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Australian Garden HISTORY

New Zealand – artists and an activist

A singular cabbage palm

Marsilea at home and abroad

Designed by David Wilkinson in 1992, the Knot Garden is planted with English box (*Buxus sempervirens*) and Japanese box (*Buxus microphylla* var. *japonica*), with mop top robinias (*Robinia pseudoacacia* 'Inermis').

all photos Alison Pouliot

Alison Pouliot

Rethinking garden fungi – a foray at Retford Park

This article reflects on an autumn foray through the stunning gardens of Retford Park, Bowral, in the Southern Highlands of NSW. AGHS conference-goers visited Retford Park in October 2018. It is a garden of surprises – of history and horticulture, of half a century of James Fairfax's passion and attention to detail, of art and design, and of organisms less often considered – fungi.

We are changing our thinking about the role of fungi in gardens. Once misunderstood and maligned as problematic and pathogenic, the greater beneficial significance of fungi in gardens is becoming better appreciated. Fungi are vital to healthy and resilient gardens. Beneath the soil, clandestine fungal networks provide the supportive architecture of garden soils, increasing resistance to drought and disease. Fungi recycle organic matter, building soils. Progressive gardeners are rethinking ways to encourage fungi in gardens for the benefit of both soil and plants.

An autumn day

Sweeping up the red bauxite driveway on a gentle autumn afternoon, I was greeted by horticulturalist Rick Shepherd. Charming and philosophical about all things botanical, Rick has been head gardener at Retford Park since 2011. Rick led me on a tour of the ten hectares of park-like gardens and 'garden rooms'. Also accompanying us was James Fairfax's dog Selene, his sixth Rhodesian Ridgeback, named in honour of the Greek goddess of the moon.

European ownership of the property began in 1821, when Edward Riley was granted two parcels of land including Retford Park (then named 'Bloomfield') by NSW Governor Lachlan Macquarie. It was renamed Retford Park by stockbreeders Samuel and Jane Hordern, who acquired the property in 1887 and developed it as a premier stud property. The Victorian Italianate house and park-style garden were established by the Horderns and subsequently owned by three generations of the family until 1960. The transition from agricultural property to gentlemen's residence began in 1964 with the purchase of the property by James Fairfax AC (1933–2017), former chairman and director of the media group John Fairfax Limited. He purchased it for £15,000 as a country retreat for his mother who visited from England, and for the weekend entertainment of friends and business associates. He also opened the house to various art and garden societies and to raise funds for various charities. The property became his permanent home in 1995.

After initial misgivings about the purchase, Fairfax commissioned Donald Friend to paint two murals, and appointed designer Leslie Walford to do the interior redecoration. Walford's initial impression that 'the garden was choking the house' and 'the house was a sort of cow-pat colour' prompted his suggestion to convert the house into a 'wonderful villa' and paint it 'Portuguese pink'. The colour is retained today.

In 1967, Fairfax enhanced the park-like nature of the garden with advice from renowned English landscape architect John Codrington. It was James's mother who appointed Codrington to redesign the garden as a birthday present to Fairfax. Fairfax adopted some of Codrington's recommendations, which were in the style of 18th century English landscape designer Humphry Repton, but added many elements of his own, including the planting of more deciduous trees. These trees provide the stunning autumn hues of the garden today. The temperate (although increasingly dry) climate of the Southern Highlands of New South Wales accommodates a range or exotic species and Retford Park comprises a vast assortment of conifers and broadleaved trees. Rick took me to see the collection of unusual oaks, including spectacular Algerian oaks (*Quercus canariensis*) from North Africa and the Iberian Peninsula; a cork oak (*Q. suber*) from the Mediterranean; a daimyo oak (*Q. dentata*) that originates in Japan, Korea and China, with beautiful dentate (lobed) leaves; as well as a chestnut-leaved oak (*Q. castaneifolia*) from Iran, so named for its lanceolate serrated leaves, similar to those of the sweet chestnut. Three oaks

Above: Autumn colours of the maples adjacent to the Millennium Canal, with Selene on watch.

Left: The velvet shank (*Flammulina velutipes*) is an important recycler of hardwoods.

Below left: The redlead roundhead (*Leratiomyces ceres*) grows gregariously in woodchips and mulched areas.

Below right: Wefts of mycelium course through wood and other organic matter, dismantling it and releasing locked-up nutrients.

inoculated with black truffles (*Tuber melanosporum*) were planted at Retford Park in 2016. Other trees of special interest in the garden include an old redwood (*Sequoiadendron giganteum*) and bunya (*Araucaria bidwillii*), as well as a bull bay (*Magnolia grandiflora*), deodar cedar (*Cedrus deodara*), linden (*Tilia platyphyllos* 'Rubra'), horse chestnut (*Aesculus hippocastanum*), maidenhair tree (*Ginkgo biloba*), tupelo (*Nyssa sylvatica*) and weeping Japanese maple (*Acer palmatum* 'Dissectum').

The garden rooms

Retford Park's garden rooms, each uniquely designed to showcase sculptures or other garden features, are meticulously hedged in combinations of cherry laurel (*Prunus laurocerasus*), Western red cedar (*Thuja plicata*), photinia (*Photinia* x *fraseri*), English box (*Buxus sempervirens*) and Japanese box (*Buxus microphylla* var. *japonica*), to mention a few. We then visited a very special outdoor living room — Aunty Eileen's best room. This enchanting and colour-coordinated room features a 'rug' of woolly thyme (*Thymus pulegioides*) and a steel-framed sofa of mattress vine (*Muehlenbeckia*) sporting a cushion of liquorice plant (*Helichrysum petiolare*). It has walls of clipped sasanqua camellias like floral wallpaper when in bloom. Rick conceived and designed the room as a sanctuary for his great-aunt and today his craftwork is a visitor highlight.

In the underworld

But what, if anything, did Fairfax and his predecessors think about fungi? The variety of trees and age structure of the garden provide ideal habitat for a diversity of fungi. Moreover, Rick has insisted on phasing out herbicides and other chemical applications, which is good news for plants, fungi and animals. Although usually overshadowed by the botanical and design elements of gardens, fungi occupy the dynamic interface between a garden's plants, microbes, water regimes and soils. They are the key mediators of nutrient and carbon cycles. Fungi also form relationships that allow for the transfer of energy, information and materials between plants and other organisms. Over 90% of plants (about 330,000 species of vascular plants worldwide and many non-vascular plants such as hornworts and liverworts) form these relationships with fungi, including almost every plant species at Retford Park. At least 50,000 species of mycorrhizal fungi worldwide collaborate in these relationships. Collectively these fungi form an intermingling tapestry of hyphae, connecting the roots of diverse plants and partaking in networks of nutritional and energetic exchange.

From the end of the 19th century, about the time when Retford Park was being established, mycologists and botanists were increasingly recognising the significance of fungus–plant symbioses. The exact nature and complexities of these relationship are being explored in great detail today, aided by advancements in the field of molecular science. Relationships between fungi and plants known as mycorrhizas (*myco* meaning fungus and *rhiza* meaning root) perform some of the most relevant biological processes on the planet. Albert Bernhard Frank (1839–1900) was the first to recognise the widespread nature of fungus–plant alliances and first used the term *symbiosis* in 1877 (in the context of lichens) and in 1885 (in the context of mycorrhizas). Fungi coevolved with the rise of land plants. Growing understanding of fungal genomes provides illuminating insights into their evolutionary histories and how and why these relationships evolved. Scientists now consider symbioses with fungi to have been crucial to the initial colonisation and ongoing success of land plants. These findings are changing not just understanding, but also perception of the relevance of these relationships in underpinning the functioning of terrestrial ecosystems from gardens to grasslands, to forests and woodlands and beyond.

Scientists studying plant exudates are revealing 'molecular dialogues' of fungus–plant interactions. Fungi also communicate by releasing volatile compounds that, for example, induce lateral root formation, the first developmental cue in mycorrhiza formation. This secret signalling in the subterrain extends across further kingdoms to include other soil inhabitants such as bacteria and invertebrates. Also highly communicative and even less conspicuous than mycorrhizal fungi, are fungi called endopyhtes. First described by German botanist Heinrich Friedrich Link in 1809, entophytic fungi live within plant cells and enhance the plant's tolerance of heat, cold, drought, salt etc.

Fungal functions

Gardeners and designers might think they are in control of their gardens, but other forces are also at play. It is now accepted that mycorrhizal symbioses influence plant biodiversity and ecosystem variability. They not only control plant productivity and nitrogen and phosphorus cycles, but also the survival of seedlings and soil aggregation. Mycorrhizas are now being used in horticulture and agriculture to minimise or eliminate chemical fertilisers and irrigation. Knowledge about mycorrhizas also helps us understand the adaptive potential of plants and how they might respond to climate change.

Natural ecosystems are not tidy places. Many gardeners struggle with the 'natural mess' in gardens, succumbing to a miscellany of machinery to mulch, chip and 'manage' unwanted organic matter. However, fungi will do the same job; just on different time scales. Various organisms are involved in decomposition including invertebrates and bacteria but as the only organisms capable of degrading recalcitrant lignocellulose in woody plants, fungi play a central role. Without the work of fungi, nutrients would not be recycled, ecosystems could not function and gardens would not exist. Retford Park has tremendous horticultural and heritage significance. The extensively landscaped grounds reflect the tastes and design sensibilities of a visionary man and dedicated gardeners. Fairfax had a strong desire that the property be preserved for future generations. On 19 April 2016 he consummated a lifetime of giving by gifting Retford Park to the National Trust of Australia (NSW).

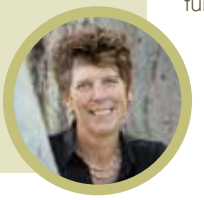
James Fairfax died at Retford Park on 11 January 2017 at the age of 83.

Acknowledgement

Many thanks to Rick Shepherd for his kind assistance with the article.

Retford Park is hosting a special fungus foray on Thursday 9 May 2019. For details visit **www.alisonpouliot.com.**

Alison Pouliot is an ecologist and environmental photographer with a special interest in fungi. Her recent book, *The allure of fungi* (reviewed by Max Bourke in the January 2019 issue of *Australian Garden History*) documents a side of the natural world that is both beguiling, and fundamental to life.



Left: *Lycogala epidendrum*, also in shades of 'Portuguese pink', is a slime mould, not a fungus, and as well as perfectly matching the house, is an important part of the garden's ecology.

Right: Pink bonnets (*Mycena*) adorn an old conifer stump.

Opposite page:

Top: The Fountain Walk, designed by John Codrington, leads to the house. Recently it has been reworked by Rick Shepherd, who refers to it as The Blobbery. The mushroom shaped 'blobs' include *Teucrium fruticans, Helichrysum petiolare* and *Podocarpus lawrencii*.

Second: The endearing 'Aunty Eileen's best room' designed by Rick Shepherd.

Third: The iconic fly agaric (*Amanita muscaria*) forms mycorrhizal relationships with species of beech, fir, cedar, pine and spruce, among others.

Bottom: Each of the 26 species of conifers in the garden forms mycorrhizal relationships with fungi.