

JOHN CAIRNEY, PhD

QUALIFICATIONS AND CAREER SYNOPSIS

Dr. Cairney holds a B.Sc (Honours) in Molecular Biology from the University of Glasgow, Scotland (<http://www.gla.ac.uk/about/>). The University of Glasgow, founded in 1451, is the fourth oldest University in the UK, and is ranked 6th out of 194 UK Universities (http://www.webometrics.info/rank_by_country.asp?country=uk). Glasgow University is in the top 100 Universities Worldwide (in the Top 8,000 ranking, <http://www.webometrics.info/top8000.asp>)

John Cairney gained his PhD in the field of Bacterial Genetics from the Department of Biochemistry (now College of Life Sciences), at the University of Dundee, Scotland . The college of Life Sciences is one of the top 5 European Universities for Excellence in Research in Biology, Biochemistry, Molecular Biology and Genetics (<http://www.lifesci.dundee.ac.uk/>).

Dr. Cairney then changed fields electing to study plant molecular biology and was awarded a prestigious European Molecular Biology Organization (EMBO) Fellowship to conduct post-doctoral research at the Max Planck Institute for Molecular Genetics in Berlin, Germany. In 1986, when the award was made, a total of only 90 such fellowships were awarded for the whole of Europe.

John Cairney has conducted research in Human Genetics at the MRC Human Genetics Unit, Edinburgh, Scotland and, on moving to the US, Cancer Research in the Department of Biological Sciences Columbia University, New York City. Columbia University is ranked 16th among world universities (http://www.webometrics.info/top100_continent.asp?cont=usa_canada&zoom_highlight=Columbia+University). John returned to plant biology, in particular tree biology, and moved to Texas A&M University in 1990 as a Research Associate. He was appointed to a faculty position just over a year later and joined the Department of Forest Science as Assistant Professor in 1991. Texas A&M University is currently ranked 17th in the list of the Top 8,000 Universities Worldwide (<http://www.webometrics.info/premierleague.html>).

Dr. Cairney moved to the Institute of Paper Science and Technology (IPST), Atlanta, in 1994 as an Assistant Professor and was promoted to Associate Professor in 1999. IPST is a small industry-sponsored graduate school located on the campus of Georgia Tech in Atlanta. Over its 75 year history IPST has produced one quarter of the senior executives in the Pulp and Paper Industry. While the IPST faculty are few in number, the strong emphasis on the application of research has led to IPST being one of the most innovative Research Institutes in the nation. As judged by the number of patents per faculty member IPST is rated #5 in the US, above MIT, Georgia Tech and Stanford University (http://ipst.gatech.edu/news/archive/2000/top_innovators.html). Dr. Cairney's research fields, while at IPST, were plant molecular biology and forest products biotechnology.

Since May 2009, Dr. Cairney has been working full time with Lee Maddan to develop Aqua Resources. John is in charge of the Biological aspects of Nanoplatelet Research and Development.

RESEARCH:

Upon his arrival at IPST in 1994 Dr. Cairney initiated a program in the molecular biology of embryogenesis in the gymnosperm, loblolly pine (*Pinus taeda* L.). The program had a strong focus on application, reflecting industrial sponsorship to Forest Biology of about \$350,000/year (about \$100,000 of which was directed at molecular biology). Dr. Cairney aggressively sought external funding for the IPST Forest Biology group, bringing funding levels from approximately \$20,000/year upon his arrival to approximately \$500,000/year at its zenith. In most of these successful proposals, gymnosperm molecular biology was the principal thrust or comprised a significant proportion of the project. Since 1994 Dr. Cairney has, as PI or Co-PI brought in almost \$4.5 Million in research funds.

Provision of research findings for industrial consortia was a principal mission of IPST. This 'Research & Development' environment was similar to that found in Industry and most research was required to be recorded as reports to industrial sponsors. Publication in academic journals was not always encouraged. Dr. Cairney authored over 60 full-length annual and semi-annual reports and made a similar number of presentations to industrial sponsors. Dr. Cairney endeavored to maintain an academic profile and in addition, over this period, published peer-reviewed papers, book chapters plus a number of conference proceedings and popular articles. Dr. Cairney was recently invited to write a "Tansley Review". Tansley Reviews are high profile syntheses, written from a personal perspective, of topical areas of plant biology. The average TR impact factor is high: 9.2,

Dr. Cairney and is a frequent speaker at international conferences and has been an invited speaker at many Universities and Research Institutes around the world, including Oxford University (England), the Max Planck Institute (Berlin, Germany), Imperial College (London), the Gulbenkian Institute (Portugal), IBET (INSTITUTO DE BIOLOGIA EXPERIMENTAL E TECNÓLOGICA) (Oreas (Lisbon), Portugal), University of Laval (Quebec, Canada), The New York Botanical Gardens (Bronx, NY), Zhejiang Forestry University (Hangzhou, China), the Swedish University of Agricultural Sciences (Uppsala, Sweden). In 2006 Dr. Cairney visited China at the invitation of the Molecular Genetics Group at Zhejiang Forestry University (all expenses paid by Chinese hosts).

Dr. Cairney has published over 50 peer-reviewed research papers, 20 conference proceedings and 60 Industrial Reports. Hold 2 patents, 1 pending patent, 5 invention disclosures lodged.

SAMPLE PUBLICATIONS

1. Dong C, **Cairney J**, Sun Q, Maddan OL, He G, Deng Y. 2010. Investigation of Mg(OH)₂ nanoparticles as an antibacterial agent. **J. Nanopart Res** (online) DOI 10.1007/s11051-009-9769-9
2. Oh, T., R. M. Wartell, **J. Cairney**, G. S. Pullman. 2008. Evidence for stage-specific modulation of specific microRNAs (miRNA) and miRNA processing components in female gametophyte tissues during embryogenesis of loblolly pine (*Pinus taeda* L.). **New Phytologist**. 179: **67 - 80** (OnlineEarly; doi:10.1111/j.1469-8137.2008.02448.x)

3. **Cairney J**, Pullman GS. 2007. The cellular and molecular biology of conifer embryogenesis. (Invited **Tansley Review**) **New Phytol.** 176:511-36.
4. **Cairney J**, Zheng L, Cowels A, Hsiao J, Zismann V, Liu J, Ouyang S, Thibaud-Nissen F, Hamilton J, Childs K, Pullman GS, Zhang Y, Oh T, Buell CR. 2006. Expressed Sequence Tags from loblolly pine embryos reveal similarities with angiosperm Embryogenesis. **Plant Mol. Biol.** 62:485-501 ([DOI: 10.1007/s11103-006-9035-9](https://doi.org/10.1007/s11103-006-9035-9)) ([View PDF](#))
5. Ragauskas AJ.; Williams CK.; Davison BH.; Britovsek G; **Cairney J**; Eckert CA.; Frederick W J. Jr.; Hallett JP.; Leak DJ.; Liotta CL.; Mielenz JR.; Murphy R; Templer R; Tschaplinski T. 2006. The Path Forward for Biofuels and Biomaterials. **Science** 311(5760), 484-489. ([View PDF](#)).
6. Lee SH, Stubbs DD, **Cairney J.**, Hunt WD. 2005. Rapid detection of bacterial spores using a Quartz Crystal Microbalance (QCM) immunoassay. **IEEE Sensors Journal**. Special Issue on Sensors for the Prevention of Terrorist Acts. 5: 737-743
7. Ciavatta VT, Egertsdotter U, Clapham D, von Arnold S, **Cairney J.** 2002. A promoter from the loblolly pine PtNIP1:1 gene directs expression in an early-embryogenesis and suspensor-specific fashion. **Planta** 215: 694-698 (DOI 10.1007/s00425-002-0822-5) (<http://link.springer.com/link/service/journals/00425/contents/02/00822/>)
8. Ciavatta VT, Morillon R, Pullman GS, Chrispeels M, **Cairney J.** 2001. An aquaglyceroporin is abundantly expressed early in the development of the suspensor and the embryo proper of loblolly pine (*Pinus taeda* L.). **Plant Physiol.** 127: 1556-1567 (<http://www.plantphysiol.org/cgi/content/full/127/4/1556>)
9. Strauss S, Boerjan W, **Cairney J**, Malcolm Campbell M, Dean J, Ellis D, Jouanin L, Sundberg B. 1999. Forest biotechnology makes its position known. **Nature/Biotechnology** 17 (12) 1145. (<http://www.nature.com/cgi-bin/doifinder.pl?URL=/doifinder/10.1038/70652>)
10. Higgins CF, **Cairney J**, Stirling DA, Sutherland L, Booth IR. 1987. Osmotic regulation of gene expression: ionic strength as an intracellular signal? **Trends Biochem. Sci.** 12: 339-344.

PATENTS

- US Patent #: 6,462,257 B1. Vicilin-like seed storage protein gene promoter and methods of using the same. Ranjan Perera, John Cairney, Gerald S. Pullman.. Issued: Oct. 8, 2002.
- Provisional Patent Application, John Cairney, Nanfei Xu. "Differentially Expressed Conifer cDNAs and Uses Thereof" Filed 11th October, 2000.
- Second Provisional Patent Application, John Cairney, Nanfei Xu. "Differentially Expressed Conifer cDNAs and Uses Thereof" Filed 12th January, 2001.
- Provisional Patent Application, John Cairney, William Hunt. "Detection of Eukaryotic and Prokaryotic Cells and DNA Using a Nanobiosensor", (filed by Georgia Tech; GTRC ID 2799) filed 14 November, 2002.

- Non-Provisional Patent Application, John Cairney, William Hunt. "Detection of Eukaryotic and Prokaryotic Cells and DNA Using a Nanobiosensor", (filed by Georgia Tech; GTRC ID 2799) filed 14 November, 2004.
- Invention disclosure Arthur Ragauskas & John Cairney. "Genetic In-Vivo Synthesis of Triggered Cellulase Activity for Enhanced Biofuel Processing of Plant Fibers" No
- Invention Disclosure by John Cairney (GT, Biology) & Boris Mizaikoff (GT, Chemistry & Biochemistry), "Methods for Imparting Molecular Recognition Properties to the Surfaces of Paper and Packaging" April, 2006
- Invention Disclosure by John Cairney (GT, Biology), "Lignocellulolytic Enzyme Screening in planta Mediated by Endophytes" July, 2006

TEACHING:

Dr. Cairney has graduated 5 PhD students, 13 MS Students and has mentored 10 Post-Doctoral Fellows.

Teaching Distinctions:

- Dr. Cairney was Nominated for "IPST Teacher of the Year" in 1996

Two of Dr. Cairney's Ph.D students have won awards at interstate conferences;

- Debbie Villalon: Best Graduate Student Presentation at the Southern Section of the American Society for Plant Physiologists Annual Meeting at University of Tennessee, Knoxville held 18-20 March, 1995. Paper "Molecular Characterization of a drought-inducible proteinase inhibitor from *Atriplex canescens*" by Debbie K. Villalon, Ronald Newton and John Cairney. This paper was selected from a field of 8 competing papers.
- Vincent Ciavatta: Best Graduate Student Presentation at the Southern Section of the American Society for Plant Physiologists Annual Meeting at Roanoke, VA held 21-23 March, 1998. Paper "Gene expression during embryogenesis in Loblolly Pine: cDNA cloning of early embryo-specific mRNAs" by Vincent Ciavatta, Gerald S. Pullman and John Cairney. This paper was selected from a field of 21 competing papers.

SERVICE ACTIVITIES

Service Georgia Tech

Dr. Cairney has developed and led an initiative to establish a “Forest Products Genomics Center” at IPST. He is negotiating a \$1Million gift from The Weyerhaeuser Foundation (contact Dr. Peter Franum, VP Forestry) and gifts from other forest products companies. This money will be the ‘seed’ for a center focused on Genomics and Biotechnology that will conduct research on both plant genetics and biotechnology (e.g. enzyme engineering for Biofuel applications). The vision is for a center, partially funded by a Consortium of Industrial Companies, which will conduct both fundamental and applied research. The efforts are being conducted with the knowledge and encouragement of both Dean Gary Schuster and Vice Provost Charlie Liotta. Dr. Cairney holds regular meetings with Drs. Liotta and Schuster to update them on the progress of the project.

Service to IPST

- Established IPST Forest Biotechnology as a world leader. This was done in collaboration with Jerry Pullman. My contributions include grant authorship, publications, award winning presentations by my students at national meetings, hosting an international meeting at IPST, speaking at international meetings, developing new courses, recruiting world-class faculty and staff.
- Served: Admissions Committee
Seminar Coordinator
A390 Coordinator
Admissions Committee
- Chair Radiation Safety Committee 1998
- Led redrafting of Radiation Safety Procedures for Forest Biology

Service to the Profession

Co-organizer of International Conference: "Wood and Wood Fibers: Properties and Genetic Improvement" held July 19-22, 1998 at IPST in Atlanta, Georgia, Cosponsored by International Paper and the Institute of Paper Science and Technology (IPST). Jointly organized with Dr. Dana Nelson (International Paper). This meeting was attended by over 100 scientists from six countries and provide a unique opportunity to discuss wood properties and tree improvement with biologists, chemists and physicists whose work is focused on different aspects of the wood product industries. More Information can be found via the IPST Home Page: <http://www.ipst.edu/treeconf/>

Dr. Cairney has served on three USDA grant review panels in Washington D.C. and has been an ad hoc reviewer for NSF, DOE, USDA and other grant awarding agencies. Dr. Cairney is a regular manuscript reviewer for several plant biology journals. He speaks frequently at international meetings.