TH, Thomas HM, Morgan WG, Thomas A, Ougham HJ, Huang L, Fentem PA, Roberts LA, King IP (2005) Molecular tagging of a senescence gene by introgression mapping of a mutant stay-green locus from *Festuca pratensis*. *New Phytologist* 165: 801-806.
- Morgan MT, Schoen DJ, Bataillon TM (1997) The evolution of self-fertilization in perennials. *American Naturalist* 150: 618-638.
- Morgan TH (1911) Chromosomes and associative inheritance. *Science (New Series)* 34: 636-638.

Morison JIL, Spence RA (1989) Early season temperatures and plant development. *Weather* 44: 176-179.

Moriyasu Y (1995) Examination of the contribution of vacuolar proteases to intracellular protein degradation in *Chara corallina*. *Plant Physiology* 109: 1309-1315.

Morris K; Thomas H; Rogers LJ (1996) Endopeptidases during the development and senescence of *Lolium temulentum* leaves. *Phytochemistry* 41: 377-384.

Moser D, Matile P (1997) Chlorophyll breakdown in ripening fruits of *Capsicum annuum*. *Journal of Plant Physiology* 150: 759-761.

Mothes K (1970) Über grüne Inseln. *Leopoldina* 15: 171-172.

Mothes K, Baudisch W (1958) Untersuchungen über die Reversibilität der Ausbleichung grüner Blätter. *Flora* 146: 521-531.

Mothes K, Engelbrecht L (1952) Über geschlorophyll echtsverschiedenen Stoffwechsel zureihausiger ein jahnger Pflanzen I. Untersuchungen über den Stickstoffumsatz beim Hanf (*Cannabis sativa* L.). *Flora* 139: 1-27.

Mothes K, Engelbrecht L, Kulajewa O (1959) Über die Wirkung des Kinetins auf Stickstoffverteilung und Eiweissynthese in isolierten Blättern. *Flora* 147: 445-464.

Mott JJ, McComb AJ (1975) Effects of moisture stress on the growth and reproduction of three annual species from an arid region of Western Australia. *Journal of Ecology* 63: 825-834.

Muchow RC, Carberry PS (1989) Environmental control of phenology and leaf growth in a tropically adapted maize. *Field Crops Research* 20: 221-236.

Mühlecker W, Kräutler B (1996) Breakdown of chlorophyll: constitution of nonfluorescing chlorophyll-catabolites from senescent cotyledons of the dicot rape. *Plant Physiology and Biochemistry* 34: 61-75.

Mühlecker W, Kräutler B, Ginsburg S, Matile P (1993) Breakdown of chlorophyll: the constitution of a secoporphanoid chlorophyll catabolite from senescent rape leaves. *Helvetica Chimica Acta* 76: 2976-2980.

Mühlecker W, Kräutler B, Moser D, Matile P, Hörtensteiner S (2000) Breakdown of chlorophyll: a fluorescent chlorophyll catabolite from sweet pepper (*Capsicum annuum*). *Helvetica Chimica Acta* 83: 278-286.

Mühlecker W, Ongania K-H, Kräutler B, Matile P, Hörtensteiner S (1997) Tracking down chlorophyll breakdown in plants: elucidation of the constitution of a 'fluorescent' chlorophyll catabolite. *Angewandte Chemie International Edition in English* 36: 401-404.

Müller T, Moser S, Ongania K-H, Pružinská A, Hörtensteiner S, Kräutler B (2006) A divergent path of chlorophyll breakdown in the model plant *Arabidopsis thaliana*. *ChemBioChem* 7: 40-42.

Müller-Dombois D, Ellenberg H (1974) *Aims and methods in vegetation ecology*. NY: Wiley.

- Munné-Bosch S (2007) Aging in perennials. *Critical Reviews in Plant Sciences* 26: 123–138.
- Munne-Bosch S, Penuelas J (2003) Photo- and antioxidative protection during summer leaf senescence in *Pistacia lentiscus* L. grown under Mediterranean field conditions. *Annals of Botany* 92: 385-391.
- Mur LJ, Kenton P, Lloyd A.J, Ougham H, Prats E (2008) The Hypersensitive Response; the centenary is upon us but how much do we know? *Journal of Experimental Botany* 59: 501-520.
- Muramatsu M, Fukazawa C (1993) A high-order structure of plant-storage proprotein allows its 2nd conversion by an asparagine-specific cysteine protease, a novel proteolytic-enzyme. *European Journal of Biochemistry* 215: 123-132.
- Murchie EH, Chen YZ, Hubbart S, Peng SB, Horton P (1999) Interactions between senescence and leaf orientation determine in situ patterns of photosynthesis and photoinhibition in field-grown rice. *Plant Physiology* 119: 553-563.
- Mýtinová Z; Haisel D; Wilhelmová N (2006) Photosynthesis and protective mechanisms during ageing in transgenic tobacco leaves with over-expressed cytokinin oxidase/dehydrogenase and thus lowered cytokinin content. *Photosynthetica* 44: 599-605.
- Naes T, Isaksson T, Fearn T, Davies T (2004) *Multivariate Calibration and Classification*. Chichester, UK: NIR publications.
- Naito K, Ueda K, Tsuji H (1981) Differential effects of benzyladenine on the ultrastructure of chloroplasts in intact bean leaves according to their age. *Protoplasma* 105: 293-306.
- Nakagawa A, Sakamoto S, Takahashi, M, Morikawa H, Sakamoto A (2007) The RNAi-mediated silencing of xanthine dehydrogenase impairs growth and fertility and accelerates leaf senescence in transgenic *Arabidopsis* plants. *Plant and Cell Physiology* 48: 1484-1495.
- Nakamura H, Musicki B, Kishi Y (1988) Structure of the light emitter in krill (*Euphausia pacific*) bioluminescence. *Journal of the American Chemical Society* 110: 2683-2685.
- Nakatogawa H, Ichimura Y, Ohsumi Y (2007) Atg8, a ubiquitin-like protein required for autophagosome formation, mediates membrane tethering and hemifusion *Cell* 130: 165-178.
- Nam H-G (1997) The molecular genetic analysis of leaf senescence. *Current Opinion in Biotechnology* 8: 200-207.
- Neave IA, Dawson JO, DeLucia EH (1989) Autumnal photosynthesis is extended in nitrogen-fixing European black alder compared with white basswood: possible adaptive significance. *Canadian Journal of Forestry Research* 19: 12-17.
- Nebel B, Matile P (1992) Longevity and senescence in needles of *Pinus cembra*. *Trees – Structure and Function* 6: 156-161.
- Neill SO, Gould KS (2003) Anthocyanins in leaves: light attenuators or antioxidants?. *Functional Plant Biology* 30: 865–873.

- Nelson CJ (1988) Genetic associations between photosynthetic characteristics and yield: review of the evidence. *Plant Physiology and Biochemistry* 26: 543-554.
- Nemani R, Running S W (1996) Implementation of a hierarchical global vegetation classification in ecosystem function models. *Journal of Vegetation Science* 7: 337-346.
- Neumann HH, den Hartog C, Shaw RH (1989) Leaf area measurements based on hemispheric photographs and leaf-litter collection in a deciduous forest during autumn leaf-fall. *Agricultural and Forest Meteorology* 45: 325-345.
- Neumann PM (1987) Sequential leaf senescence and correlatively controlled increases in xylem flow resistance. *Plant Physiology* 83: 941-944.
- Newbigin MI (1898) *Colour in nature*. London: John Murray.
- Nichols R, Ho LC (1975) An effect of ethylene on the distribution of ^{14}C sucrose from the petals to other flower parts in the senescent cut inflorescence of *Dianthus caryophyllus*. *Annals of Botany* 39: 433-438.
- Nichols R, Ho LC (1975) Effects of ethylene and sucrose on translocation of dry matter and ^{14}C sucrose in the cut flower of the glasshouse carnation (*Dianthus caryophyllus*) during senescence. *Annals of Botany* 39: 287-296.
- Nielsen H, Engelbrecht J, Brunak S, vonHeijne G (1997) Identification of prokaryotic and eukaryotic signal peptides and prediction of their cleavage sites. *Protein Engineering* 10: 1-6.
- Niinumets U (2007) Photosynthesis and resource distribution through plant canopies. *Plant, Cell and Environment* 30: 1052–1071.
- Nishimura M, Takeuchi Y, DeBellis L, Haranishimura I (1993) Leaf peroxisomes are directly transformed to glyoxysomes during senescence of pumpkin cotyledons. *Protoplasma* 175: 131-137.
- Nishiyama Y, Kitamura M, Tamura S, Watanabe T (1994) Purification and substrate specificity of chlorophyllase from *Chlorella regularis*. *Chemistry Letters* 1: 69-72.
- Nobel PS, Long SP (1985) Canopy structure and light interception. In: *Techniques in Bioproductivity and Photosynthesis 2nd Edition* (Coombs J, Hall DO eds). pp 41-49. Oxford: Pergamon.
- Nock L P, Rogers LJ, Thomas H (1992) Metabolism of protein and chlorophyll in leaf tissue of *Festuca pratensis* Huds. during chloroplast assembly and senescence. *Phytochemistry* 31: 1465-1470.
- Noda K-J, Glover B, Linstead P, Martin C (1994) Flower colour intensity depends on specialized cell shape controlled by a Myb-related transcription factor. *Nature* 369: 661–664.
- Noodén LD, Kahanak GM, Okatan Y (1979) Prevention of monocarpic senescence in soybean with auxin and cytokinin. *Science* 206: 841-843.
- Noodén LD, Leopold AC (1978) Phytohormones and the endogenous regulation of senescence and abscission. In: *Phytohormones and Related Compounds: a Comprehensive*

Treatise (Letham DS, Goodwin PB, Higgins TJV, eds). Vol II, pp 329-369. Amsterdam: Elsevier.

Noodén LD, Obermeyer WR (1981) Changes in abscisic acid translocation during pod development and senescence in soybean. *Biochemie und Physiologie der Pflanzen* 176: 859-868.

Noodén LD, Penney JP (2001) Correlative controls of senescence and plant death in *Arabidopsis thaliana* (Brassicaceae). *Journal of Experimental Botany* 52: 2151–2159.

Obara M, Kajiura M, Fukuta Y, Yano M, Hayashi M, Yamaya T, Sato T (2001) Mapping of QTLs associated with cytosolic glutamine synthetase and NADH-glutamate synthase in rice (*Oryza sativa* L.). *Journal of Experimental Botany* 52: 1209-1217.

Oberhuber M, Berghold J, Breuker K, Hörtensteiner S, Kräutler B (2003) Breakdown of chlorophyll: a nonenzymatic reaction accounts for the formation of the colorless "nonfluorescent" chlorophyll catabolites. *Proceedings of the National Academy of Sciences, USA* 100: 6910-6915.

O'Donoghue EM, Somerfield SD, Heyes JA (2002) Organization of cell walls in *Sandersonia aurantiaca* floral tissue. *Journal of Experimental Botany* 53: 513-523.

Ofir M, Koller D, Negbi M (1967) Studies on the physiology of regeneration buds of *Hordeum bulbosum*. *Botanical Gazette* 128: 25-34.

OhCJ, Lee H, Kim HB, An CS (2004) Isolation and characterization of a root nodule-specific cysteine proteinase cDNA from soybean. *Journal of Plant Biology* 47: 216-220.

Oinonen E (1967) The correlation between the size of Finnish bracken (*Pteridium aquilinum* (L.) Kuhn) clones and certain periods of site history. *Acta Forest Fennica* 83: 1-51.

O'Kennedy BT, Titus JS (1979) Isolation and mobilization of storage proteins from apple shoot bark. *Physiologia Plantarum* 45: 419-424.

Olmos S, Distelfeld A, Chicaiza O, Schlatter AR, Fahima T, Echenique V, Dubcovsky J (2003) Precise mapping of a locus affecting grain protein content in durum wheat. *Theoretical and Applied Genetics* 107: 1243-1251.

Olmsted CE (1951) Experiments on photoperiodism, dormancy, and leaf age and abscission in sugar maple. *Botanical Gazette* 112: 365-393.

Ong BL, Ng SL, Wee YC (1995) Photosynthesis in *Platyserium coronarium* (Koenig ex Mueller) Desv. *Photosynthetica* 31: 59-69.

Oraez D, Granell A (1997) The plant homologue of the defender against apoptotic death gene is down-regulated during senescence of flower petals. *FEBS Letters* 404: 275-278.

Orive ME (2001) Somatic mutations in organisms with complex life histories. *Theoretical Population Biology* 59: 235-249.

- Oshio Y, Hase E (1969a) Studies on red pigments excreted by cells of *Chlorella protothecoides* during the process of bleaching induced by glucose or acetate. I. Chemical properties of the red pigments. *Plant and Cell Physiology* 10: 41-49.
- Oshio Y, Hase E (1969b) Studies on red pigments excreted by cells of *Chlorella protothecoides* during the process of bleaching induced by glucose or acetate. II. Mode of formation of the red pigments. *Plant and Cell Physiology* 10: 51-59.
- Oster U, Rüdiger W (1997) The G4 gene of *Arabidopsis thaliana* encodes a chlorophyll synthase of etiolated plants. *Botanica Acta* 110: 420-423.
- Otegui MS, Noh Y-S, Martínez DE, Vila Petroff MG, Staehelin LA, Amasino RM, Guamét JG (2005) Senescence-associated vacuoles with intense proteolytic activity develop in leaves of *Arabidopsis* and soybean. *Plant Journal* 41: 831-844.
- Ottander C, Campbell D, Oquist G (1995) Seasonal-changes in Photosystem-II organization and pigment composition in *Pinus sylvestris*. *Planta* 197: 176-183.
- Ougham H, Armstead I, Howarth C, Galyuon I, Donnison I, Thomas H (2007) The genetic control of senescence revealed by mapping quantitative trait loci. *Annual Plant Reviews* 26: 171-201.
- Ougham H, Hörtensteiner S, Armstead I, Donnison I, King I, Thomas H, Mur L (2008) The control of chlorophyll catabolism and the status of yellowing as a biomarker of leaf senescence. *Plant Biology* (in press).
- Ougham HJ, Howarth CJ (1988) Temperature shock proteins in plants. In: *Plants and Temperature*. (Long SP, Woodward FI, eds) SEB Symposium 42: 259-280. Cambridge: Company of Biologists.
- Ougham HJ, Morris P, Thomas H (2005) The colors of autumn leaves as symptoms of cellular recycling and defenses against environmental stresses. *Current Topics in Developmental Biology* 66: 135-160.
- Owens TG, Falkowski PG (1982) Enzymatic degradation of chlorophyll a by marine phytoplankton in vitro. *Phytochemistry* 21: 979-984.
- Ozawa S, Yasutani I, Fukuda H, Komamine A, Sugiyama M (1998) Organogenic responses in tissue culture of *srd* mutants of *Arabidopsis thaliana*. *Development* 125: 135-142.
- Oziel A, Hayes PM, Chen FQ, Jones B (1996) Application of quantitative trait locus mapping to the development of winter-habit malting barley. *Plant Breeding* 115: 43-51.
- Page T, Griffiths G, Buchanan-Wollaston V (2001) Molecular and biochemical characterization of postharvest senescence in broccoli. *Plant Physiology* 125: 718-727.
- Pannell JR, Barrett SCH (1998) Baker's law revisited: Reproductive assurance in a metapopulation. *Evolution* 52: 657-668.
- Papakosta DK, Gagianas AA (1991) Nitrogen and dry-matter accumulation, remobilization, and losses for Mediterranean wheat during grain filling. *Agronomy Journal* 83: 864-870.

- Parish RW (1975) The lysosome-concept in plants. *Planta* 123: 15-31.
- Park H, Eggink LL, Robertson RW, Hooper JK (1999) Transfer of proteins from the chloroplast to vacuoles in *Chlamydomonas reinhardtii* (Chlorophyta): A pathway for degradation. *Journal of Phycology* 35: 528-538.
- Park JH, Oh SA, Kim YH, Woo HR, Nam HG (1998) Differential expression of senescence-associated mRNAs during leaf senescence induced by different senescence-inducing factors in *Arabidopsis*. *Plant Molecular Biology* 37: 445-454.
- Park S-Y, Yu J-W, Park J-S, Li J, Yoo S-C, Lee N-Y, Lee S-K, Jeong S-W, Seo HS, Koh H-J, Jeon J-S, Park Y-I, Paek N-C (2007) The senescence-induced staygreen protein regulates chlorophyll degradation. *Plant Cell* 19: 1649-1664.
- Parthier B (1988) Gerontoplasts: the yellow end in the ontogenesis of chloroplasts. *Endocytobiosis and Cell Research* 5: 163-190.
- Pasakinskiene I, Griffiths CM, Bettany AJE, Paplauskiene V, Humphreys MW (2000) Anchored simple-sequence repeats as primers to generate species-specific DNA markers in *Lolium* and *Festuca* grasses. *Theoretical and Applied Genetics* 100: 384-390.
- Passardi F, Penel C, Dunand C (2004) Performing the paradoxical: how plant peroxidases modify the cell wall. *Trends in Plant Science* 9: 534-540.
- Paterson AH, Lander ES, Had JD, Paterson S, Lincoln SE, Tanksley SD (1988) Resolution of quantitative traits into Mendelian factors by using a complete linkage map of restriction fragment length polymorphisms. *Nature* 335: 721-726.
- Patterson TG, Brun WA (1980) Influence of sink removal in the senescence pattern of wheat. *Crop Science* 20: 19-23.
- Paulsen H, Bogorad L (1988) Diurnal and circadian rhythms in the accumulation and synthesis of mRNA for the light-harvesting chlorophyll a/b-binding protein in tobacco. *Plant Physiology* 88: 1104-1109.
- Pearcy RW (1990) Sun flecks and photosynthesis in plant canopies. *Annual Review of Plant Physiology Plant Molecular Biology* 41: 421-453.
- Peckert RC, Small CJ (1980) Occurrence, location and development of anthocyanoplasts. *Phytochemistry* 19: 2571-2576.
- Pegadaraju V, Knepper C, Reese J, Jyoti Shah J (2005) Premature leaf senescence modulated by the *Arabidopsis* PHYTOALEXIN DEFICIENT4 gene is associated with defense against the phloem-feeding green peach aphid. *Plant Physiology* 139: 1927-1934.
- Peisker C, Düggelein T, Rentsch D, Matile P (1989) Phytol and the breakdown of chlorophyll in senescent leaves. *Journal of Plant Physiology* 135: 428-432.
- Peisker C, Thomas H, Keller F, Matile P (1990) Radiolabelling of chlorophyll for studies on catabolism. *Journal of Plant Physiology* 136: 544-549.

- Peoples MB, Dalling MJ (1978) Degradation of ribulose-1,5-bisphosphate carboxylase by proteolytic enzymes from crude extracts of wheat leaves. *Planta* 138: 153-160.
- Perkins HJ, Roberts DWA (1963) Chlorophyll turnover in monocotyledons and dicotyledons. *Canadian Journal of Botany* 41: 221-226.
- Pichersky E, Gang DR (2000) Genetics and biochemistry of secondary metabolites in plants: an evolutionary perspective. *Trends in Plant Science* 5: 439-445.
- Pickard WF (2008) Laticifers and secretory ducts: two other tube systems in plants *New Phytologist* 177: 877-888.
- Piechulla B, Riesselmann S (1990) Effect of temperature alterations on the diurnal expression pattern of the chlorophyll a/b binding proteins in tomato seedlings. *Plant Physiology* 94: 1903-1906.
- Pigg KB, Trivett ML (1994) Evolution of the glossopterid gymnosperms from Permian Gondwana. *Journal of Plant Research* 107: 461-477.
- Pineda-Krch M, Fagerstrom T (1999) On the potential for evolutionary change in meristematic cell lineages through intraorganismal selection. *Journal of Evolutionary Biology* 12: 681-688.
- Pittendrigh CS, Minis DH (1964) The entrainment of circadian oscillations by light and their role as photoperiodic clocks. *American Naturalist* 98: 261-294.
- Plaxton W; Podestá F (2006) The functional organization and control of plant respiration. *Critical Reviews in Plant Sciences* 25: 159-198.
- Plumstead EP (1958) The habit of growth of *Glossopteridae*. *Transactions of the Geological Society of South Africa* 61: 81-94.
- Pollock CJ, Eagles CF (1988) Low temperature and the growth of plants. In: *Plants and Temperature*. (Long SP, Woodward FI, eds) *SEB Symposium* 42: 157-180. Cambridge: Company of Biologists.
- Pommel B, Gallais A, Coque M, Quillere I, Hirel B, Prioul JL, Andrieu B, Floriot M (2006) Carbon and nitrogen allocation and grain filling in three maize hybrids differing in leaf senescence. *European Journal of Agronomy* 24: 203-211.
- Powell W, Thomas WTB, Baird E, Lawrence P, Booth A, Harrower B, McNicol JW, Waugh R (1997) Analysis of quantitative traits in barley by the use of amplified fragment length polymorphisms. *Heredity* 79: 48-59.
- Pozueta-Romero J, Rafia F, Houlne G, Cheniclet C, Carde JP, Schantz ML, Schantz R (1997) A ubiquitous plant housekeeping gene, PAP, encodes a major protein component of bell pepper chromoplasts. *Plant Physiology* 115: 1185-1194.
- Priault P, Vidal G, De Paepe R, Ribas-Carbo M (2007) Leaf age-related changes in respiratory pathways are dependent on complex I activity in *Nicotiana sylvestris*. *Physiologia Plantarum* 129: 152-162.

- Prusinkiewicz P (2004) Modeling plant growth and development. *Current Opinion in Plant Biology* 7: 79-83.
- Pruvot G, Cuiné S, Peltier G, Rey P (1996) Characterization of a novel drought-induced 34 kDa protein located in the thylakoids of *Solanum tuberosum* L. plants. *Planta* 198: 471-479.
- Pružinská A, Anders I, Tanner G, Roca M, Hörtensteiner S (2003) Chlorophyll breakdown: pheophorbide a oxygenase is a Rieske-type iron-sulfur protein, encoded by the accelerated cell death 1 gene. *Proceedings of the National Academy of Sciences, USA* 100: 15259-15264.
- Pružinská A, Tanner G, Aubry S, Anders I, Moser S, Müller T, Ongania K-H, Kräutler B, Youn J-Y, Liljegren SJ, Hörtensteiner S (2005) Chlorophyll breakdown in senescent *Arabidopsis* leaves: characterization of chlorophyll catabolites and of chlorophyll catabolic enzymes involved in the degreening reaction. *Plant Physiology* 139: 52-63.
- Pružinská A, Anders I, Aubry S, Schenk N, Tapernoux-Lüthi E, Müller T, Kräutler B, Hörtensteiner S (2007) In vivo participation of red chlorophyll catabolite reductase in chlorophyll breakdown. *Plant Cell* 19: 369-387.
- Pugnaire FI; Chapin FS (1993) Controls over nutrient resorption from leaves of evergreen Mediterranean species. *Ecology* 74: 124-129.
- Punwani JA, Drews GN (2007) Development and function of the synergid cell. *Sexual Plant Reproduction* 21: 7-15.
- Purohit SS (1982) Prevention by kinetin of ethylene-induced chlorophyllase activity in senescing detached leaves of *Helianthus annuus*. *Biochemie und Physiologie der Pflanzen* 177: 625-627.
- Pyke K (1994) *Arabidopsis* - its use in the genetic and molecular analysis of plant morphogenesis. *New Phytologist* 128: 19-37.
- Quirino BF, Noh YS, Himmelblau E, Amasino RM (2000) Molecular aspects of leaf senescence. *Trends In Plant Science* 5: 278-282.
- Radin JW (1983) Control of plant growth by nitrogen: differences between cereals and broadleaf species. *Plant Cell and Environment* 6: 65-68.
- Radin JW, Boyer JS (1982) Control of leaf expansion by nitrogen nutrition in sunflower plants. Role of hydraulic conductivity and turgor. *Plant Physiology* 69: 771-775.
- Raunkiaer C (1934) *The Life Forms of Plants*. Oxford University Press.
- Raven JA (1986) Evolution of plant life forms. In: *On the economy of plant form and function* (Givnish TJ ed) pp. 421-492. New York: Cambridge University Press.
- Raven JA, Edwards D (2001) Roots: evolutionary origins and biogeochemical significance. *Journal of Experimental Botany* 52: 381-401.

- Read J, Francis J (1992) Responses of some southern-hemisphere tree species to a prolonged dark period and their implications for high-latitude Cretaceous and Tertiary floras. *Paleogeography Paleoclimatology Paleoecology* 99: 271-290.
- Reich PB, Walters MB, Ellsworth DS (1992) Leaf life-span in relation to leaf, plant, and stand characteristics among diverse ecosystems. *Ecological Monographs* 62: 365-392.
- Reid JB (1980) Apical senescence in *Pisum*: A direct or indirect role for the flowering genes? *Annals of Botany* 45: 195-201.
- Ren G, An K, Liao Y, Zhou X, Cao Y, Zhao H, Ge X, Kuai B (2007) Identification of a novel chloroplast protein AtNYE1 regulating chlorophyll degradation during leaf senescence in *Arabidopsis*. *Plant Physiology* 144: 1429-1441.
- Rennenberg H, Kreutzer K, Papen H, Weber P (1998) Consequences of high loads of nitrogen for spruce (*Picea abies*) and beech (*Fagus sylvatica*) forests. *New Phytologist* 139: 71-86.
- Richards PW (1957) *The Tropical Rain Forest. An Ecological Study*. Cambridge University Press.
- Richardson D, Duigan SP, Berlyn GP (2002) An evaluation of noninvasive methods to estimate foliar chlorophyll content. *New Phytologist* 153: 185-194.
- Richmond AE, Lang A (1957) Effect of kinetin on protein content and survival of detached *Xanthium* leaves. *Science* 125: 650-651.
- Riefler M, Novak O, Strnad M, Schmölling T (2006) *Arabidopsis* cytokinin receptor mutants reveal functions in shoot growth, leaf senescence, seed size, germination, root development, and cytokinin metabolism. *Plant Cell* 18: 40-54.
- Roberts DR, Thompson JE, Dumbroff EB, Gepstein S, Mattoo AK (1987) Differential changes in the synthesis and steady-state levels of thylakoid proteins during bean leaf senescence. *Plant Molecular Biology* 9: 343-353.
- Robertson DS (1978) Characterization of a mutator system in maize. *Mutation Research* 51: 21-28.
- Robson PRH, Donnison IS, Wang K, Frame B, Pegg SE, Thomas A, Thomas H (2004) Leaf senescence is delayed in maize expressing the *Agrobacterium* IPT gene under the control of a novel maize senescence-enhanced promoter. *Plant Biotechnology Journal* 2: 101-112 .
- Roca M, James C, Pružinská A, Hörtensteiner S, Thomas H, Ougham H (2004) Analysis of the chlorophyll catabolism pathway in leaves of an introgression senescence mutant of *Lolium temulentum*. *Phytochemistry* 65: 1231-1238.
- Röder B, Hanke TH, Oelckers ST, Hackborth ST, Symietz CH (2000) Photophysical properties of pheophorbide a in solution and in model membrane systems. *Journal of Porphyrins and Phthalocyanines* 4: 37-44.

Rodoni S, Mühlecker W, Anderl M, Kräutler B, Moser D, Thomas H, Matile P, Hörtensteiner S (1997a) Chlorophyll breakdown in senescent chloroplasts. Cleavage of phaeophorbide a in two enzymic steps. *Plant Physiology* 115: 669-676.

Rodoni S, Schellenberg M, Matile P (1998) Chlorophyll breakdown in senescing barley leaves as correlated with phaeophorbide a oxygenase activity. *Journal of Plant Physiology* 152: 139-144.

Rodoni S, Vicentini F, Schellenberg M, Matile P, Hörtensteiner S (1997b) Partial purification and characterization of red chlorophyll catabolite reductase, a stroma protein involved in chlorophyll breakdown. *Plant Physiology* 115: 677-682.

Rogers HJ (2005) Cell death and organ development in plants. *Current Topics in Developmental Biology* 71: 225-261.

Rogers HJ (2006) Programmed cell death in floral organs: how and why do flowers die? *Annals of Botany* 97: 309-315.

Roitsch T, González M-C (2004) Function and regulation of plant invertases: sweet sensations. *Trends in Plant Science* 9: 606-613.

Rolshausen GR, Schaefer HM (2007) Do aphids paint the tree red (or yellow)—can herbivore resistance or photoprotection explain colourful leaves in autumn?. *Plant Ecology* 191: 77-84.

Romero-Puertas MC, Delledonne M (2003) Nitric oxide signaling in plant-pathogen interactions. *IUBMB Life* 55: 579-583.

Rontani JF, Perrote S, Cuny P (2000) Can a high chlorophyllase activity bias the use of the phytyldiol versus phytol ratio (CPPI) for the monitoring of chlorophyll photooxidation in seawater? *Organic Geochemistry* 31: 91-99.

Room PM, Maillette L, Hanan JS (1994) Module and metamer dynamics and virtual plants. *Advances in Ecological Research* 25: 105-157.

Rosenow DT (1984) Breeding for resistance to root and stalk rots in Texas. In: *Sorghum Root and Stalk Rots, a Critical Review. Proceedings of Workshop held in Bellagio, Italy* (ed Mughogho LK, Rosenberg, G) pp 209-217. Patancheru, AP, India: ICRISAT.

Rosenow DT, Clark LE (1981) Drought tolerance in sorghum. In: *Proceedings, 36th Annual Corn and Sorghum Industry Research Conference, Chicago IL.* (ed Loden HD, Wilkinson D) pp 18-31. Washington DC: American Seed Trade Association.

Rosenow DT, Quisenberry JE, Wendt CW, Clark LE (1983) Drought tolerant sorghum and cotton germplasm. *Agricultural Water Management* 7: 207-222.

Rousseaux MC, Hall AJ, Sánchez RA (1993) Far-red enrichment and photosynthetically active radiation level influence leaf senescence in field-grown sunflower. *Physiologia Plantarum* 96: 217-224.

Rousseaux MC, Hall AJ, Sánchez RA (1999) Light environment, nitrogen content, and carbon balance of basal leaves of sunflower canopies. *Crop Science* 39: 1093-1100.

- Rowland LJ, Strommer JN (1985) Insertion of an unstable element in an intervening sequence of maize Adh1 affects transcription but not processing. *Proceedings of the National Academy of Sciences, USA* 82: 2875-2879.
- Ruther J, Reinecke A, Hilker M (2002) Plant volatiles in the sexual communication of *Melolontha hippocastani*: response towards time-dependent bouquets and novel function of (Z)-3-hexen-1-ol as a sexual kairomone. *Ecological Entomology* 27: 76-83.
- Ryerson DE, Heath MC (1996) Cleavage of nuclear DNA into oligonucleosomal fragments during cell death induced by fungal infection or by abiotic treatments. *Plant Cell* 8: 393-402.
- Sachs T, Novoplansky A, Cohen D (1993) Plants as competing populations of redundant organs. *Plant Cell and Environment* 16: 765-770.
- Sadras VO, Echarte L, Andrade FH (2000) Profiles of leaf senescence during reproductive growth of sunflower and maize. *Annals of Botany* 85: 187-195.
- Sadras VO, Hall AJ, Connor DJ (1993) Light-associated nitrogen distribution profile in flowering canopies of sunflower (*Helianthus annuus* L.) altered during grain filling. *Oecologia* 95: 488-494.
- Salomonson A (1996) Interactions between somatic mutations and plant development. *Vegetatio* 127: 71-75.
- Samuels AL, Kaneda M, Rensing KH (2006) The cell biology of wood formation: from cambial divisions to mature secondary xylem. *Canadian Journal of Botany* 84: 631-639.
- Sanchez AC, Subudhi PK, Rosenow DT, Nguyen HT (2002) Mapping QTLs associated with drought resistance in sorghum (*Sorghum bicolor* L. Moench). *Plant Molecular Biology* 48: 713-726.
- Sandmann G, Scheer H (2000) Chloroplast pigments: chlorophylls and carotenoids. In *Photosynthesis: a Comprehensive Treatise* (Raghavendra AS ed). pp. 44-57. Cambridge University Press.
- Satler SO, Thimann KV (1983) Metabolism of oat leaves during senescence: VII. The interaction of carbon dioxide and other atmospheric gases with light in controlling chlorophyll loss and senescence. *Plant Physiology* 71: 67-70.
- Sato Y, Morita R, Nishimura M, Yamaguchi H, Kusaba M (2007) Mendel's green cotyledon gene encodes a positive regulator of the chlorophyll-degrading pathway. *Proceedings of the National Academy of Sciences, USA* 104: 14169-14174.
- Satoh H, Uchida A, Nakayama K, Okada M (2001) Water-soluble chlorophyll protein in Brassicaceae plants is a stress-induced chlorophyll-binding protein. *Plant and Cell Physiology* 42: 906-911.
- Saulescu NN, Ittu G, Mustatea P (2001) Dark induced senescence as a tool in breeding wheat for optimum senescence pattern. *Euphytica* 119: 205-209.

Schaberg PG, Van den Berg AK, Murakami PF, Shane JB, Donnelly JR (2003) Factors influencing red expression in autumn foliage of sugar maple trees. *Tree Physiology* 23: 325-333.

Schaefer HM, Rolshausen G (2006) Plants on red alert: do insects pay attention?. *BioEssays* 28: 65-71.

Schellenberg M, Matile P (1995) Association of components of the chlorophyll catabolic system with pigment-protein complexes from solubilized chloroplast membranes. *Journal of Plant Physiology* 146: 604-608.

Schellenberg M, Matile P, Thomas H (1993) Production of a presumptive chlorophyll catabolite in vitro: requirement for reduced ferredoxin. *Planta* 191: 417-420.

Schenk N, Schelbert S, Kanwischer M, Goldschmidt EE, Dormann P, Hörtensteiner S (2007) The chlorophyllases AtCLH1 and AtCHL2 are not essential for senescence-related chlorophyll breakdown in *Arabidopsis*. *FEBS Letters* 581: 5517-5525.

Scheumann V, Ito H, Tanaka A, Schoch S, Rüdiger W (1996) Substrate specificity of chlorophyll (ide) b reductase in etioplasts of barley (*Hordeum vulgare*). *European Journal of Biochemistry* 242: 163-170.

Scheumann V, Schoch S, Rüdiger W (1998) Chlorophyll a formation in the chlorophyll b reductase reaction requires reduced ferredoxin. *Journal of Biological Chemistry* 273: 35102-35108.

Scheumann V, Schoch S, Rüdiger W (1999) Chlorophyll b reduction during senescence of barley seedlings. *Planta* 209: 364-370.

Schiltz S, Gallardo K, Huart M, Negroni L, Sommerer N, Burstin J (2004) Proteome reference maps of vegetative tissues in pea. An investigation of nitrogen mobilization from leaves during seed filling. *Plant Physiology* 135: 2241-2260.

Schmid M, Davison TS, Henz SR, Pape UJ, Demar M, Vingron M, Schölkopf B, Weigel D, Lohmann JU (2005) A gene expression map of *Arabidopsis thaliana* development. *Nature Genetics* 37: 501-506.

Schmid M, Simpson D, Kalousek F, Gietl C (1998) A cysteine endopeptidase with a C-terminal KDEL motif isolated from castor bean endosperm is a marker enzyme for the ricinosome, a putative lytic compartment. *Planta* 206: 466-475 .

Schoch S, Rüdiger W, Lüthy B, Matile P (1984) 132-hydroxychlorophyll a, the first product of the reaction of chlorophyll-oxidase. *Journal of Plant Physiology* 115: 85-89.

Schoch S, Scheer H, Schiff JA, Rüdiger W, Siegelman HW (1981) Pyropheophytin a accompanies pheophytin a in darkened light grown cells of *Euglena*. *Zeitschrift für Naturforschung* 36c: 827-833.

Schoch S, Vielwerth FX (1983) Chlorophyll degradation in senescent tobacco cell culture (*Nicotiana tabacum* var. "Samsun"). *Zeitschrift für Naturforschung* 110: 309-317.

Scholes J, Bundock N, Wilde R, Rolfe S (1996) The impact of reduced vacuolar invertase activity on the photosynthetic and carbohydrate metabolism of tomato. *Planta* 200: 265-272.

Scholes JD, Farrar JF (1987) Development of symptoms of brown rust of barley in relation to the distribution of fungal mycelium, starch accumulation and localized changes in the concentration of chlorophyll. *New Phytologist* 107: 103-117.

Schuler MA (1996) Plant cytochrome P450 monooxygenases. *Critical Reviews in Plant Science* 15: 235-284.

Schwabe WW (1970) The control of leaf senescence in *Kleinia articulata* by photoperiod. *Annals of Botany* 34: 43-55.

See D, Kanazin V, Kephart K, Blake T (2002) Mapping genes controlling variation in barley grain protein concentration. *Crop Science* 42: 680-685.

Sembdner G, Parthier B (1993) The biochemistry and the physiological and molecular actions of jasmonates. *Annual Review of Plant Physiology and Plant Molecular Biology* 44: 569-589.

Seong JC, Bong LH, Weon SY (2004) Development of AFLP and STS markers related to stay green trait in multi-tillered maize. *Korean Journal of Crop Science* 49: 358-362.

Servin B, Martin OC, Mezard M, Hospital F (2004) Toward a theory of marker-assisted gene pyramiding. *Genetics* 168: 513-523.

Sesay A, Shibles R (1980) Mineral depletion and leaf senescence in soya bean as influenced by foliar nutrient application during seed filling. *Annals of Botany* 45: 47-55.

Shimada T, Hiraiwa N, Nishimura M, Hara-Nishimura I (1994) Vacuolar processing enzyme of soybean that converts proproteins to the corresponding mature forms. *Plant and Cell Physiology* 35: 713-718.

Shimada T, Yamada K, Kataoka M, Nakaune S, Koumoto Y, Kuroyanagi M, Tabata S, Kato T, Shinozaki K, Seki M, Kobayashi M, Kondo M, Nishimura M, Hara-Nishimura I (2003) Vacuolar processing enzymes are essential for proper processing of seed storage proteins in *Arabidopsis thaliana*. *Journal of Biological Chemistry* 278: 32292-32299.

Shimokawa K, Hashizume A, Shioi Y (1990) Pyropheophorbide a, a catabolite of ethylene-induced chlorophyll a degradation. *Phytochemistry* 29: 2105-2106.

Shioi Y, Sasa T (1986) Purification of solubilized chlorophyllase from *Chlorella protothecoides*. *Methods in Enzymology* 123: 421-427.

Shioi Y, Tatsumi Y, Shimokawa K (1991) Enzymatic degradation of chlorophyll in *Chenopodium album*. *Plant and Cell Physiology* 32: 87-93.

Shioi Y, Tomita N, Tsuchiya T, Takamiya K (1996a) Conversion of chlorophyllide to phaeophorbide by Mg-dechelating substance in extracts of *Chenopodium album*. *Plant Physiology and Biochemistry* 34: 41-47.

- Shioi Y, Watanabe K, Takamiya K (1996b) Enzymatic conversion of phaeophorbide a to a precursor of pyropheophorbide a in leaves of *Chenopodium album*. *Plant and Cell Physiology* 37: 1143-1149.
- Shure M, Wessler S, Fedoroff N (1983) Molecular-identification and isolation of the waxy locus in maize. *Cell* 35: 225-233.
- Shutov AD, Lanh DN, Vaintraub IA (1982) Purification and partial characterization of Protease-B from germinating vetch seeds. *Biochemistry. (Moscow)* 47: 678-685.
- Siefermann-Harms D (1987) The light-harvesting and protective functions of carotenoids in photosynthetic membranes. *Physiologia Plantarum* 69: 561-568.
- Simon EW (1967) Types of leaf senescence. *SEB Symposium* 21: 215-230
- Simon MR (1999) Inheritance of flag-leaf angle, leaf area and flag leaf area duration in four wheat crosses. *Theoretical and Applied Genetics* 98: 310-314.
- Sims DA, Gamon JA (2002) Relationships between leaf pigment content and spectral reflectance across a wide range of species, leaf structures and developmental stages. *Remote Sensing of Environment* 81: 337-354.
- Sinclair TR, de Wit CT (1975) Photosynthate and nitrogen requirements for seed production by various crops. *Science* 189: 565-567.
- Sinclair TR, Sheehy JE (1999) Erect leaves and photosynthesis in rice. *Science* 283: 1456-1457.
- Sinkkonen A (2006) Do autumn leaf colours serve as a reproductive insurance against sucking herbivores?. *Oikos* 113: 557-562.
- Sinkkonen A (2006) Sexual reproduction advances autumn leaf colours in mountain birch (*Betula pubescens* ssp. *czerepanovii*). *Journal of Evolutionary Biology* 19: 1722-1724.
- Sitte P (1977) Chromoplasten - bunte Objekte der modernen Zellbiologie. *Biologie in unserer Zeit* 7: 65-74.
- Sjödin A, Bylesjö M, Skogström O, Eriksson D, Nilsson P, Ryden P, Jansson S, Karlsson J. 2006. UPSC-BASE - Populus transcriptomics online. *Plant Journal* 48: 806-817.
- Skadsen RW, Cherry JH (1983) Quantitative changes in in vitro and in vivo protein synthesis in aging and rejuvenated soybean cotyledons. *Plant Physiology* 71: 861-868.
- Slotkin RK, Freeling M, Lisch D (2003) Mu killer causes the heritable inactivation of the Mutator family of transposable elements in *Zea mays*. *Genetics* 165: 781-797.
- Smart CM (1994) Gene expression during leaf senescence. *New Phytologist* 126: 419-448.
- Smart CM, Hosken SE, Thomas H, Greaves JA, Blair BG, Schuch W (1995) The timing of maize leaf senescence and characterization of senescence-related cDNAs. *Physiologia Plantarum* 93: 673-682.

Smart CM, Scofield SR, Bevan MW, Dyer TA (1991) Delayed leaf senescence in tobacco plants transformed with *tmr*, a gene for cytokinin production in *Agrobacterium*. *Plant Cell* 3: 647-656.

Smith H, Whitelam GC (1990) Phytochrome, a family of photoreceptors with multiple physiological roles. *Plant Cell and Environment* 13: 695-707.

Smith ML, Bruhn JN, Anderson JB (1992) The fungus *Armillaria bulbosa* is among the largest and oldest living organisms. *Nature* 356: 428-431.

Sodmergen KS, Tano S, Kuroiwa T (1989) Preferential digestion of chloroplast nuclei (nucleoids) during senescence of the coleoptile of *Oryza sativa*. *Protoplasma* 152: 65-68.

Solary E, Eymin B, Droin N, Haugg M (1998) Proteases, proteolysis, and apoptosis. *Cell Biology and Toxicology* 14: 121-132.

Solyosi K, Martinez K, Kristóf Z, Sundqvist C, Böddi B (2004) Plastid differentiation and chlorophyll biosynthesis in different leaf layers of white cabbage (*Brassica oleracea* cv. *capitata*). *Physiologia Plantarum* 121: 520–529.

Spaeth SC, Cortes PH (1995) Root cortex death and subsequent initiation and growth of lateral roots from bare steles of chickpeas. *Canadian Journal of Botany* 73: 253-261.

Spano G, Di Fonzo N, Perrotta C, Platani C, Ronga G, Lawlor DW, Napier JA, Shewry PR (2003) Physiological characterization of 'stay green' mutants in durum wheat. *Journal of Experimental Botany* 54: 1415-1420.

Spooner N, Harvey HR, Pearce GES, Eckardt CB, Maxwell JR (1994a) Biological defunctionalization of chlorophyll in the aquatic environment. 2. Action of endogenous algal enzymes and aerobic bacteria. *Organic Geochemistry* 22: 773-780.

Spooner N, Keely BJ, Maxwell JR (1994b) Biologically mediated defunctionalization of chlorophyll in the aquatic environment. 1. Senescence decay of the diatom *Phaeodactylum tricornutum*. *Organic Geochemistry* 21: 509-516.

Stanislaus RC, Maravolo NC (1994) The influence of polyamines on senescence in *Marchantia polymorpha*. *The Bryologist* 97: 162-165.

Stead AD, van Doorn W (1994) Strategies of flower senescence – a review. In: SEB Seminar Series 55: Molecular and Cellular Aspects of Plant Reproduction (Scott RJ, Stead AD eds). Pp215-237. Cambridge University Press.

Stebbins GL (1958) Longevity, habitat and release of genetic variability in the higher plants. *Cold Spring Harbor Symposia on Quantitative Biology* 23: 365-378.

Steiger DK, Elias EM, Cantrell RG (1996) Evaluation of lines derived from wild emmer chromosome substitutions. 1. Quality traits. *Crop Science* 36: 223-227.

Steinmuller D, Tevini M (1985) Composition and function of plastoglobuli I. Isolation and purification from chloroplasts and chromoplasts. *Planta* 163: 201-207.

Stephens DW, Krebs CR (1987) *Foraging Theory*. NJ: Princeton University Press.

- Stephenson AG (1981) Flower and fruit abortion: Proximate causes and ultimate functions. *Annual Review of Ecology and Systematics* 12: 253-279.
- Stevens CJ, Head EJM (1998) A model of chlorophyll a destruction by *Calanus* spp. and implications for the estimation of ingestion rates using the gut fluorescence method. *Marine Ecology-Progress Series* 171: 187-198.
- Steyn WJ, Wand SJE, Holcroft DM, Jacobs G (2002) Anthocyanins in vegetative tissues: a proposed unified function in photoprotection. *New Phytologist* 155: 349-361.
- Stiles EW (1982) Fruit flags: two hypotheses. *American Naturalist* 120: 500-509.
- Stitt M, Schulze D (1994) Does Rubisco control the rate of photosynthesis and plant growth? An exercise in molecular ecophysiology. *Plant Cell and Environment* 17: 465-487.
- Stoddart JL, Thomas H (1982) Leaf senescence. In: *Encyclopaedia of Plant Physiology* (Boulter D, Parthier B eds) Vol 14A, pp 592-636. Berlin: Springer Verlag.
- Stoddart JL, Thomas H, Lloyd EJ, Pollock CJ (1986) The use of a temperature profiled position transducer for the study of low temperature growth in Gramineae: equipment design and output interpretation. *Planta* 167: 359-363
- Stoll A (1912) Über Chlorophyllase und die Chlorophyllide. PhD thesis, ETH Zürich.
- Strack D, Wray V (1989) Anthocyanins. In: *Methods in Plant Biochemistry* (Harborne JB, Dey PM eds). Vol 1 pp 326-352. NY: Academic Press.
- Suarez MF, Filonova LH, Smertenko A, Savenkov EI, Clapham DH, von Arnold S, Zhivotovsky B, Bozhkov PV (2004) Metacaspase-dependent programmed cell death is essential for plant embryogenesis. *Current Biology* 14: R339-R340.
- Subudhi PK, Rosenow DT, Nguyen HT (2000) Quantitative trait loci for the stay green trait in sorghum (*Sorghum bicolor* L. Moench): consistency across genetic backgrounds and environments. *Theoretical and Applied Genetics* 101: 733-741.
- Sugiyama M (1999) Organogenesis in vitro. *Current Opinion in Plant Biology* 2: 61-64.
- Sullivan JA, Shirasu K, Deng XW (2003) The diverse roles of ubiquitin and the 26S proteasome in the life of plants. *Nature Reviews Genetics* 4: 948-958.
- Sultan SE (2003) Phenotypic plasticity in plants: a case study in ecological development. *Evolution and Development* 5: 25-33.
- SurrIDGE AK, Osorio D, Mundy NI (2003) Evolution and selection of trichromatic vision in primates. *Trends in Ecology and Evolution* 18: 198-205.
- Suzuki T, Shioi Y (2002) Re-examination of Mg-dechelation reaction in the degradation of chlorophylls using chlorophyllin a as substrate. *Photosynthesis Research* 74: 217-223.
- Suzuki Y, Amano T, Shioi Y (2006) Characterization and cloning of the chlorophyll-degrading enzyme pheophorbidease from cotyledons of radish. *Plant Physiology* 140: 716-725.

- Suzuki Y, Shioi Y (1999) Detection of chlorophyll breakdown products in the senescent leaves of higher plants. *Plant and Cell Physiology* 40: 909-915.
- Suzuki Y, Tanabe K, Shioi Y (1999) Determination of chemical oxidation products of chlorophyll and porphyrin by high-performance liquid chromatography. *Journal of Chromatography A*. 839: 85-91.
- Swank SE, Oechel WC (1991) Interactions among the effects of herbivory, competition and resource limitation on chaparral herbs. *Ecology* 72: 104-115.
- Takamiya K-I, Tsuchiya T, Ohta H (2000) Degradation pathway(s) of chlorophyll: what has gene cloning revealed? *Trends in Plant Science* 5: 426-431.
- Takeda O, Miura Y, Mitta M, Matsushita H, Kato I., Abe Y, Yokosawa H, Ishii S (1994) Isolation and analysis of cDNA encoding a precursor of *Canavalia ensiformis* asparaginyl endopeptidase. (legumain). *Journal of Biochemistry* 116: 541-546.
- Tamai H, Shioi Y, Sasa T (1979) Studies on chlorophyllase of *Chlorella protothecoides*. IV. Some properties of the purified enzyme. *Plant and Cell Physiology* 20: 1141-1145.
- Tamas IA, Engels CJ, Kaplan SL, Ozbun JL, Wallace DH (1981) Role of indoleacetic acid and abscisic acid in the correlative control by fruits of axillary bud development and leaf senescence. *Plant Physiology* 68: 476-481.
- Tanaka A, Ito H, Tanaka R, Tanaka NK, Yoshida K, Okada K (1998) Chlorophyll a oxygenase (CAO) is involved in chlorophyll b formation from chlorophyll a. *Proceedings of the National Academy of Sciences, USA* 95: 12719-12723.
- Tanaka A, Tanaka R (2006) Chlorophyll metabolism. *Current Opinion in Plant Biology* 9: 248-255.
- Tanaka K, Kakuno T, Yamashita J, Horio T (1982) Purification and properties of chlorophyllase from greened rye seedlings. *Journal of Biochemistry* 92: 1763-1773.
- Tanaka R, Hirashima M, Satoh S, Tanaka A (2003) The Arabidopsis-accelerated cell death gene ACD1 is involved in oxygenation of pheophorbide a: Inhibition of the pheophorbide a oxygenase activity does not lead to the "stay-green" phenotype in Arabidopsis. *Plant and Cell Physiology* 44: 1266-1274.
- Tanaka T, Inazawa J, Nakamura Y (1996) Molecular cloning of a human cDNA encoding putative cysteine protease (PRSC1) and its chromosome assignment to 14q32.1. *Cytogenetics and Cell Genetics* 74: 120-123.
- Tang L, Okazawa A, Itoh Y, Fukusaki E, Kobayashi A (2004) Expression of chlorophyllase is not induced during autumnal yellowing in *Ginkgo biloba*. *Zeitschrift für Naturforschung C* 59: 415-420.
- Tani T, Kudo G (2003) Storage ability of overwintering leaves and rhizomes in a semi-evergreen fern, *Dryopteris crassirhizoma* (Dryopteridaceae). *Ecological Research* 18: 15-24.

- Tao YZ, Henzell RG, Jordan DR, Butler DG, Kelly AM, McIntyre CL (2000) Identification of genomic regions associated with stay green in sorghum by testing RILs in multiple environments. *Theoretical and Applied Genetics* 100: 1225-1232.
- Tarasenko LG, Khodasevich EV, Orlovskaya KI (1986) Location of chlorophyllase in chloroplast membranes. *Photobiochemistry and Photobiophysics* 12: 119-121.
- Taylor IB, Linforth RST, Al-Naieb RJ, Bowman WR, Marples BA (1988) *Plant Cell and Environment* 11: 739-745.
- Tenkouano A, Miller FR, Frederiksen RA, Rosenow DT (1993) Genetics of non-senescence and charcoal rot resistance in sorghum. *Theoretical and Applied Genetics* 85: 644-648.
- Terpstra W (1981) Identification of chlorophyllase as a glycoprotein. *FEBS Letters* 126: 231-235.
- Tevini M, Steinmüller D (1985) Composition and function of plastoglobuli II. Lipid composition of leaves and plastoglobuli during beech leaf senescence. *Planta* 163: 91-96.
- Thimann KV (1985) The senescence of detached leaves of *Tropaeolum*. *Plant Physiology* 79: 1107-1110.
- Thimann KV, Tetley RM, Krivak BM (1977) Metabolism of oat leaves during senescence: V. Senescence in light. *Plant Physiology* 59: 448-454.
- Thom R (1975) *Structural Stability and Morphogenesis: an Outline of a General Theory of Models*. Reading: Benjamin.
- Thomas H (1976) Delayed senescence in leaves treated with the protein synthesis inhibitor MDMP. *Plant Science Letters* 6: 369-377.
- Thomas H (1982) Leaf senescence in a non-yellowing mutant of *Festuca pratensis*. I. Chloroplast membrane polypeptides. *Planta* 154: 212-218.
- Thomas H (1987) Foliar senescence mutants and other genetic variants. In: *Developmental Mutants in Higher Plants* (eds Thomas H, Grierson D) pp 245-265. Cambridge University Press.
- Thomas H (1987) Sid: a Mendelian locus controlling thylakoid membrane disassembly in senescing leaves of *Festuca pratensis*. *Theoretical and Applied Genetics* 73: 551-555.
- Thomas H (1992) Canopy survival. In: *Crop Photosynthesis: Spatial and Temporal Determinants* (eds Baker N, Thomas H) pp 11-41. Amsterdam: Elsevier.
- Thomas H (1994) Ageing in the plant and animal kingdoms - the role of cell death. *Reviews in Clinical Gerontology* 4: 5-20.
- Thomas H (1994) Resource rejection by higher plants. In: *Resource capture by crops. Proceedings of the 52nd Easter School, University of Nottingham, School of Agriculture*. Nottingham (eds Monteith JL, Scott RK, Unsworth MH) pp. 375-385. Nottingham University Press.

- Thomas H (1997) Chlorophyll: a symptom and a regulator of plastid development. *New Phytologist* 136: 163-181.
- Thomas H (2002) Ageing in plants. *Mechanisms of Ageing and Development* 123: 747-753.
- Thomas H (2003) Do green plants age and if so how? *Topics in Current Genetics* 3: 145-171.
- Thomas H (2008) Systems biology and the biology of systems: how, if at all, are they related? *New Phytologist* 177: 11-15.
- Thomas H, Bortlik K-H, Rentsch D, Schellenberg M, Matile P (1989) Catabolism of chlorophyll in vivo: significance of polar chlorophyll catabolites in a non-yellowing senescence mutant of *Festuca pratensis* Huds. *New Phytologist* 111: 3-8.
- Thomas H, de Villiers L (1996) Gene expression in rosette leaves of *Arabidopsis thaliana* induced to senesce by nutrient deprivation. *Journal of Experimental Botany* 47: 1845-1852.
- Thomas H, Donnison I (2000) Back from the brink: plant senescence and its reversibility. In: *Programmed Cell Death in Animals and Plants* (eds Bryant J, Hughes SG, Garland JM) pp149-162. Oxford: Bios.
- Thomas H, Evans C, Thomas HM, Humphreys MW, Morgan WG, Hauck B, Donnison I (1997) Introgression, tagging and expression of a leaf senescence gene in *Festulolium*. *New Phytologist* 137: 29-34.
- Thomas H, Hilditch P (1987) Metabolism of thylakoid membrane proteins during foliar senescence. In: *Plant senescence: its biochemistry and physiology* (eds Thomson WW, Nothnagel EA, Huffaker RC) pp 114-122. Rockville, Md: ASPP.
- Thomas H, Howarth CJ (2000) Five ways to stay green. *Journal of Experimental Botany* 51: 329-337.
- Thomas H, Matile P (1988) Photobleaching of chloroplast pigments in leaves of a non yellowing mutant genotype of *Festuca pratensis*. *Phytochemistry* 27: 345-348.
- Thomas H, Morgan WG, Thomas AM, Ougham HJ (1999) Expression of the stay-green character introgressed into *Lolium temulentum* Ceres from a senescence mutant of *Festuca pratensis*. *Theoretical and Applied Genetics* 99: 92-99.
- Thomas H, Ougham H, Canter P, Donnison I (2002) What stay-green mutants tell us about nitrogen remobilisation in leaf senescence. *Journal of Experimental Botany* 53: 801-808.
- Thomas H, Ougham H, Hörtensteiner S (2001) Recent advances in the cell biology of chlorophyll catabolism. *Advances In Botanical Research* 35: 1-52.
- Thomas H, Ougham H, Wagstaff C, Stead AJ (2003) Defining senescence and death. *Journal of Experimental Botany* 54: 1127-1132.
- Thomas H, Ougham HJ, Davies TGE (1992) Leaf senescence in a non-yellowing mutant of *Festuca pratensis*: transcripts and translation products. *Journal of Plant Physiology* 139: 403-412.

Thomas H, Potter JF (1985) Fitting logistic type curves to extension growth data for leaves of grass species by means of the Maximum Likelihood Program: analysis of leaf extension in *Lolium temulentum* at optimal and chilling temperatures. *Environmental and Experimental Botany* 25: 157-166

Thomas H, Sadras VO (2001) The capture and gratuitous disposal of resources by plants. *Functional Ecology* 15: 3-12.

Thomas H, Schellenberg M, Vicentini F, Matile P (1996) Gregor Mendel's green and yellow pea seeds. *Botanica Acta* 109: 3-4.

Thomas H, Smart CM (1993) Crops that stay green. *Annals of Applied Biology* 123: 193-129.

Thomas H, Stoddart JL (1975) Separation of chlorophyll degradation from other senescence processes in leaves of a mutant genotype of meadow fescue (*Festuca pratensis*). *Plant Physiology* 56: 438-441.

Thomas H, Stoddart JL (1980) Leaf senescence. *Annual Review of Plant Physiology* 31: 83-111.

Thomas H, Stoddart JL (1984) Kinetics of leaf growth in *Lolium temulentum* at optimal and chilling temperatures. *Annals of Botany* 53: 341-347.

Thomas H, Thomas HM, Ougham HJ (2000) Annuality, perenniality and cell death. *Journal of Experimental Botany* 51: 1-8.

Thomas Henry (1990) Osmotic adjustment in *Lolium perenne*; its heritability and the nature of solute accumulation. *Annals of Botany* 66: 521-530.

Thomas Henry, Norris IB (1981) The influence of light and temperature during winter on growth and death in simulated swards of *Lolium perenne*. *Grass and Forage Science* 36: 107-116.

Thomas HM (1995) Meiosis of triploid *Lolium*. II. Discrepancies between the analyses of chromosome configurations at metaphase I in inverse autoallotriploid combinations. *Heredity* 75: 446-452.

Thomas HM, Morgan WG, Meredith MR, Humphreys MW, Thomas Huw, Leggett JM (1994) Identification of parental recombined chromosomes of *Lolium multiflorum* x *Festuca pratensis* by genomic in situ hybridisation. *Theoretical and Applied Genetics* 88: 909-913.

Thompson JE, Hopkins MT, Taylor C, Wang T-W (2004) Regulation of senescence by eukaryotic translation initiation factor 5A: implications for plant growth and development. *Trends in Plant Science* 9: 174-179.

Thomson WW, Platt-Aloia KA (1987) Ultrastructure and senescence in plants. In: *Plant senescence: its biochemistry and physiology* (eds Thomson WW, Nothnagel EA, Huffaker RC) pp 20-30. Rockville, Md: ASPP.

Thomson WW, Whatley JM (1980) Development of nongreen plastids. *Annual Review of Plant Physiology* 31: 375-394.

- Thornley JHM, Cockshull KE (1980) A catastrophe model for the switch from vegetative to reproductive growth in the shoot apex. *Annals of Botany* 46: 333-341.
- Thorogood D, Humphreys M, Turner L, Laroche S (1999) QTL analysis of chlorophyll breakdown in *Lolium perenne*. Abstracts of Plant and Animal Genome VII, San Diego, P280.
- Tikhonov AP, SanMiguel PJ, Nakajima Y, Gorenstein NM, Bennetzen JL, Avramova Z (1999) Colinearity and its exceptions in orthologous adh regions of maize and sorghum. *Proceedings of the National Academy of Sciences, USA* 96: 7409-7414.
- Tilman D (1988) *Plant strategies and the dynamics and structure of plant communities*. Princeton University Press.
- Tollenaar M, McCullough E, Dwyer LM (1994) Physiological basis of the genetic improvement of corn. In: *Genetic Improvement of Field Crops* (ed Slafer GA) pp 183-236. New York: Marcel Dekker.
- Tommasini R, Evers R, Vogt E, Mornet C, Zaman GH, Schinkel AH, Borst P, Martinoia E (1996) The human multidrug resistance-associated protein functionally complements the yeast cadmium factor 1. *Proceedings of the National Academy of Sciences, USA* 93: 6743-6748.
- Tommasini R, Vogt E, Fromenteau M, Hörtensteiner S, Matile P, Amrhein N, Martinoia E (1998) An ABC transporter of *Arabidopsis thaliana* has both glutathione-conjugate and chlorophyll catabolite transport activity. *Plant Journal* 13: 773-780.
- Toojinda T, Siangliw M, Tragoonrung S, Vanavichit (2003) A Molecular genetics of submergence tolerance in rice: QTL analysis of key traits. *Annals of Botany* 91: 243-253.
- Trebitsh T, Goldschmidt EE, Riov J (1993) Ethylene induces de novo synthesis of chlorophyllase, a chlorophyll degrading enzyme, in Citrus fruit peel. *Proceedings of the National Academy of Sciences, USA* 90: 9441-9445.
- Tsuchiya T, Ohta H, Masuda T, Mikami B, Kita N, Shioi Y, Takamiya K (1997) Purification and characterization of two isozymes of chlorophyllase from mature leaves of *Chenopodium album*. *Plant and Cell Physiology* 38: 1026-1031.
- Tsuchiya T, Ohta H, Okawa K, Iwamatsu A, Shimada H, Masuda T, Takamiya K (1999) Cloning of chlorophyllase, the key enzyme in chlorophyll degradation: finding of a lipase motif and the induction by methyl jasmonate. *Proceedings of the National Academy of Sciences, USA* 96: 15362-15367.
- Tsuda T, Watanabe M, Ohshima K, Norinobu S, Cho SW, Kawakishi S, Osawa T (1994) Antioxidative activity of the anthocyanin pigments cyanidin 3-O- β -D-glucoside and cyanidin. *Journal of Agricultural Food Chemistry* 42: 2407-2410.
- Tuinstra MR, Ejeta G, Goldsbrough PB (1998) Evaluation of near-isogenic sorghum lines for QTL markers associated with drought tolerance. *Crop Science* 38: 835-842.
- Tuinstra MR, Grote EM, Goldsbrough PB, Ejeta G (1997) Genetic analysis of post-flowering drought tolerance and components of grain development in *Sorghum bicolor* (L.) Moench. *Molecular Breeding* 3: 439-448.

- Turner LB, Pollock CJ (1998) Changes in stolon carbohydrates during winter in four varieties of white clover (*Trifolium repens* L.) with contrasting hardiness. *Annals of Botany* 81: 97-107.
- Turner S, Gallois P, Brown D (2007) Tracheary element differentiation. *Annual Review of Plant Biology* 58: 407-433.
- Ueda J, Kato J (1980) Isolation and identification of a senescence-promoting substance from wormwood (*Artemisia absinthium* L.). *Plant Physiology* 66: 246-249.
- Valjakka M, Luomala EM, Kangasjarvi J, Vapaavuori E (1999) Expression of photosynthesis- and senescence-related genes during leaf development and senescence in silver birch (*Betula pendula*) seedlings. *Physiologia Plantarum* 106: 302-310.
- Van der Graaff E, Schwacke R, Schneider A, Desimone M, Flugge UI, Kunze R (2006) Transcription analysis of Arabidopsis membrane transporters and hormone pathways during developmental and induced leaf senescence. *Plant Physiology* 141: 776-792.
- van Doorn WG (2005) Plant programmed cell death and the point of no return. *Trends in Plant Science* 10: 478-483.
- van Doorn WG, Woltering EJ (2004) Senescence and programmed cell death: substance or semantics? *Journal of Experimental Botany* 55: 2147-2153.
- Van Kleunen M, Fischer M (2001) Adaptive evolution of plastic foraging responses in a clonal plant *Ecology* 82: 3309-3319.
- Van Oosterom EJ, Jayachandran R, Bidinger FR (1996) Diallel analysis of the stay-green trait and its components in sorghum. *Crop Science* 36: 549-555.
- Van Sandford DA, Mackown CT (1987) Cultivar differences in nitrogen remobilization in grain fill in soft red winter wheat. *Crop Science* 27: 295-300.
- Vanlerberghe GC, McIntosh L (1997) Alternative oxidase: from gene to function. *Annual Review of Plant Physiology and Plant Molecular Biology* 48: 703-734.
- Varga A, Bruinsma J (1973) Effects of different cytokinins on the senescence of detached oat leaves. *Planta* 111: 91-93.
- Vavilin D, Vermaas W (2007) Continuous chlorophyll degradation accompanied by chlorophyllide and phytol reutilization for chlorophyll synthesis in *Synechocystis* sp PCC 6803. *Biochimica et Biophysica Acta* 1767: 920-929.
- Vega CRC, Sadras VO, Andrade FH, Uhart SA (2000) Reproductive allometry in soybean, maize and sunflower. *Annals of Botany* 85: 461-468.
- Vegis A (1964) Dormancy in higher plants. *Annual Review of Plant Physiology* 15: 185-224.
- Venable DL, Brown JS (1993) The population-dynamic functions of seed dispersal. *Vegetatio* 108: 31-55.
- Venkatarayappa T, Fletcher RA, Thompson JE (1984) Retardation and reversal of senescence in bean leaves by benzyladenine and decapitation. *Plant and Cell Physiology* 25: 407-418.

Verma V, Foulkes MJ, Worland AJ, Sylvester-Bradley R, Caligari PDS, Snape JW (2004) Mapping quantitative trait loci for flag leaf senescence as a yield determinant in winter wheat under optimal and drought-stressed environments. *Euphytica* 135: 255-263.

Vermeij GJ (1995) Economics, volcanoes and Phanerozoic revolutions. *Paleobiology* 21: 125-152.

Vicentini F, Hörtensteiner S, Schellenberg M, Thomas H, Matile P (1995) Chlorophyll breakdown in senescent leaves: identification of the biochemical lesion in a stay-green genotype of *Festuca pratensis* Huds. *New Phytologist* 129: 247-252.

Vick BA, Zimmerman DC (1984) Biosynthesis of jasmonic acid by several plant species. *Plant Physiology* 75: 458-461.

Vishnevetsky M, Ovadis M, Zuker A, Vainstein A (1999) Molecular mechanisms underlying carotenogenesis in the chromoplast: multilevel regulation of carotenoid-associated genes. *Plant Journal* 20: 423-431.

Vogelmann TC (1989) Penetration of light into plants. *Photochemistry Photobiology* 50: 895-902.

von Bothmer R, Flink J, Jacobsen N, Kotimaki M, Landstrom T (1983) Interspecific hybridization with cultivated barley (*Hordeum vulgare* L.). *Hereditas* 99: 219-244.

Waggoner PE, Berger RD (1987) Defoliation, disease, and growth. *Phytopathology* 77: 393-398.

Wagner GJ (1979) Content and vacuole/extravacuole distribution of neutral sugars, free amino acids, and anthocyanin in protoplasts. *Plant Physiology* 64: 88-93.

Wagstaff C, Leverentz MK, Griffiths G, Thomas B, Chanasut U, Stead AD, Rogers HJ (2002) Cysteine protease gene expression and proteolytic activity during senescence of *Alstroemeria* petals. *Journal of Experimental Botany* 53: 233-240.

Wagstaff C, Malcolm P, Rafiq A, Leverentz M, Griffiths G, Thomas B, Stead AD, Rogers HJ (2003) Programmed cell death (PCD) processes begin extremely early in *Alstroemeria* petal senescence. *New Phytologist* 160: 49-59.

Walbot V (1985) On the life strategies of plants and animals. *Trends in Genetics* 1: 165-170.

Walbot V, Stapleton AE (1998) Reactivation potential of epigenetically inactive Mu transposable elements of *Zea mays* L. Decreases in successive generations. *Maydica* 43: 183-193.

Wallsgrave RM, Keys AJ, Lea PJ, Mifflin BJ (1983) Photosynthesis, photorespiration and nitrogen metabolism. *Plant Cell and Environment* 6: 301-309.

Walulu RS, Rosenow DT, Wester DB, Nguyen HT (1994) Inheritance of the stay green trait in sorghum. *Crop Science* 34: 970-972.

Wang DL, Zhu J, Li ZK, Paterson AH (1999) Mapping QTLs with epistatic effects and QTL x environment interactions by mixed linear model approaches. *Theoretical and Applied Genetics* 99: 1255–1264.

Wang D-Y, Li Q, Cui K-M, Zhu Y-X (2007) Gibberellin is involved in the regulation of cell death-mediated apical senescence in G2 pea. *Journal of Integrative Plant Biology* 49: 1627–1633.

Wang H, Li J, Bostock RM, Gilchrist DG (1996) Apoptosis: a functional paradigm for programmed plant cell death induced by a host-selective phytotoxin and invoked during development. *Plant Cell* 8: 375-391.

Wang TL, Woolhouse HW (1982) Hormonal aspects of senescence in plant development. *British Plant Growth Regulator Group Monograph* 8: 5-25.

Wang Y, Li J (2006) Genes controlling plant architecture. *Current Opinion in Biotechnology* 17: 123-129.

Wang YT, Yang CY, Chen Y-T, Lin Y, Shaw J-F (2004) Characterization of senescence-associated proteases in postharvest broccoli florets. *Plant Physiology and Biochemistry* 42: 663-670.

Wardle DA, Nilsson MC, Gallet C, Zackrisson O (1998) An ecosystem-level perspective of allelopathy. *Biological Reviews* 73: 305-319.

Wardley TM, Bhalla PL, Dalling MJ (1984) Changes in the number and composition of chloroplasts during senescence of mesophyll cells of attached and detached primary leaves of wheat (*Triticum aestivum* L.). *Plant Physiology* 75: 421-424.

Ware D, Jaiswal P, Ni J, Pan X, Chang K, Clark K, Teytelman L, Schmidt S, Zhao W, Cartinhour S, McCouch S, Stein L (2002) Gramene: a resource for comparative grass genomics. *Nucleic Acids Research* 30: 103-105.

Wareing PF, Seth AK (1967) Ageing and senescence in the whole plant. *SEB Symposia* 21: 543-558.

Watanabe N, Lam E (2004) Recent advance in the study of caspase-like proteases and Bax inhibitor-1 in plants: their possible roles as regulator of programmed cell death. *Mol. Plant Pathology* 5: 65-70.

Watson DJ (1947) Comparative physiological studies on the growth of field crops: I. Variation in net assimilation rate and leaf area between species and varieties, and within and between years. *Annals of Botany* 11: 41-76.

Watson DJ (1952) The physiological basis of variation in yield. *Advances in Agronomy* 4: 101-145.

Waughman GJ, Bellamy DJ (1981) Movement of cations in some plant species prior to leaf senescence. *Annals of Botany* 47: 141-145.

Weichmann J (2000) Postharvest physiology and secondary metabolism. *Journal of Applied Botany-Angewandte Botanik* 74: 126-130

- Weidner M, Franz A, Napp-Zinn K (1985) Plastid ultrastructure and photosynthesis in greening petalloid hypsophylls. *Planta* 163: 164-174.
- Weiss C, Vaadia Y (1965) *Life Sciences* 4: 1323-1326.
- Weisshaar B, Jenkins GI (1998) Phenylpropanoid biosynthesis and its regulation. *Current Opinion in Plant Biology* 1: 251-257.
- Welbank PJ, French SAW, Witts KJ (1966) Dependence of yields of wheat varieties on their leaf area durations. *Annals of Botany* 30: 291-299.
- Werger MJA, Hirose T (1991) Leaf nitrogen distribution and whole canopy photosynthetic carbon gain in herbaceous stands. *Vegetatio* 97: 11-20.
- Westoby M (1984) The self-thinning rule. *Advances in Ecological Research* 14: 167-226.
- Westoby M (1998) A leaf-height-seed (LHS) plant ecology strategy scheme. *Plant and Soil* 199: 213-227.
- Whatley JM (1978) A suggested cycle of plastid developmental interrelationships. *New Phytologist* 80: 489-502.
- White J (1979) The plant as a metapopulation. *Annual Review of Ecology and Systematics* 10: 109-145.
- Wilkins MB (1992) Circadian rhythms - their origin and control. *New Phytologist* 121: 347-375.
- Wilkinson DM, Sherratt TN, Phillip DM, Wratten SD, Dixon AFG, Young AJ (2002) The adaptive significance of autumn leaf colours. *Oikos* 99: 402-407.
- Wilkinson JQ, Lanahan MB, Clark DG, Bleecker AB, Chang C, Meyerowitz EM, Klee HJ (1997) A dominant mutant receptor from *Arabidopsis* confers ethylene insensitivity in heterologous plants. *Nature Biotechnology* 15: 444-447.
- Williams K, Field CB, Mooney HA (1989) Relationships among leaf construction cost, leaf longevity, and light environment in rain-forest plants of the genus *Piper*. *American Naturalist* 133: 198-211.
- Willstätter R, Stoll A (1913) Die Wirkung der Chlorophyllase. In: *Untersuchungen über Chlorophyll* (eds Willstätter R, Stoll A) pp 172-187. Berlin: Springer.
- Wilson LA (1977) Root crops. In: *Ecophysiology of Tropical Crops* (eds Alvim PT, Kozlowski TT) pp 187-236. New York: Academic.
- Wingler A (2007) Transcriptional or posttranscriptional regulation – how does a plant know when to senesce? *New Phytologist* 175: 1–4.
- Wingler A, Marès M, Pourtau N (2004) Spatial patterns and metabolic regulation of photosynthetic parameters during leaf senescence. *New Phytologist* 161: 781-789.
- Witten IH, Frank E (2005) *Data Mining*. San Francisco, USA: Morgan Kaufman.

- Wittenbach VA (1982) Effect of pod removal on leaf senescence in soybeans. *Plant Physiology* 70: 1544-1548.
- Wittenbach VA (1983) Purification and characterization of a soybean leaf storage glycoprotein. *Plant Physiology* 73: 125-129.
- Wittenbach VA, Lin W, Hebert RR (1982) Vacuolar localization of proteases and degradation of chloroplasts in mesophyll protoplasts from senescing primary wheat leaves. *Plant Physiology* 69: 98-102.
- Wolfe DW, Fereres E, Voss RE (1983) Growth and yield response of two potato cultivars to various levels of applied water. *Irrigation Science* 3: 211-222.
- Wolfe DW, Henderson DW, Hsiao TC, Alvino A (1988a) Interactive water and nitrogen effects on senescence of maize. I: Leaf area duration, nitrogen distribution, and yield. *Agronomy Journal* 80: 859-864.
- Wolfe DW, Henderson DW, Hsiao TC, Alvino A (1988b) Interactive water and nitrogen effects on senescence of maize. 2. Photosynthetic decline and longevity of individual leaves. *Agronomy Journal* 80: 865-870.
- Wollgiehn R (1961) Untersuchungen über den Einfluss des Kinetins auf den Nucleinsäure und Proteinstoffwechsel isolierter Blätter. *Flora* 150: 117-127.
- Woodcock A, Davis M (1978) *Catastrophe Theory*. Harmondsworth: Pelican.
- Woolhouse HW ed (1967) *SEB Symposium 21: Aspects of the biology of ageing*. Cambridge University Press.
- Wu HM, Cheun AY (2000) Programmed cell death in plant reproduction. *Plant Molecular Biology* 44: 267-281.
- Wüthrich KL, Bovet L, Hunziker PE, Donnison IS, Hörtensteiner S (2000) Molecular cloning, functional expression and characterisation of RCC reductase involved in chlorophyll catabolism. *Plant Journal* 21: 189-198.
- Xie DY, Sharma SB, Paiva NL, Ferreira D, Dixon RA (2003) Role of anthocyanidin reductase, encoded by BANYULS in plant flavonoid biosynthesis. *Science* 299: 396-399.
- Xiong Y, Contento AL, Bassham DC (2005) AtATG18a is required for the formation of autophagosomes during nutrient stress and senescence in *Arabidopsis thaliana*. *Plant Journal* 42: 535-546.
- Xu W, Subudhi PK, Crasta OR, Rosenow DT, Mullet JE, Nguyen HT (2000) Molecular mapping of QTLs conferring stay-green in grain sorghum (*Sorghum bicolor* L. Moench). *Genome* 43: 461-469.
- Yadav RS, Hash CT, Bidinger FR, Devos KM, Howarth CJ (2004) Genomic regions associated with grain yield and aspects of post-flowering drought tolerance in pearl millet across stress environments and testers background. *Euphytica* 136: 265-277.

Yadav RS, Hash CT, Bidinger FR, Howarth CJ (1999) QTL analysis and marker-assisted breeding of traits associated with drought tolerance in pearl millet. In: Genetic improvement of rice for water-limited environments (eds Ito O, O'Toole J, Hardy B) pp 211-223. Los Banos, The Philippines: IRRI.

Yadav RS, Hash CT, Cavan GP, Bidinger FR, Howarth CJ (2002) Quantitative trait loci associated with traits determining grain and stover yield in pearl millet under terminal drought stress conditions. *Theoretical and Applied Genetics* 104: 67-83.

Yadegari R, Drews GN (2004) Female gametophyte development. *Plant Cell* 16(Suppl.): S133–S141.

Yamauchi N, Watada AE (1991) Regulated chlorophyll degradation in spinach leaves during storage. *Journal of the American Society for Horticultural Science* 116: 58-62.

Yamaya T, Obara M, Nakajima H, Sasaki S, Hayakawa T, Sato T (2002) Genetic manipulation and quantitative-trait loci mapping for nitrogen recycling in rice. *Journal of Experimental Botany* 53: 917-925.

Yang LT, Mickelson S, See D, Blake TK, Fischer AM (2004) Genetic analysis of the function of major leaf proteases in barley (*Hordeum vulgare* L.) nitrogen remobilization. *Journal of Experimental Botany* 55: 2607-2616.

Yang SF, Oetiker JH (1998) Molecular biology of ethylene biosynthesis and its application in horticulture. *Journal of the Japanese Society for Horticultural Science* 67: 1209-1214.

Yao N, Eisfelder BJ, Marvin J, Greenberg JT (2004) The mitochondrion - an organelle commonly involved in programmed cell death in *Arabidopsis thaliana*. *Plant Journal* 40: 596-610.

Yao N, Greenberg JT (2006) *Arabidopsis* ACCELERATED CELL DEATH2 Modulates Programmed Cell Death. *Plant Cell* 18: 397–411.

Yoshida S (2003) Molecular regulation of leaf senescence. *Current Opinion in Plant Biology* 6: 79-84.

Yoshida S, Ito M, Nishida I, Watanabe A (2002) Identification of a novel gene HYS1/CPR5 that has a repressive role in the induction of leaf senescence and pathogen-defence responses in *Arabidopsis thaliana*. *Plant Journal* 29: 427–437.

Young AJ, Wellings R, Britton G (1991) The fate of chloroplast pigments during senescence of primary leaves of *Hordeum-vulgare* and *Avena-sativum*. *Journal of Plant Physiology* 137: 701-705.

Yu J, Hu S, many other authors (2002) A draft sequence of the rice genome (*Oryza sativa* L. ssp. *indica*) *Science* 296: 79-92.

Yupsanis T, Eleftheriou P, Kelepiri Z (1996) Separation and purification of both acid and neutral nucleases from germinated alfalfa seeds. *Journal of Plant Physiology* 149: 641-649.

Zahavi A (1975) Mate selection – A selection for a handicap. *Journal of Theoretical Biology* 53: 205–214.

Zarco-Tejada PJ, Berjón A, López-Lozano R, Miller JR, Martín P, Cachorro V, González MR, de Frutos A (2005) Assessing vineyard condition with hyperspectral indices: Leaf and canopy reflectance simulation in a row structured discontinuous canopy. *Remote Sensing of Environment* 99: 271-287.

Zavaleta-Mancera HA, Franklin KA, Ougham HJ, Thomas H, Scott IM (1999a) Regreening of senescent *Nicotiana* leaves. I. Reappearance of NADPH-protochlorophyllide oxidoreductase and light-harvesting chlorophyll a/b-binding protein. *Journal of Experimental Botany* 50: 1677-1682.

Zavaleta-Mancera HA, Thomas BJ, Thomas H, Scott IM (1999b) Regreening of senescent *Nicotiana* leaves. II. Redifferentiation of plastids. *Journal of Experimental Botany* 50: 1683-1689.

Zeiger E, Schwartz A (1982) Longevity of guard cell chloroplasts in falling leaves: implication for stomatal function and cellular aging. *Science* 218: 680-682.

Zelisko A, Garcia-Lorenzo M, Jackowski G, Jansson S, Funk C (2005) AtFtsH6 is involved in the degradation of the light-harvesting complex II during high-light acclimation and senescence. *Proceedings of the National Academy of Sciences, USA* 102: 13699-13704.

Zhang WK, Wang YJ, Luo GZ, Zhang JS, He CY, Wu XL, Gai JY, Chen SY (2004) QTL mapping of ten agronomic traits on the soybean (*Glycine max* L. Merr.) genetic map and their association with EST markers. *Theoretical and Applied Genetics* 108: 1131-1139.

Zhang Y, Wang L (2005) The WRKY transcription factor superfamily: its origin in eukaryotes and expansion in plants. *BMC Evolutionary Biology* 5: 1

Zhu YX, Davies PJ (1997) The control of apical bud growth and senescence by auxin and gibberellin in genetic lines of peas. *Plant Physiology* 113: 631-637.

Zhuang H, Hildebrand DF, Barth M (1995) Senescence of broccoli buds is related to changes in lipid peroxidation. *Journal of Agricultural and Food Chemistry* 43: 2585-2591.

Ziegler R, Blaheta A, Guha N, Schönege B (1988) Enzymatic formation of phaeophorbide and pyropheophorbide during chlorophyll degradation in a mutant of *Chlorella fusca* SHIRIA et KRAUS. *Journal of Plant Physiology* 132: 327-332.

Zimmermann P, Zentgraf U (2005) The correlation between oxidative stress and leaf senescence during plant development. *Cellular and Molecular Biology Letters* 10: 515-534.

Zubko E, Adams CJ, Machaekova I, Malbeck J, Scollan C, Meyer P (2002) Activation tagging identifies a gene from *Petunia hybrida* responsible for the production of active cytokinins in plants. *Plant Journal* 29: 797-808.

Zucchelli G, Jennings RC, Garlaschi FM, Cinque G, Bassi R, Cremonesi O (2002) The calculated in vitro and in vivo chlorophyll a absorption bandshape. *Biophysical Journal* 82: 378-390.