

**BRENDAN CHOAT**

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**EDUCATION**

Ph.D. James Cook University (JCU), Townsville, Australia and Research School of Biological Sciences (RSBS), Australian National University, Canberra, Australia (2003).

Dissertation: Hydraulic architecture and seasonal water-use in dry rainforest trees of contrasting leaf phenology. Supervisors: Dr Joe Holtum (JCU), Dr Jon Luly (JCU), Dr Marilyn Ball (RSBS).

B.Sc. (Hons) Class H1, Plant Biology, James Cook University (1997)

**POSTDOCTORAL APPOINTMENTS**

Postdoctoral fellow: Viticulture and Enology, University of California, Davis (2005-Present) Laboratory of Dr Mark Matthews

Postdoctoral fellow: Organismic and Evolutionary Biology, Harvard University (2003 to 2005) Laboratory of Dr Michele Holbrook

**RESEARCH EXPERIENCE**

**Postdoctoral Research:** Development and refinement of microfluidic technique for measurement of hydraulic parameters in single xylem vessels. Construction of systems to measure hydraulic conductivity and vulnerability to embolism. Design and fabrication of cell and xylem pressure probes. Electronics and circuit building. Further experience in scanning-, transmission- and cryo- electron microscopy

**Doctoral Research:** Leaf level gas exchange (infrared gas analysers and porometry), chlorophyll fluorescence (PAM fluorometers), stem sap flow (heat pulse probes). Plant water and soil water relations including pressure bomb, pressure-volume curves in leaves and TDR probes. Environmental measurements of light, temperature, relative humidity, etc using Campbell and Hobo data loggers. Light microscopy, scanning electron microscopy, cryo-electron microscopy.

**TEACHING EXPERIENCE**

- Mentor, Masters Program, Department of Viticulture and Enology, UC Davis (2006). Assistance with development of hypotheses and research proposal, construction of equipment and experimental design, data analysis and preparation of results for publication.
- Mentor, Research Experience for Undergraduates (REU) program, Harvard Forest (2003, 2005). One-on-one mentoring of undergraduate students for experimental design, data acquisition and analysis, oral and written presentation of results.
- Mentor, Research Science Institute program, Massachusetts Institute of Technology (2004) Mentoring of high school students in developing research project, conducting experiments, written and oral presentation of results.

- Guest Lecture, “Plant Physiology” Harvard Forest (2003) Lecture on physiology of water transport in plants to 30 undergraduate students in REU program.
- Guest Lecture, “Tropical Plant Ecology” Harvard University, Dr Michele Holbrook (2003) Lecture on the historical biogeography of Australia flora.
- Teaching Assistant, “Plant Ecophysiology” James Cook University, Dr Joe Holtum (2000). Instruction of undergraduate students in ecophysiological measurements including leaf gas exchange, chlorophyll fluorescence and plant water status.
- Lab Teaching Assistant, “Marine Botany” James Cook University, Dr Joe Holtum (1999-2000). Instruction of 10 students in laboratory and field components including sampling techniques and electron microscopy.
- Lab Teaching Assistant, “Introduction to Botany” James Cook University, Prof. Betsy Jackes (1997, 1999). Instruction in laboratory component of course on topics of plant identification, anatomy, diversity and evolutionary relationships.

#### **ACADEMIC EXCELLENCE AWARDS AND SCHOLARSHIPS**

- Collaborative Research Scholarship, Research School of Biological Sciences, Australian National University, Canberra (1999)
- Australian Society of Plant Physiologists Student Poster Prize, Combio Conference (1999)
- Australian Postgraduate Award Scholarship, James Cook University (1998)
- P.F. Brownell Medal for Plant Physiology (1998)

#### **RESEARCH GRANTS**

- Co-authored proposal for USDA, National Research Initiative, Environmental Stress Program – “Solute accumulation and apparent hydraulic isolation of fleshy fruit” Funded \$175,495 (2006-2008) Principal Investigators: Dr Mark Matthews
- Partner on Natural Environmental Research Council (NERC) new investigators proposal - “Structure and function of pit membranes in water conduction pathways of plants” £69,513 (2006) Principal investigator: Dr Steven Jansen, Royal Botanical Gardens, Kew.
- Lennox Boyd Memorial Trust Fund Award – Covered visit to Royal Botanical Gardens, Kew. £2,000 (2005)
- AW Mellon Exploration Grant, Smithsonian Tropical Research Institute and Organisation of Tropical Studies) – “The effects of seasonal drought on hydraulic architecture and vulnerability to embolism in *Cordia*” Funded \$6000 (2003)

#### **PUBLICATIONS (\*publication co-authored with student)**

- \*Cobb AR, **Choat B**, Holbrook NM. (Submitted). Dynamics of freeze-thaw embolism in *Smilax rotundifolia* (Smilacaceae) *American Journal of Botany*
- Choat B**, Holbrook NM. (In Revision). Variation in hydraulic traits of *Cordia* species along a precipitation gradient. *Plant, Cell and Environment*
- Jansen S, Sano Y, **Choat B**, Rabaey D, Lens F, Dute RR. (Accepted). Pit membranes in tracheary elements of *Rosaceae* and related families: new records of tori and pseudo-tori. *American Journal of Botany*

- \*Stuart SA, **Choat B**, Martin K, Holbrook NM and Ball MC. (In Press). The role of freezing in defining the latitudinal limits of mangrove forests. *New Phytologist*
- \***Choat B**, Brodie TW, Cobb AR, Zwieniecki MA, Holbrook NM. (2006). Direct measurements of intervessel pit membrane hydraulic resistance in two angiosperm tree species. *American Journal of Botany* 93: 993-1000
- Choat B**, Ball MC, Luly JG, Donnelly C, Holtum JAM. (2006). Seasonal patterns of leaf gas exchange and water relations in dry rainforest trees of contrasting leaf phenology. *Tree Physiology* 26: 657-664
- Lovelock CE, Ball MC, **Choat B**, Holbrook NM, Feller IC. (2006). Physiological processes with patterns in mangrove forest structure: Phosphorus deficiency limits canopy development, hydraulic conductivity and photosynthetic carbon gain in dwarf *Rhizophora mangle*. *Plant, Cell and Environment* 29: 793-802
- \***Choat B**, Lahr E, Melcher PJ, Zwieniecki MA, Holbrook NM. (2005). The spatial pattern of air seeding thresholds in mature sugar maple trees. *Plant, Cell and Environment* 28: 1082–1089
- Choat B**, Ball MC, Luly JG, Holtum JAM. (2005). Hydraulic architecture of deciduous and evergreen dry rainforest tree species from north-eastern Australia. *Trees – Structure and Function* 19: 305–311
- Choat B**, Jansen S, Zwieniecki MA, Smets E, Holbrook NM. (2004). Changes in pit membrane porosity due to deflection and stretching: the role of vested pits. *Journal of Experimental Botany* 55: 1569 - 1575
- Jansen S, **Choat B**, Vinckier S, Lens F, Schols P, Smets E. (2004). Intervascular pit membranes with a torus in the wood of *Ulmus* (Ulmaceae) and related genera. *New Phytologist* 163: 51-59
- Choat B**, Ball M, Luly J, Holtum J. (2003). Pit membrane porosity and water stress-induced cavitation in four co-existing dry rainforest tree species. *Plant Physiology* 131: 41-48

## EDITORIAL AND PROFESSIONAL SERVICE

Editorial Review Board: *Tree Physiology* (beginning 2007)

Referee for *American Journal of Botany*, *Ecology*, *International Association of Wood Anatomists*, *New Phytologist*, *Plant Biology*, *Plant Cell and Environment*, *Plant Physiology*, *Tree Physiology*, *Trees—Structure and Function*.

## PROFESSIONAL SOCIETIES

Botanical Society of America, Ecological Society of America, International Association of Wood Anatomists.

## SELECTED CONFERENCE PARTICIPATION

- Choat B, Brodie TW, Cobb AR, Zwieniecki MA, Holbrook NM. Oral Presentation. “Direct measurements of intervessel pit membrane hydraulic resistance in two angiosperm tree species.” 100<sup>th</sup> annual meeting of the Botanical Society of America, Chico, California, 28<sup>th</sup> Jul – 2<sup>nd</sup> Aug 2006.
- Choat B, Zwieniecki MA, Holbrook NM. Oral presentation. “Spatial variation in cavitation threshold and xylem sap ionic concentration in mature sugar maple trees.” 90<sup>th</sup> annual meeting of the Ecological Society of America, Montreal, Canada, Aug 2005.

- Choat B, Jansen S, Zwieniecki MA, Smets E, Holbrook NM. Oral Presentation. "Changes in pit membrane porosity due to deflection and stretching: the role of vested pits." International Association of Wood Anatomists Annual Meeting, Montpellier 24<sup>th</sup> – 29<sup>th</sup> Oct 2004.
- Choat B, Holbrook NM. Oral presentation. "Variation in hydraulic traits of *Cordia* species occurring across a rainfall gradient" Association of Tropical Biology annual meeting, Miami, Florida 12<sup>th</sup> - 15<sup>th</sup> Jul 2004.
- Choat B, Luly J, Ball MC, Holtum JAM. Oral presentation. "Pit membrane porosity and vulnerability to embolism in four seasonally dry rainforest tree species" 87<sup>th</sup> annual meeting of the Ecological Society of America, Tucson, Arizona 3<sup>rd</sup>-9<sup>th</sup> Aug 2002.
- Choat B, Luly J, Ball MC, Holtum JAM. Oral presentation. "Gas exchange and hydraulic architecture of trees of different leaf phenology from a seasonally dry rainforest in Australia" Association of Tropical Biology annual meeting, Panama City, Panama 29<sup>th</sup> Jul – 2<sup>nd</sup> Aug 2002.
- Choat B, Luly J, Ball MC, Holtum JAM. Oral presentation. "Vulnerability to embolism and hydraulic architecture of dry rainforest tree species of differing leaf phenology from north Queensland." 85<sup>th</sup> annual meeting of the Ecological Society of America, Snowbird, Utah, 6<sup>th</sup> – 10<sup>th</sup> Aug 2000.
- Choat B, Luly J, Ball MC, Holtum JAM. Poster presentation. "Hydraulic architecture in trees of differing leaf phenology in a seasonally dry rainforest." Combio 99, 39<sup>th</sup> Annual meeting of the Australian Society for Plant Physiologists, Gold Coast, Queensland, 27<sup>th</sup> Sept – 1<sup>st</sup> Oct 1999. ASPP student poster prize awarded for presentation.
- Choat B, Luly J, Hansman D, Holtum JAM. Poster presentation. "Water use strategies of dry rainforest tree species at red falls, north Queensland." Combio 98, 38<sup>th</sup> Annual meeting of the Australian Society for Plant Physiologists, Adelaide, South Australia 28<sup>th</sup> – 30<sup>th</sup> Sept 1998.