

Personal data

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Academic degrees

Graduate in Agronomy (Technical University of Lisbon), in 1981
Master of Science in Plant Productivity (Technical University of Lisbon), in 1983
Ph.D. in Biochemistry (University of East Anglia, U.K.), in 1987
Agregação (Technical University of Lisbon), in 1994

Previous and current scientific and/or professional activities

Full Professor at the Instituto Superior de Agronomia, Technical University of Lisbon, Portugal; phone 351.213653416; fax 351.213635031; E-mail rbferreira@isa.utl.pt

Researcher at the Instituto de Tecnologia Química e Biológica, New University of Lisbon, Oeiras, Portugal; phone 351.214469651; fax 351.214433644; E-mail rbferreira@itqb.unl.pt

Area of scientific activity

Biochemistry & Molecular Biology

Present research interests

Transcriptomics, Proteomics and Metabolomics; Biomedicine; Fungal Pathogen/Host (man or plant) Interactions; Plant Transformation; Microbiology (Pathogenic Fungi); Neurodegenerative Diseases; Human Nutrition; Search for Novel Bioactive Plant Secondary Metabolites.

Novel, non-toxic strategies to control human/plant fungal pathogens; Action mechanisms of blad antifungal polypeptide; Transcriptomic, proteomic & metabolomic analyses of vine/fungal interactions; Host-induced changes in human fungal pathogen exoglycome (e.g. *Aspergillus fumigatus* and *Alternaria alternata*). Transcriptomic/metabolomic changes in *A. fumigatus* when challenged by other fungi; Stereochemistry of dirigent proteins; Vine/rose transformation; R&D on bioelectronic methods to control recalcitrant plant diseases; Wine proteins; Biomedical applications of plant natural products; R&D on novel bioactive (antioxidant/antiproliferative/antimicrobial) compounds; Transcriptomic/proteomic analyses of the bioactive compounds on a human neuroblastoma cell model; Bioavailability of antioxidant compounds after *in vitro* digestion/human intervention studies; Redox proteomics in a neurodegeneration human cell model; Human PBM cells; Transcriptomic/proteomic changes induced by novel MMP-9 inhibitors on human colon cancer cells; DNA repair mechanisms.

Other skills/activities

Coordination of the Disease & Stress Biology (D&SB) research group, in collaboration with Sara Monteiro and Cláudia Santos. The DSB group operates in three poles: Instituto Superior de Agronomia (UTL); Instituto de Tecnologia Química e Biológica (UNL); CEV-Biotecnologia das Plantas, SA, a private company, established in 2007 after the 16-year-long study of a polypeptide with a potent fungicide activity, termed blad.

Supervision of many final-year undergraduates (>40), Master of Science (>10) and Ph.D. students (>10), as well as other post-graduates (>30) and post-doctorates (>10), from both Portugal and abroad (Italy, Netherlands, France, Egypt, India, China, Russia). Currently involved in the supervision of 5 Ph.D. students and 4 post-doctorates.

Coordination and execution of many research projects, both national and international: 3 EU, 16 FCT, 4 AdI; 7 funded by AdI and FCT in collaboration with private companies.

Publications

In Books:

- **Davies, D.D. and Ferreira, R.B.** (1987) Protein turnover under conditions of osmotic stress. *In*: "Drought resistance in plants: physiological and genetic aspects" (pp. 215-232). Monti, L. e Porceddu, E., eds. Agriculture series. Comissão das Comunidades Europeias (EUR 10700 EN), Luxemburgo.
- **Ferreira, R.M.B. and Teixeira, A.R.N.** (1993) Metabolism of amino acids. *In*: "Encyclopaedia of Food Science, Food Technology and Nutrition", (R. Macrae, R.K. Robinson e M.J. Sadler, eds.), vol. 1, pp. 158-166. Academic Press, London.
- **Teixeira, A.R.N. and Ferreira, R.M.B.** (1993) Ripening of fruits. *In*: "Encyclopaedia of Food Science, Food Technology and Nutrition", (R. Macrae, R.K. Robinson e M.J. Sadler, eds.), vol. 6, pp. 3933-3940. Academic Press, London.
- **Ferreira, R.M.B. and Teixeira, A.R.N.** (2003) Amino acids (c) Metabolism. *In*: "Encyclopedia of Food Sciences and Nutrition", (B. Caballero, L. Trugo and P. Finglas, eds.), Academic Press, London.
- **Teixeira, A.R.N. and Ferreira, R.M.B.** (2003). Ripening of fruit. *In*: "Encyclopedia of Food Sciences and Nutrition", (B. Caballero, L. Trugo and P. Finglas, eds.), Academic Press, London.
- **Ferreira, R.B.** (1993-2004) Editor of the area of Biochemistry and author of hundreds of entries. Enciclopédia Luso-Brasileira de Cultura, 2nd Edition, Editorial Verbo, Lisboa.
- **Monteiro, S., Batista, L., Loureiro, V., Teixeira, A. and Ferreira, R.B.** (2007) Major characteristics of wine proteins. *In*: Macromolecules and secondary metabolites of grapevine and wine, (P. Jeandet, C. Clément and A. Conreux), pp. 153-158. Lavoisier, Paris.
- **Ferreira, R.B., Monteiro, S., Freitas, R., Santos, C.N., Chen, Z., Batista, L.M., Duarte, J., Borges, A. and Teixeira, A.R.** (2008) Plant/fungal interactions studied at the molecular level. *In*: Plant pathology concepts and laboratory exercises. 2nd Edition. Chapter 28, pp. 309-322. R.N. Trigiano, M.T. Windham, and A.S. Windham, Eds. CRC Press, Boca Raton.
- **Monteiro, S. and Ferreira, R.B.** (2008) Testing Blad, a potent antifungal protein. *In*: Plant pathology concepts and laboratory exercises. 2nd Edition. Chapter 29, pp. 323-328. R.N. Trigiano, M.T. Windham, and A.S. Windham, Eds. CRC Press, Boca Raton.

In Scientific National Journals:

- **Ferreira, R.M. and Teixeira, A.R.** (1985) Some physical and catalytic properties of glutamate synthase from maize roots. *Ciência Biológica* (Portugal), **10** : 15-30.
- **Ferreira, R.M. and Teixeira, A.R.** (1987) Studies on glutamate synthase from the roots of maize. Effects of nicotinamide-adenine dinucleotides and inorganic salts on its activity. *Anais do Instituto Superior de Agronomia*, **42** : 231-247.
- **Ferreira, R.M.B.** (1987) Aspectos bioquímicos da degradação celular de proteínas. *Anais do Instituto Superior de Agronomia*, **42** : 267-297.
- **Franco, E., Ferreira, R.B. and Teixeira, A.N.** (1989) Effect of nitrogen source and

protein synthesis inhibitors on glutamate dehydrogenase activity from *Lemna minor*. *Ciência Biológica (Mol. Cell. Biol.)* (Portugal), **14** : 59-70.

- **Monteiro, S., Piçarra-Pereira, M.A., Tanganho, M., Loureiro, V., Teixeira, A. and Ferreira, R.B.** (1998) Study of wine proteins by immunological methods. I- Production of highly specific antibodies. *Polish Journal of Food and Nutrition Sciences*, vol. **7/48**, n.º 2 (S) : 101-106.
- **Piçarra-Pereira, M.A., Monteiro, S., Loureiro, V., Teixeira, A. and Ferreira, R.B.** (1998) Study of wine proteins by immunological methods. II- Evidence for structural dissimilarity with chitinase and thaumatin. *Polish Journal of Food and Nutrition Sciences*, vol. **7/48**, n.º 2 (S) : 107-111.
- **Esquível, M.G., Ferreira, R.B. and Teixeira, A.R.** (1999) Development of a new method for determination of the rates of RuBP carboxylase degradation. *Agronomia Lusitana*, **47** : 351-357.
- **Ferreira, R.B.** (1999) The ubiquitin system for protein modification and degradation. *Agronomia Lusitana*, **47** : 287-315.
- **Ferreira, R.B., Monteiro, S., Batista, L., Loureiro, V. and Teixeira, A.** (2008) Micoses da vinha e instabilidade proteica de vinhos. *Enologia*, **51/52** : 11-23.
- **Ferreira, R.B.** (2008) Fungos patogénicos das plantas. A batalha química para a patogénese. *Agros, MMVIII(2)* : 4-13.

In International Scientific Journals:

- **Ferreira, R.B. and Davies, D.D.** (1986) Is protein degradation correlated with either the charge or size of *Lemna* proteins? *Planta*, **169** : 278-288.
- **Ferreira, R.** (1986) Data in graphs and tables. *Nature*, **324** : 215-216.
Esta publicação foi posteriormente comentada por A.S.Beedle (1987) : Data in graphs and tables. *Nature*, **325** : 305.
- **Ferreira, R.B. and Davies, D.D.** (1987) Protein degradation in *Lemna* with particular reference to ribulose biphosphate carboxylase I. The effect of light and dark. *Plant Physiology*, **83** : 869-877.
- **Ferreira, R.B. and Davies, D.D.** (1987) Protein degradation in *Lemna* with particular reference to ribulose biphosphate carboxylase II. The effect of nutrient starvation. *Plant Physiology*, **83** : 878-883.
- **Ferreira, R.M.B. and Davies, D.D.** (1989) Nitrogen supply and light intensity on properties of glutamate dehydrogenase and glycollate oxidase in *Lemna*. *Phytochemistry*, **28** : 349-354.
- **Ferreira, R.M.B., Bird, B. and Davies, D.D.** (1989) The effect of light on the structure and organization of *Lemna* peroxisomes. *Journal of Experimental Botany*, **40** : 1029-1035.
- **Ferreira, R.B. and Davies, D.D.** (1989) Conversion of ribulose-1,5-bisphosphate carboxylase to an acidic and catalytically inactive form by extracts of osmotically stressed *Lemna* fronds. *Planta*, **179** : 448-455.
- **Ferreira, R.B. and Shaw, N.M.** (1989) Effect of osmotic stress on protein turnover in *Lemna minor* fronds. *Planta*, **179** : 456-465.
- **Franco, E., Ferreira, R.M.B. and Teixeira, A.R.N.** (1992) Involvement of membrane damage in stress-induced oxidative deactivation of ribulose biphosphate carboxylase from *Lemna minor*. *Australian Journal of Plant Physiology*, **19** : 297-307.
- **Ferreira, R.M.B. and Teixeira, A.R.N.** (1992) Sulfur starvation in *Lemna* leads to degradation of ribulose-bisphosphate carboxylase without plant death. *Journal of Biological Chemistry*, **267** : 7253-7257.
- **Cordeiro, A.F., Ferreira, R.B. and Teixeira, A.N.** (1993) *In vitro* degradation of

ribulose biphosphate carboxylase in chloroplasts isolated from *Lemna minor* subjected to sulfur starvation. *Phyton*, **32** : 31-35.

- **Melo, T.S., Ferreira, R.B. and Teixeira, A.N.** (1994) The seed storage proteins from *Lupinus albus* seeds. *Phytochemistry*, **37** : 641-648.
- **Dorresteijn, E., Ferreira, R.B., Laureano, O. and Teixeira, A.R.** (1995) Electrophoretic and FPLC analysis of soluble proteins in four Portuguese wines. *American Journal of Enology and Viticulture*, **46** : 235-242.
- **Ferreira, R.B., Melo, T.S. and Teixeira, A.N.** (1995) Catabolism of the seed storage proteins from *Lupinus albus*. Fate of globulins during germination and seedling growth. *Australian Journal of Plant Physiology*, **22** : 211-219.
- **Ramos, P.C.R., Cordeiro, A.C.F., Ferreira, R.M.B., Ricardo, C.P.P. and Teixeira, A.R.N.** (1995) The presence of ubiquitin-protein conjugates in plant chloroplast lysates is due to cytosolic contamination. *Australian Journal of Plant Physiology*, **22** : 893-901.
- **Ferreira, R.M.B., Ramos, P.C.R., Franco, E., Ricardo, C.P.P. and Teixeira, A.R.N.** (1995) Changes in ubiquitin and ubiquitin protein conjugates during seed formation and germination. *Journal of Experimental Botany*, **46** : 211-219.
- **Ramos, P.C.R., Ferreira, R.M.B. and Ricardo, C.P.P.** (1996) Synthesis of ¹²⁵I-ubiquitin conjugates in extracts of *Lemna minor*. *Journal of Experimental Botany*, **47** : 569-575.
- **Ferreira, R.M.B., Franco, E. and Teixeira, A.R.N.** (1996) Covalent dimerization of ribulose biphosphate carboxylase subunits by UV radiation. *Biochemical Journal*, **318** : 227-234.
- **Ferreira, R.B., Esquível, G. and Teixeira, A.R.** (1996) Immunological exercises for beginners. Analysis of plant proteins. *Biochemical Education*, **24** : 176-178.
- **Ramos, P.C.R., Ferreira, R.M.S.B., Franco, E. and Teixeira, A.R.N.** (1997) Accumulation of a lectin-like breakdown product of β -conglutin catabolism in cotyledons of germinating *Lupinus albus* L. seeds. *Planta*, **203** : 26-34.
- **Gaspar, M.M., Ferreira, R.B., Chaves, M.M. and Teixeira, A.R.** (1997) Improved method for the extraction of proteins from *Eucalyptus* leaves. Application in leaf response to temperature. *Phytochemical Analysis*, **8** : 279-285.
- **Fonseca, P.A., Ferreira, R.B. and Teixeira, A.R.** (1997) The seed proteins from *Quercus suber*. *Journal of Agricultural and Food Chemistry*, **45** : 3443-3447.
- **Santos, C.N., Ferreira, R.B. and Teixeira, A.R.** (1997) The seed proteins of *Lupinus mutabilis*. *Journal of Agricultural and Food Chemistry*, **45** : 3821-3825.
- **Franco, E., Ferreira, R.B. and Teixeira, A.R.** (1997) Utilization of an improved methodology to isolate *Lupinus albus* conglutins in the study of their sedimentation coefficients. *Journal of Agricultural and Food Chemistry*, **45** : 3908-3913.
- **Esquível, M.G., Ferreira, R.B. and Teixeira, A.R.** (1998) Protein degradation in C₃ and C₄ plants with particular reference to ribulose biphosphate carboxylase and glycolate oxidase. *Journal of Experimental Botany*, **49** : 807-816.
- **Monteiro, S., Piçarra-Pereira, M.A., Tanganho M.C., Rente, J.P., Loureiro, V.B., Teixeira, A.R. and Ferreira, R.B.** (1999) Preparation of polyclonal antibodies specific for wine proteins. *Journal of the Science of Food and Agriculture*, **79** : 772-778.
- **Seabra, M.A., Freire, J.P.B., Ferreira, R.B., Cunha, L.F. and Teixeira, A.R.** (1999) Utilização do tremço (*Lupinus albus*), da fêverole (*Vicia faba*) ou do feijão frade (*Vigna unguiculata*) no regime de desmame do leitão: carácter antigénico e implicações zootécnicas. *Revista Portuguesa de Zootécnia*, **6** : 133-149.
- **Ferreira, R.B., Franco, E. and Teixeira, A.R.** (1999) Calcium- and magnesium-dependent aggregation of legume seed storage proteins. *Journal of Agricultural and Food Chemistry*, **47** : 3009-3015.

- **Ferreira, R.B., Esquível, M.G. and Teixeira, A.R.** (2000) Catabolism of ribulose biphosphate carboxylase from higher plants. *Current Topics in Phytochemistry*, **3** : 129-165. (review article)
- **Ferreira, R.B., Monteiro, S., Piçarra-Pereira, M.A., Tanganho, M.C., Loureiro, V.B. and Teixeira, A.R.** (2000) Characterization of the proteins from grapes and wines by immunological methods. *American Journal of Enology and Viticulture*, **51** : 22-28.
- **Esquível, M.G., Ferreira, R.B. and Teixeira, A.R.** (2000) Protein degradation in C₃ and C₄ plants subjected to nutrient starvation. Particular reference to ribulose biphosphate carboxylase/oxygenase and glycolate oxidase. *Plant Science*, **153** : 15-23.
- **Freitas, R.L., Ferreira, R.B. and Teixeira, A.R.** (2000) Use of a single method in the extraction of the seed storage globulins from several legume species. Application to analyse structural comparisons within the major classes of globulins. *International Journal of Food Sciences and Nutrition*, **51** : 341-352.
- **Ferreira, R.M.S.B., Esquível, M.G.C.I. and Teixeira, A.R.N.** (2000) An accurate method to quantify ribulose biphosphate carboxylase content in plant tissue. *Plant, Cell & Environment*, **23** : 1329-1340.
- **Rosa, M.J.S., Ferreira, R.B. and Teixeira, A.R.** (2000) Storage proteins from *Lathyrus sativus* seeds. *Journal of Agricultural and Food Chemistry*, **48** : 5432-5439.
- **Seabra, M., Carvalho, S., Freire, J., Ferreira, R., Mourato, R., Cunha, M., Cabral, F., Teixeira, A. and Aumaitre, A.** (2001) *Lupinus luteus*, *Vicia sativa* and *Lathyrus cicera* as protein sources for piglets: ileal and total tract apparent digestibility of amino acids and antigenic effects. *Animal Feed Science & Technology*, **89** : 1-16.
- **Albuquerque, J.A., Esquível, M.G., Teixeira, A.R. and Ferreira, R.B.** (2001) The catabolism of ribulose biphosphate carboxylase from higher plants. A hypothesis. *Plant Science*, **161**, 55-65.
- **Monteiro, S., Piçarra-Pereira, M.A., Mesquita, P.R., Loureiro, V.B., Teixeira, A. and Ferreira, R.B.** (2001) The wide diversity of structurally similar wine proteins. *Journal of Agricultural and Food Chemistry*, **49** : 3999-4010.
- **Mesquita, P.R., Piçarra-Pereira, M.A., Monteiro, S., Loureiro, V.B., Teixeira, A.R. and Ferreira, R.B.** (2001). Effect of wine composition on protein stability. *American Journal of Enology and Viticulture*, **52** : 324-330.
- **Salgado, P., Freire, J.B., Ferreira, R.B., Seabra, M., Teixeira, A.R., Toullec, R. and Lallès, J.-P.** (2002) Legume proteins of the vicilin family are more immunogenic than those of the legumin family in weaned piglets. *Food and Agricultural Immunology*, **14** : 51-63.
- **Salgado, P., Montagne, L., Freire, J.P.B., Ferreira, R.B., Teixeira, A., Bento, O., Abreu, M.C., Toullec, R. and Lallès, J.-P.** (2002) Legume grains enhance ileal losses of specific endogenous serine-protease proteins in the weaned pig. *Journal of Nutrition*, **132** : 1913-1920.
- **Ferreira, R.B., Piçarra-Pereira, M.A., Monteiro, S., Loureiro, V.B. and Teixeira, A.R.** (2002) The wine proteins. *Trends in Food Science & Technology*, **12** : 230-239.
- **Ferreira, R.B., Freitas, R.L. and Teixeira, A.R.** (2003) Self-aggregation of legume seed storage proteins inside the protein storage vacuoles is electrostatic in nature, rather than lectin mediated. *FEBS Letters*, **534** : 106-110.
- **Monteiro, S., Piçarra-Pereira, M.A., Teixeira, A.R., Loureiro, V.B. and Ferreira, R.B.** (2003) Environmental conditions during vegetative growth determine the major proteins that accumulate in mature grapes. *Journal of Agricultural and Food Chemistry*, **51** : 4046-4053.
- **Monteiro, S., Barakat, M., Piçarra-Pereira, M.A., Teixeira, A.R. and Ferreira, R.B.** (2003) Osmotin and thaumatin from grape. A putative general defence mechanism against

pathogenic fungi. *Phytopathology*, **93** : 1505-1512.

- **Salgado, P., Freira, J.P.B., Ferreira, R.B., Teixeira, A.R., Bento, O., Abreu, M.C., Toullec, R. E. and Lallès, J.-P.** (2003) Immunodetection of legume proteins resistant to small intestinal digestion in weaned piglets. *Journal of the Science of Food and Agriculture*, **83** : 1571-1580.
- **Ferreira, R.B., Freitas, R.L. and Teixeira, A.R.** (2003) The structure of *Lupinus* seed storage proteins. Recent developments. *Current Topics in Plant Biology*, **4** : 139-150. (review article)
- **Freitas, R.L., Teixeira, A.R. and Ferreira, R.B.** (2004) Characterization of the proteins from *Vigna unguiculata* seeds. *Journal of Agricultural and Food Chemistry*, **52** : 1682-1687.
- **Ribeiro, A.C., Teixeira, A.R. and Ferreira, R.B.** (2004) Characterization of globulins from common vetch (*Vicia sativa* L.). *Journal of Agricultural and Food Chemistry*, **52** : 4913-4920.
- **Ferreira, R.B., Monteiro, S.S., Piçarra-Pereira, M.A. and Teixeira, A.R.** (2004) Biotechnology of grapevine for increased resistance to fungal pathogens without compromising wine stability. *Trends in Biotechnology*, **22** : 168-173.
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- **Cherian, S., Reddy, M.P. and Ferreira, R.B.** (2006) Transgenic plants with improved dehydration-stress tolerance: Progress and future prospects. *Biologia Plantarum*, **50** : 481-495.
- **Monteiro, S., Piçarra-Pereira, M.A., Batista, L.M., Loureiro, V.B., Teixeira, A.R. and Ferreira, R.B.** (2006) Electrophoretic analysis of the polypeptide composition during berry development. *Vitis*, **45** : 149-150.
- **Santos, C., Caeiro, A.S., Branco-Price, C., Teixeira, A.R. and Ferreira, R.B.** (2006) Exposure of *Lemna minor* to arsenite: expression levels of the components and intermediates of the ubiquitin/proteasome pathway. *Plant and Cell Physiology*, **47** : 1262-1273.
- **Ferreira, R.B., Monteiro, S., Freitas, R., Santos, C.N., Chen, Z., Batista, L.M., Duarte, J., Borges, A. and Teixeira, A.R.** (2006) Fungal pathogens: The battle for plant infection. *Critical Reviews in Plant Sciences*, **25** : 505-524.
- **Freitas, R.L., Teixeira, A.R. and Ferreira, R.B.** (2007) Vicilin-type globulins follow distinct patterns of degradation in different species of germinating legume seeds. *Food Chemistry*, **102** : 323-329.
- **Oliveira, P.B., Silva, M.J., Ferreira, R.B., Oliveira, C.M., and Monteiro, A.A.** (2007) Dry matter partitioning, carbohydrate composition, protein reserves and fruiting in 'Autumn Bliss' red raspberry vary in response to pruning date and cane density. *HortScience*, **42** : 77-82.
- **Monteiro, S., Piçarra-Pereira, M.A., Loureiro, V., Teixeira, A. and Ferreira, R.B.** (2007) The diversity of pathogenesis-related proteins decreases during grape maturation. *Phytochemistry*, **68** : 416-425.
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- **Batista, L., Monteiro, S., Loureiro, V.B., Teixeira, A.R. and Ferreira, R.B.** (2009) The

complexity of protein haze formation in wines. *Food Chemistry*, **112** : 169-177.

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- **Batista, L., Monteiro, S., Loureiro, V.B., Teixeira, A.R. and Ferreira, R.B.** (2010) Protein haze formation in wines revisited. The stabilizing effect of organic acids. *Food Chemistry*, **122** : 1067-1075. doi:10.1016/j.foodchem.2010.03.076
- **Tavares L., Fortalezas, S., Carrilho, C., McDougall, G.J., Stewart, D., Ferreira, R.B. and Santos, C.** (2010) Antioxidant and antiproliferative properties of strawberry tree tissues. *Journal of Berry Research*, In Press.
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Protein and gene sequences

- **Caeiro A.S., Santos, C.N., Price, C.B., Teixeira, A.R. and Ferreira, R.B.** (2004) 78 nucleotides (26 amino acids). *Pisum sativum* ubiquitin mRNA, partial cds. GenBank Accession number AY702914 (AAU14829).
- **Caeiro A.S., Santos, C.N., Price, C.B., Teixeira, A.R. and Ferreira, R.B.** (2004) 633 nucleotides (221 amino acids). *Pisum sativum* 26S proteasome ATPase subunit mRNA, partial cds. GenBank Accession number AY623108 (AAT52191).
- **Caeiro A.S., Santos, C.N., Price, C.B., Teixeira, A.R. and Ferreira, R.B.** (2004) 161 nucleotides (54 amino acids). *Pisum sativum* 26S proteasome beta subunit mRNA, partial cds. GenBank Accession number AY623107 (AAT52190).
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Communications

Many oral communications by invitation.

Many oral communications in scientific meetings, both national and international.

Over 150 posters presented at scientific meetings, both national and international.