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Canterbury, New Zealand 7495

Education

1983–1986

BSc Honours

Applied and Human Biology.
Aston University,
Birmingham, UK

1987– 1988

MSc Biodeterioration of Materials.

Portsmouth University, UK.

2000–2004

PhD. Effects of environmental factors on wood decay

micromorphology of *Pinus radiata* and *Fagus sylvatica* and its significance for in-ground wood preservative performance
Waikato University, NZ.

Nationality

Dual New Zealand / British

DR ROBIN WAKELING

Director / Beagle Consultancy Ltd

Profile

Masters degree in biodeterioration of materials and related PhD.

30 years of experience in research, forensics, consultancy and litigation. Biodeterioration field investigations and specialised laboratory microscopy and other analytical techniques. Detailed microscopic analysis of tens of thousands of material samples from over 9000 buildings and other fixtures, and a wide range of industrial marine and terrestrial situations: transport, construction, storage, work place, domestic. Patent disputes expert analysis, typically for biocidal compositions. Development and analysis of the performance of new generation biocides.

Experience & Employment

2005

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present

Beagle Consultancy Ltd

Industry Consultant

Biodeterioration, mould and decay forensics consultancy and expert witness.

Privately owned independant consultancy, Beagle Consultancy Ltd dealing with;

- Biodeterioration field investigations, structural integrity of manmade structures and specialised laboratory microscopy and other analytical techniques.
- Detailed microscopic analysis of tens of thousands of material samples from over 9000 buildings and other fixtures, and a wide range of industrial, marine and terrestrial situations: transport, construction, storage, work-place, domestic.
- Patent disputes expert analysis, typically for biocidal compositions for wood protection.
- Analysis of the performance of new generation biocides.

2003

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2005

Foundation for Research Science and Technology

Research and Development Scientist

Agrichemicals research.

1990

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2003

NZ Forest Research Institute

Research Scientist and project leader

Wood biodeterioration, mould and sapstain research leader.

1988

Shell Research Centre, Sittingbourne, UK

Student post.

Micro-organisms in gas oil, associated filterability problems.

Other Posts Held

Chairman of the Biology, mould and sapstain and bacterial decay

sections of the International Research Group on Wood Preservation (IRG) – 2003 – 2005.

- IRG scientific organising committee member 2003 – 2005.

References

- Dr Rodney Eaton, Head of MSc in Biodeterioration, Portsmouth University**, Hampshire, UK; Tel: +442392842027. fax: +442392842070. E mail: Rod.eaton@port.ac.uk
- Professor Hugh Morgan. Head of Biological Sciences, Waikato University**; Tel. 0064 07 856 2889. Email: H.morgan@waikato.ac.nz
- Dr Dirk Stahlhut, Director, Prendos New Zealand Limited**. Level 8, PD Insurance House, 5–7 Byron Avenue, Takapuna, Auckland 0622. Phone: (+64) 021 269 5114; +64 09 970 7070
- Mr James Wollerman: Partner, Dalzell Wollerman**, Level 20, Lambton Quay, Wellington, New Zealand. Tel. +64 (0) 21 077 9600, +64 04 499 0390. jwollerman@dwlaw.co.nz

Dr Robin Wakeling

Publications & Conference Presentations

NOTE: Most publications since 2003 are private and confidential and legally privileged, mostly covering biodeterioration of man-made materials: cause, timing of damage, remediation and control; & patent disputes.

- **Wakeling, R.N. and Morris, P. 2013.** Wood Deterioration. Ground contact hazards. American Wood Preservers Association.
- **Stahlhut, D; Farrell, R. L.; Wakeling, R.N.; Hedley, M.E. 2009.** Wood decay fungi from New Zealand leaky buildings – PCR identification PHD thesis at Waikato University
- **Wakeling, R.N. 2008.** Above and In-Ground Copper-Azole and Copper, Chrome Arsenate Depletion from *Pinus radiata* and *Fagus sylvatica* at Thirteen New Zealand & Australian Sites. Paper for the thirty ninth annual meeting of the International Research Group on Wood Preservation annual meeting in Istanbul, Turkey. May 2008. IRG/WP 08-30460
- **Stahlhut, D; Farrell, R. L.; Wakeling, R.N.; Hedley, M.E. 2008.** Wood decay fungi from New Zealand leaky buildings – PCR identification (Part 2) and aerial spore trapping. Thirty ninth annual meeting of the International Research Group on Wood Preservation held at Istanbul, Turkey. IRG/WP 08-10649
- **Stahlhut, D; Farrell, R. L.; Wakeling, R.N.; Hedley, M.E. 2007.** Wood decay fungi from New Zealand 'leaky' buildings: PCR identification and laboratory decay tests of wood preservative-treated *Pinus radiata* (Part 1). Thirty eighth annual meeting of the International Research Group on Wood Preservation held at Jackson, Wyoming, USA. IRG/WP 07-10620
- **Wakeling, R.N. 2006.** Evidence for Basidiomycete Tunnelling in *Pinus radiata* and *Fagus sylvatica* Paper for the International Research Group on Wood Preservation annual meeting in Tromso, Norway.
- **Wakeling, R.N. 2006.** Above and Below-Ground Depletion of Copper, Chromium and Arsenic from *Pinus radiata* and *Fagus sylvatica* at Thirteen Test Sites in New Zealand and Australia. Paper for the International Research Group on Wood Preservation annual meeting in Tromso, Norway.
- **Wakeling, R.N. 2006.** New Observations and Interpretation for Tunnelling Bacteria Decay Paper for the International Research Group on Wood Preservation annual meeting in Tromso, Norway.
- **Wakeling, R.N. 2006.** Common Decay Micromorphology "Anomalies" Challenge Current Decay Classification. Paper for the International Research Group on Wood Preservation annual meeting in Tromso, Norway.
- **Wakeling, R.N. 2006.** Is Field Test Data from 20 x 20mm Stakes Reliable? Effects of Decay Hazard, Decay Type and Preservative Depletion Hazard. Paper for the International Research Group on Wood Preservation annual meeting in Tromso, Norway.
- **O Sullivan, P. and Wakeling, R. N. 2004.** Woodframe Housing Durability and Disaster Issues. October 4-6, 2004. Aladdin Resort & Casino. Las Vegas, Nevada, USA
- **Wakeling, R.N. (2003)** Effects of environmental factors on wood decay micromorphology of *Pinus radiata* and *Fagus sylvatica* and its significance of the in-ground preservative performance (Volumes 1 and 2). PhD thesis, Waikato University, New Zealand.
- **Wakeling, R.N. 2002.** Suitability of preservative treated radiata pine for use in cooling towers. Proceedings of the 2002 Cooling Tower Institute annual conference, Houston, USA.
- **Wakeling, R.N. 2001.** Method for inhibiting sapstain in wood. New Zealand patent application PCT506234 (Australia: 39613/99. Chile: 504749. South Africa: 844.99).
- **Wakeling, R.N. 2001.** Effect of test site location on performance of new generation wood preservatives. Paper presented at the 2001 IRG conference, Nara, Japan, 20-25 May 2001.
- **Wakeling, R.N. 2001.** Sapstain control in logs and lumber. Proceedings of the 2001 Forest Industry Engineering Association, biannual sapstain symposium.
- **Singh, T; Kreber, B; Chittenden, C M; Wakeling, R N; Stewart, A 2001:** Minimum inhibitory concentration of methylene bithiocyanate towards selected wood inhabiting fungi in liquid culture and on radiata pine. Paper presented at the 2001 IRG conference, Nara, Japan, 20-25 May 2001.
- **Wakeling, R N; Carpenter, B E; Chittenden C M; Eden, D R; Kreber, B; Van der Waals, J G 2001:** Antisapstain Treatment of Logs and lumber in New Zealand. Proceedings, 2000 ExpoCORMA International Conference, Chile.
- **Wakeling, R N 2001:** New generation wood preservatives are performing well in New Zealand and Australian field trials after 6 years in ground contact. Wood Processing Newsletter.
- **Chittenden, C M; Wakeling, R N; Kreber, B; Van der Waals, J G 2001:** Effect of In-Forest Treatments for Preventing Fungal Infections of Radiata Pine. Report No 8788

- **Eden, D., Kreber, B., Wakeling, R., van der Waals, J., and Chittenden, C.. 2000.** Laboratory trial to identify potential in-forest treatments to control fungal pre-infections of radiata pine logs. International Research Group on Wood Preservation. IRG/WP Document No. 00-30220. Stockholm, Sweden.
- **Eden, D.R., Kreber, B., Wakeling, R.N., van der Waals, J.G., Chittenden, C. 2000.** Laboratory trial to identify potential in-forest treatments to control fungal pre-infections of radiata pine logs. International Research Group on Wood Preservation. IRG/WP Document No. 00-30220. Paper presented at the 2000 Annual Meeting.
- **Hedley, M., Naseri, K., Person, H., Eden, D., Kreber, B. and Wakeling, R.: New Preservative Treatment Technologies Research at Forest Research, New Zealand. Paper presented at the AWPAA Annual Meeting, San Francisco 7-10 May 2000.**
- **Wakeling, R.N. 2000.** Effect of test site, preservative and wood species on decay type. Glenbervie pastoral and radiata pine forest sites. International Research Group on Wood Preservation Document No IRG/WP 00-30248. Paper presented at the May 2000 Annual Meeting.
- **Xiao Y., Wakeling R.N., Singh A.P. 2000.** Use of confocal microscopy in examining fungi in wood. Biofouling.
- **Eden, D.R., Kreber, B., Chittenden, C., Wakeling, R.N. 1999.** Variable susceptibility of common sapstain fungi against commercial antisapstain products. Material und Organismen 33/34(1): 1-12.
- **Kreber, B., Eden, D.R., Chittenden, C., Carpenter, B.E., van der Waals, J.G., Wakeling, R. 1999.** What triggers fungal melanisation in wood? Pp 133-137 in Kreber, B. (Ed.) "The 2nd New Zealand Sapstain Symposium". Proceedings of Symposium, Rotorua, New Zealand, 18-19 November. Forest Research Bulletin No. 215.
- **Wakeling, R.N., Xiao, Y. 1999.** Application of confocal laser scanning microscopy (CLSM) in wood biodeterioration. Presentation made at the International Biodeterioration and Biodegradation Symposium, 1-6 August, Washington, D.C. U.S.A.
- **Wakeling, R.N., Eden, D.R., Kreber, B., Chittenden, C, van der Waals, J.G., Carpenter, B.E., Dorset, I., Price, A. 1999.** Recent advances in protection of unseasoned radiata pine wood in New Zealand. Proceedings of the International Biodeterioration and Biodegradation Symposium, 1-6 August, Washington, D.C. U.S.A.
- **Wakeling, R.N., Wakeman, J.L. 1999.** Diffusible antisapstain method and composites. New Zealand patent application PCT/NZ99/00050.
- **Eden, D., Chittenden, C., Kreber, B., van der Waals, J., Wakeling, R., Farrel, R. and Harington, T. 1998.** Variable Tolerance of Ophiostoma spp. and Diplodia pinea to Commercial Antisapstain Products. Paper presented at the 29th Annual Meeting of the International Research Group on Wood Preservation, Maastricht, Netherlands. IRG Document No. IRG/WP 98-10266.
- **Wakeling, R. 1998.** Possible Significance of Fungicidal Tolerance Amongst Sapstain Fungi. Wood Processing Newsletter, Issue No. 22, November 1997.
- **Wakeling, R., Singh, A. 1998.** A Study of Decay Type Variability in Treated Fagus sylvatica and Pinus radiata Field Test Stakes Exposed at a Vineyard for 30 - 45 months. Paper Presented at the 29th Annual Meeting of the International Research Group on Wood Preservation, Maastricht, Netherlands. IRG Document No. IRG/WP 98-10271. (currently being further refereed before submission to Material und Organismen)
- **Xiao, Y., Wakeling, R. Singh, A. 1998a.** Confocal Laser Scanning Microscopy (CLSM) of Decayed Wood. Paper Presented at the 29th Annual Meeting of the International Research Group on Wood Preservation, Maastricht, Netherlands. IRG Document No. IRG/WP 98-10273.
- **Xiao, Y., Wakeling, R. Singh, A. 1998b.** Using Confocal Scanning Microscopy and Post-image Processing Technologies to Describe Fungal Attacking Modes in Wood. Proceedings, ACEM-15 Conference, Hobart, Australia, February 1998.
- **Eden, D., Wakeling, R., Chittenden, C., van der Waals, J. 1997.** Field Performance of Novel Antisapstain Formulations. Paper presented at the 28th Annual Meeting of the International Research Group on Wood Preservation, Whistler, Canada. IRG Document IRG/WP 97-30125
- **Eden, D., Wakeling, R., Chittenden, C., van der Waals and B. Carpenter 1997.** Time Limits for Holding Logs to Achieve Successful Antisapstain Treatment. In Strategies for Improving Protection of Logs and Lumber. Proceedings of Symposium, Rotorua. 21-22 November. FRI Bulletin No. 204.
- **Wakeling, R. 1997.** Issues for Successful Antisapstain Treatment of New Zealand Radiata Pine Logs in Strategies for Improving Protection of Logs and Lumber. Proceedings of Symposium, Rotorua. 21-22 November. FRI Bulletin No. 204.
- **Wakeling, R., Eden, D., Chittenden, C., Carpenter, B., Dorset, I., Wakeman, J., Kuluz, R. 1997.** Prevention of Sapstain in Logs using Water Barriers. Paper presented at the 28th Annual Meeting of the International Research Group on Wood Preservation, Whistler, Canada IRG Document IRG/WP 97-30147
- **Wakeling, R., Maynard, P., Eden, D., Chittenden, C., Carpenter, B. 1997.** Laboratory and Field Trials of Novel Antisapstain Formulations. Paper presented at the 28th Annual Meeting of the International Research Group on Wood Preservation, Whistler, Canada. IRG Document No. IRG/WP 97-30146

- **Xiao, Y., Wakeling, R. Singh, A.. 1997.** Confocal Laser Scanning Microscopy of a Novel Decay in Preservative-treated Radiata Pine in Wet Acidic Soils. Paper presented at the 28th Annual Meeting of the International Research Group on Wood Preservation, Whistler, Canada. IRG Document No. IRG/WP 97-10215.
- **Xiao, Y., Wakeling, R. Singh, A... 1997.** Micromorphology of a Novel Fungal Decay in Preservative-treated Pinus radiata Wood in Wet Acidic Soils. NZ Journal of Forestry Science 27 (1): 86-96.
- **Hedley, M., Wakeling, R. 1996.** Protection of Wood in New Zealand Pine User Guide, New Zealand Pine Remanufacturers' Association, Auckland.
- **Hedley, M.E., Wakeling, R.N., Foster, J.B. 1996:** Comparison of the performance of wood preservatives containing chrome and arsenic at five test sites in New Zealand. Paper presented at the 1996 International Research Group on Wood Preservation annual meeting held in Guadaloupe, France. IRGWP 96-30113.
- **Singh, A.P. and Wakeling, 1996:** R.N. Bacterial attack of compression wood. Paper presented at the 1996 International Research Group on Wood Preservation annual meeting held in Guadaloupe, France. IRGWP 96-10153.
- **Wakeling, R.N. and Kuluz, R. 1996:** Novel antisapstain treatments. Use of water vapour barriers to prevent sapstain development in logs. Provisional Patent Application Number: 280874.
- **Wakeling, R.N. and Singh, A.P. 1996:** Biodeterioration of timber in cooling towers in New Zealand. Holzforschung, (in press).
- **Wakeling, R.N. and van der Waals, J. 1996:** Thermotolerant mould growth in low temperature kilns in New Zealand. Paper presented at the International Research Group on Wood preservation annual conference held in Guadaloupe, France. IRGWP 96-10169.
- **Singh, A.P. and Wakeling, R.N. 1995.** Bacteria are important degraders of cooling tower timbers: New Zealand experience. The International Research Group on Wood Preservation, Doc. IRG/WP/95-10128.
- **Wakeling, R.N. 1995.** Protection of export logs from fungal degrade. Wood Processing Newsletter, issue No. 17 May 1995.
- **Wakeling, R.N., Eden D. & Maynard, P. N. 1995.** Fungus cellar and antisapstain trials of six triazole fungicides. International Research Group on Wood Preservation, Document No. IRG/WP 95-30046
- **Singh, A.P., Wakeling, R.N. and Drysdale, J.A. 1994.** Microbial attack of CCA-treated Pinus radiata timber from a retaining wall. Holzforschung 48: 458-462.
- **Singh, A.P., Wakeling, R.N. and Page, D.R. 1994.** A light and electron microscopic study of decayed CCA-treated radiata pine (Pinus radiata) wood from a cooling tower. The International Research Group on Wood Preservation, Document IRG/WP/94-10056.
- **Wakeling, R.N. & Maynard P.N. 1993.** Efficacy of antisapstain formulations containing triazole fungicides. International Research Group on Wood Preservation, Doc. No. IRG/WP 93-30021.
- **Wakeling, R.N., Cross, D. & Maynard, P. N. 1994.** Susceptibility of antisapstain fungicides to rain wash-off. International Research Group on Wood Preservation, Doc. No. IRG/WP 94-30046
- **Singh, A.P. and Wakeling, R.N. 1993.** Microscopic characteristics of microbial attacks of CCA-treated radiata pine wood. The International Research Group on Wood Preservation, Doc. No. IRG/WP/93-10011.
- **Wakeling, R.N. and Singh, A.P. 1993.** Premature failure of CCA-treated vineyard posts from brown rot. The International Research Group on Wood Preservation, Doc. No. IRG/WP/93-10016.
- **Vinden, P., Hedley, M.E. and Wakeling, R.N. 1992.** Wood Preservation Research in New Zealand. Annual meeting of the British Wood Preservers Association.
- **Wakeling, R.N. and Hedley, M.E. 1992.** Control of sapstain, mould and decay fungi on freshly felled timber. NZ Forest Research Institute, What's New in Forest Research No.211.
- **Wakeling, R.N. 1991.** Occurrence of Soft Rot, White Rot and Brown Rot on CCA, CCB, CCP, TCMTB and benzalkonium chloride treated after 11-15 years at five field trial test sites. International Research Group on Wood Preservation. Doc. No. IRG/WP/2034.
- **Wakeling, R.N.; Plackett, D.V. and Cronshaw, D. 1991.** The susceptibility of acetylated radiata pine to mould and stain fungi. 1st Symposium on Chemical Modification of Wood, Kyoto, Japan.

Below is a selection of legal cases: expert witness evidence given in building and building material defect disputes (mostly Auckland and Wellington High Courts).

CIV-2023-404-3022 / CIV-2011-485-1873 / CIV-2022-404-001146 / CIV-2021-404-230 / CIV-2018-409-000469
 CIV-2016-404-2823 / CIV-2012-404-823 / CIV-2014-404-716 / CIV-2014-404-0455 / CIV-2013-404-5172
 CIV-2012-404-6290 / CIV-2004-404-3230 / CIV-2007-404-3435 / CIV-2015-485-594 / CIV-2015-485-773
 CIV-1018-485-143 / CIV-2014-085-558 / CIV-2016-100-002 / CIV-2014-485-11107 / CIV-2015-100-006
 CIV-2011-485-1873 / CIV-2011-485-2618 / CIV-2011-485-710 / CIV-2010-485-2428

Evidence also given in arbitrations and patent disputes..