Applied Tree Biology

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To our families, Ruth and Cyril; Judy, Matthew and Daniel

Epigraph

In a word, and to speak a bold and noble truth, trees and woods have twice saved the whole world; first by the ark, then by the cross; making full amends for the evil fruit of the tree in paradise, by that which was born on the tree in Golgotha.

From *Sylva*
by John Evelyn, 1664

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Foreword

Practical arboriculture is the 'art' and 'science' of tree management brought together by skilled arborists. When the two principles are applied correctly at the right time, the results that follow lead to healthier and less stressed trees in a beautiful treescape.

As arborists we learn the disciplines of tree work, such as how to prune trees correctly and where the final pruning cut should be in relation to the attachment point on the parent branch by using the 'target pruning' principles rather than the old 'flush cutting' techniques. Many of us just accept these principles at face value, taking them for granted without really understanding the science of plant physiology and knowing why we target prune.

One of my highly respected predecessors was William Dallimore, who worked in the Arboretum at the Royal Botanic Gardens (RBG), Kew, in the late nineteenth century. He was one of the first arborists employed at Kew by the Director, Sir William Turner Thisleton-Dyer, to refine forestry principles and adapt them to suit and improve the maintenance of the specimen trees in the arboretum collections at RBG, Kew. This he did with very successful results, but he based most of his work on what he observed in the gardens following the pruning operations he carried out, without understanding the science behind it. He noted in his journals how different species of trees responded to the various pruning techniques that he used with his array of hand tools, stating that leaving long stumps caused dieback and eventual decay. He would follow his team, finishing off the cuts properly if he was not happy with their efforts. He even wrote a book based on these observations, *The pruning of trees and shrubs; being a description of the methods practiced in the Royal Botanic Gardens, Kew*, which was first published in 1926. Unlike Dallimore in his era, today we base our pruning practices on the scientific research work of the 1960s and 1970s. The 'compartmentalisation of decay in trees' (CODIT) by Dr Alex Shigo, the North American plant pathologist, has changed arboricultural practices around the world for the better.

When arborists know how they should be pruning, such as the correct positioning of the saw blade when making that final cut, coupled with the science behind the principles, it makes more logical sense and is easier to carry out the operation, knowing that this is better for the longevity and health of the tree. Without this scientific knowledge it would be much harder to understand and practice.

The same goes for planting a tree. Most people think they can plant a tree, but there are many 'rights' and 'wrongs' and several general practical principles such as correct planting depth, addition of soil ameliorants and mycorrhizal products, suitable plant support in the form of staking, effective weed control and adequate aftercare. All these

are used successfully today based on sound scientific research which has led to much higher success rates with tree establishment in urban tree planting. When these principles are more widely accepted and used in everyday arboriculture, our treescape will be a much better and healthier one.

There are many reference works that specialise in the practical and scientific principles of the various disciplines of arboriculture, but there are few that bring them all together in one work. This is such a book, and will help arborists at all levels to understand why we do what we do. Andrew Hirons, senior lecturer at University Centre Myerscough, and Peter Thomas, a reader in plant ecology at Keele University, are without doubt most competent to do this successfully with their broad knowledge of applied tree biology. I hope that every practising arborist and horticulturist uses this work to help them understand practical arboriculture.

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Preface

This book comes about from a desire to create a text on tree biology that is accessible to anyone looking to understand how trees work or who manages landscapes that contain trees. It is written for those studying arboriculture and tree management, whether as part of a formal course or simply as a result of their own interest. The overall aim is to provide knowledge about trees that can be used to underpin management recommendations so that the health and vitality of trees in our gardens, parks, streets and courtyards can be promoted. We have tried to include just the information that is needed to meet these aims rather than give a comprehensive guide of all that is known about how trees work. Our text is supported by a series of 'Expert boxes' authored by a range of leading practitioners and academics, namely: Richard Beeson, Roland Ennos, David Lonsdale, Glynn Percival, Henrik Sjöman and Duncan Slater.

We would like to give our heartfelt thanks to Ruth Hirons, Tony Kirkham, David Lonsdale, Hugh Morris, Glynn Percival, Keith Sacre and Duncan Slater for helpful discussions and for their reading of early drafts.

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A Note on the Text

Italics are used to emphasize key words and concepts when first used. The abbreviations **sp.** and **spp.** are used for one or more species, respectively. The units of measurement used in this book are explained at various points but it might help to know that a micrometre (μm) is a thousandth of a millimetre (mm), and ppm are parts per million.

Where the works of others are quoted, the names of the authors are given together with dates of publication so that the article or book can be looked up in the references at the end of each chapter.