Taxonomy – the discovery, description, naming and classification of organisms – is the main game for staff and associates of the Western Australian Herbarium and 2015 has been an extraordinary year, with 100 new WA plant and fungi species described in *Nuytsia*, a botanical journal managed, produced and curated by Herbarium staff.

by Juliet Wege

Western Australia is a brilliant place to work as a taxonomist. The incredible diversity of plant, algae and fungi species, many of them unique to the State, are not only of immense scientific interest, but a source of wonder, inspiration and (at times) complete bewilderment. But it is the frequent discovery of new species that really tickles the fancy of botanists at the WA Herbarium. It's not unusual to hear a yelp of excitement emanating from the Herbarium's specimen vaults as a new species is detected, or to witness a beaming botanist perform a celebratory boogie in the bush as a new species discovery is confirmed and the all-important reference samples are collected.

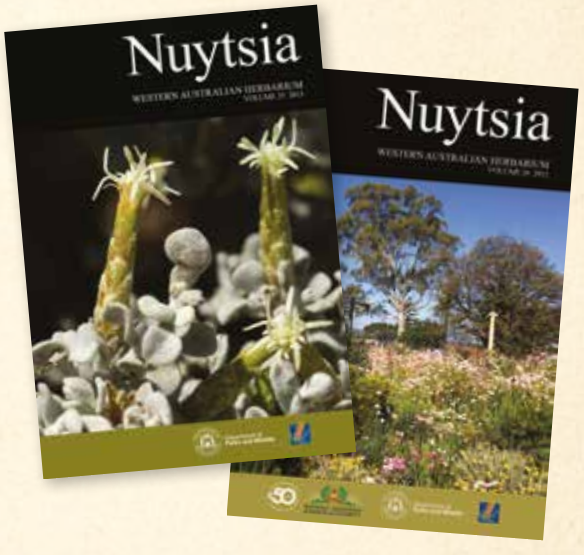
A taxonomic triumph

Many of the State's new species are named and described in *Nuytsia*, a peer-reviewed journal that has been publishing original papers with a focus on WA flora since 1970. During this time, about 2420 new names (of new genera, species, subspecies, varieties and combinations) have been published, and an average of 34 species that are completely new to science have been described every year. This year's effort, which includes the description of 100 new species across two volumes, is one of a handful of standout years for the journal and caps a remarkable year in which the 10,000th vascular plant species was recorded for the State (see 'Discovered: *Angianthus globuliformis*', *LANDSCOPE*, Spring 2015).

The 100 new species come from across WA – from the remote and rugged Kimberley to our spectacular south coast – and span a range of different plant groups. They include a tiny mitrewort from the Gibson and Little Sandy deserts (*Mitrasacme katjarranka*), two unusual aquatic plants that flourish in ephemeral pools and streams in the Kimberley (*Nymphoides astoniae* and *Eriocaulon rivicola*), a plethora of peas (*Indigofera* spp.) from the semi-arid zone, a buttercup from banded ironstone ranges in the Midwest Region (*Hibbertia cockertoniana*), a boronia that thrives on vertical sandstone cliff faces (*Boronia cremnophila*) and numerous orchids (*Caladenia* spp.) from our south-western forests and woodlands.

Main Triplet babingtonia (*Babingtonia triandra*). *Photo – Fred and Jean Hort*

Below This year's *Nuytsia* includes the description of 100 new species across two volumes.



Remarkably, several of the new species grow in patches of urban bushland in Perth, including the coastal plain babingtonia (*Babingtonia urbana*), quenda lepidella (*Amanita quenda*), stilt walker (*Stylidium araeophyllum*) and Oldham's sword sedge (*Lepidosperma oldhamii*). The known populations of others are restricted to national parks and reserves managed by Parks and Wildlife, such as the Prince Regent River boronia (*Boronia interrex*) and Mount Trafalgar spinifex (*Triodia celsa*), both of which grow in the spectacular Prince Regent National Park in the Kimberley. The beautiful lasiopetalum (*Lasiopetalum venustum*), which is confined to a nature reserve near Gingin, is one of several beautiful and horticulturally promising species.

STORIES OF DISCOVERY

There are some amazing stories associated with these new species that involve chance finds in the field, targeted surveys of unexplored habitats, helicopter flights to remote locations, and painstakingly detailed research. None is more remarkable than the Herbarium-based discovery of a new species from the Hibiscus family that hasn't been seen for nearly 100 years. The New Norcia lasiopetalum (*Lasiopetalum cenobium*) was named and described using herbarium specimens collected from the monastic town of New Norcia in 1918 (the species name is derived from a Latin word for monastery). Numerous searches in the region have failed to relocate this species, which means that it may well be extinct. The publication of a description of this species, along with notes on its close allies, will improve its chances of being rediscovered in the wild, if it still exists.

The discovery of a potentially extinct species among the specimens housed at the WA Herbarium highlights the importance of this collection, and of ongoing taxonomic research based on this collection – there is no doubt that many new species await discovery. In fact, many of the new species described this year were either discovered in the collection, or found in the field and subsequently

Above Prince Regent River boronia (*Boronia interrex*).
Photo – Russel Barrett

Right New Norcia lasiopetalum (*Lasiopetalum cenobium*) is only known from specimens collected in 1918.
Photo – Julia Percy-Bower

"There are some amazing stories associated with these new species that involve chance finds in the field, targeted surveys of unexplored habitats, helicopter flights to remote locations, and painstakingly detailed research."

matched to existing collections. For example, the notch-fruited beard heath (*Leucopogon incisus*) was first collected in 1948 by Bob Royce, a former curator of the Herbarium, but it wasn't until this species was recently recollected by an environmental consultant that it could be studied in the field, confirmed as new and described.

Discoveries in the field are less frequent than in the Herbarium but are still happening regularly in WA, particularly when botanists survey unexplored or under-collected regions, or conduct repeated surveys in the same area at different times of the year. A number of such discoveries were described in *Nuytsia* this year, including the pavement laceflower (*Trachymene pavimentum*). This species was first collected during targeted surveys of sandstone pavement habitats in the Kimberley in 2005 and is still only known from the original population despite extensive follow up surveys over many years. In contrast, the Bindoon pea (*Daviesia localis*) was opportunistically collected in 2001 when a botanist with a keen eye for the unusual was searching for another plant species. As with these two examples, there is often a lag between the first collection of a new species and its formal description. While follow-up field surveys are often required to gather more information, make additional collections, or to examine allied species, sometimes all that is needed is a window of time or some dedicated funding to conduct the detailed research that taxonomy demands.

Above Beautiful lasiopetalum (*Lasiopetalum venustum*).
Photo – Fred and Jean Hort

Above right Juliet Wege collecting voucher specimens for the WA Herbarium.
Photo – Carol Wilkins

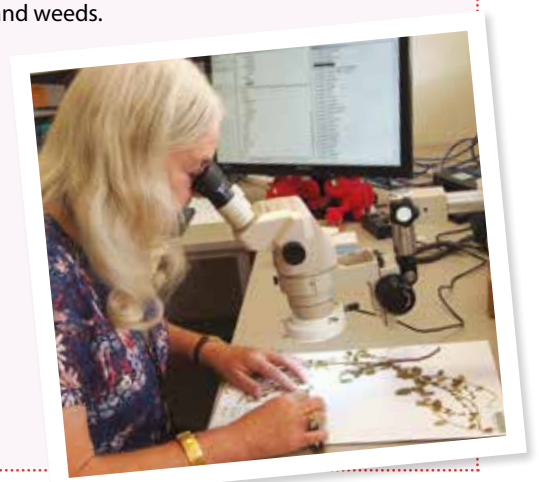
Right Volunteers are involved in a variety of work at the WA Herbarium.
Photo – Juliet Wege/Parks and Wildlife

The Western Australian Herbarium

The Western Australian Herbarium, part of the Science and Conservation Division of the Department of Parks and Wildlife, has a collection of more 750,000 scientific specimens of plants, algae and fungi collected from across WA and beyond. This collection forms the basis of our knowledge of WA's botanical biodiversity and is used by taxonomists at the Herbarium, and in other herbaria in Australia and around the world, to describe and document the species that occur in WA, and to build knowledge of the relationships of species to each other and to the environment.

Herbarium staff members are also responsible for the care of the collection and for keeping the associated databases up-to-date, including an authoritative census which lists all plant species native and naturalised in WA and serves as the basis for research, policy and conservation of the State's flora. The census is communicated through *FloraBase*, a botanical information portal which also includes descriptive information, specimen data, distributions maps, conservation information, identification tools and the Herbarium's flagship journal *Nuytsia*.

The Herbarium provides taxonomic and identification expertise to government, industry and the community, including an identification service that provides about 3000 identifications each year. It also maintains a reference herbarium, which is a public-access facility that houses representative specimens of WA's native and naturalised species. This is used widely by industry consultants, researchers and the public to help them identify wildflowers and weeds.



A popular volunteer program has been running at the Herbarium for more than 30 years. Volunteers are involved in a variety of work such as preparing and identifying specimens, capturing and processing images for *FloraBase* and creating electronic keys, and are considered an integral part of the Herbarium team.

Visit the Herbarium's Facebook page for behind-the-scenes snippets and botanical titbits www.facebook.com/WesternAustralianHerbarium.

COLLABORATION AND COMMUNICATION

WA has a taxonomic backlog of more than 1400 plant species and subspecies awaiting formal taxonomic description, which is no small task. One of the key strategies to reducing this tally is through scientific collaboration. Collaborations come in many forms, from the simple division of labour to the sharing of expertise on particular plant groups, geographic regions or scientific methodologies. Often it is simply a case of putting two (or more) heads together to nut out a thorny problem or to achieve a particular taxonomic goal. Herbaria across Australia and the world are a pivotal part of this collaborative effort, facilitating research on their collections while supporting the collection efforts of botanists.

Nuytsia too is a collaborative endeavour. The journal's editorial committee works with authors and experts from across Australia and overseas to progress submitted manuscripts to publication while the Herbarium's collections team and *FloraBase* experts ensure that the Herbarium specimens are curated, associated databases are updated, and that the most recent information is displayed on *FloraBase*. Indeed, communication of up-to-date taxonomic information is a fundamental role of the Herbarium and recent changes to *Nuytsia* are helping to do just that. Papers are now published online through *FloraBase* once they are finalised – a move made possible

Left Theda cross-flower (*Mitrasacme thedae*).
Photo – Russell Barrett

Far left Quindanning spider orchid (*Caladenia hopperiana*).
Photo – Andrew Brown/Parks and Wildlife

Below left Bennett's violet (*Hybanthus bennettiae*).
Photo – Russell Barrett

by changes to the *International Code of Nomenclature for algae, fungi and plants* – which means the very latest science on the WA flora is published quicker, and is freely and more broadly available.

This year's publication of a special issue of *Nuytsia* (Volume 26), in which 50 new species are published to celebrate the 50th anniversary of Kings Park's Botanic Garden, is a fabulous example of botanists working together to communicate a wealth of new information on WA's flora. It represents a unique collaboration between the WA Herbarium and the Botanic Gardens and Parks Authority involving 27 scientists who wrote, reviewed or edited papers, and the collections team and volunteers at the WA Herbarium who processed the associated herbarium collections. Together with the 50 species published in Volume 25, it has made for a simply tremendous (albeit exhausting) year.

INFORMING CONSERVATION

Many common and widespread species were discovered and named early in the taxonomic history of WA, with recently discovered and named species increasingly likely to be rare and geographically restricted. This, along with increasing threats to our biodiversity, means that it is more important than ever to document what species occur in WA, where they grow and how rare they are. To this end, all WA species and subspecies published in *Nuytsia* undergo a conservation assessment by Parks and Wildlife's Species and Communities branch as part of the review process. This information is then fed directly into the *Threatened and Priority Flora list for WA*, associated databases and *FloraBase* to ensure that accurate information on the conservation status of our flora is captured and broadcast.

Of the 100 species described this year, 72 are conservation-listed, most of which require further survey to better understand their distribution and conservation status. Some are threatened or known from only one or a few populations, including the Roe River commelina (*Commelina roensis*), Quindanning spider orchid (*Caladenia hopperiana*), Theda cross-flower (*Mitrasacme thedae*), Bennett's violet (*Hybanthus bennettiae*), triplet babingtonia (*Babingtonia triandra*) and Anderson's mulla mulla (*Ptilotus andersonii*). The publication of descriptions and associated taxonomic information for these species will increase the chance of more populations being uncovered and will improve our ability to conserve and manage them, which is ultimately what being a taxonomist in WA is all about.

Juliet Wege is a senior research scientist at the Western Australian Herbarium and the managing editor of *Nuytsia*.

For more information about Nuystia

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http://florabase.dpaw.wa.gov.au/nuytsia/