

Last summer, I decided to finally travel to Australia, and my visit there was framed by encounters with sculptures at its beginning and end. On my first day in Sydney, I walked past the New South Wales State Library, and there stood a statue of Mathew Flinders, someone whose name wasn't familiar to me. The attached plaque commemorated his circumnavigation of Australia in 1801–1803 on a mapping expedition for the British Navy. I was to meet up with Flinders again when I began reading about the early history of Australian biology, because the botanist Robert Brown and the artist Ferdinand Bauer were members of the expedition (Hewson, 1999). Brown spent five years in Australia and then he returned to England, as did Bauer. The latter converted his sketches of plants and animals into finished watercolors, and Brown identified many new species in the material he had collected.

Across the street from the state library is the Royal Botanic Garden Sydney, which was founded in 1816. That is early in the city's history, because the first settlement, a penal colony, wasn't established there until 1788. The founding of the garden reflects the efforts of Governor Lachlan Macquarie to change the character of the colony, moving away from its prison origins. According to Robert Hughes (1987), who wrote a detailed history of Australia's penal colonies, Britain was attempting to deal with its overcrowded prisons and social unrest by sending repeat offenders and political prisoners (mainly Irish dissidents) as far away as possible. These men and women were put to work developing the fledgling colony, including working for colonists who had the guts and entrepreneurial spirit to travel on the prison ships. After their terms were served, the former prisoners were free to fend for themselves in Australia or return to England, though few had the money for this. Most stayed, and many became successful business people and ranchers: solid, upstanding citizens, the ancestors of many present-day Australians.

Some of the early buildings, including barracks, remain in downtown Sydney, but the botanic garden is the best monument to the early efforts to make the city a civil place to live. It overlooks the harbor and the famous Sydney Opera House. At one end of the garden, with a view of the water, is Mrs. Macquarie's chair, a ledge carved into the sandstone that is abundant in the area (Simankevicius, 2004). This is where Lachlan Macquarie's wife, Elizabeth, liked to sit and look out over the water, presumably dreaming of going back to their native Scotland. They did return, but Macquarie died soon afterward, in 1824.

There is much more to tell of the early years of the colony, including the disappointment of the crew on landing to find that things were not as favorable for settlement as Captain Cook had described on visiting the area in 1770. He wrote about the place as filled with trees suitable for lumber and land suitable for agriculture; in fact, Cook's resident botanists, Joseph Banks and Daniel Solander,

enthused so about the area that Cook named it "Botany Bay." But when Captain Phillip and his entourage, termed the "First Fleet," arrived in 1788, they found the area so inhospitable that they moved on to what they called Port Jackson, later Sydney.

Cook had assumed that the inlets he saw were the outflow from substantial rivers, but that was not the case: there was little fresh water available, and many of the trees were eucalyptus, with wood so hard that it was almost impossible to saw. The soil was sandy, and sandstone was everywhere. This was not the arable farmland that they were accustomed to in England, and Australia was the antithesis of England in terms of rainfall. The first settlers met an arid land, but they made the most of it, taking the few cows, pigs, and sheep they had brought and clearing the land as pasture. The indigenous people they encountered were helpful to them and, at this early point in colonial history, interactions were in most cases peaceful between the two groups.

### ○ Early Art

The encounters with the strange animals and plants of the area were less peaceable: kangaroos and opossums were killed for meat, and many of the plants were poisonous or filled with thorns, spines, and prickles. Yet all these organisms had a beauty to them. Even in the First Fleet there was an accomplished artist who recorded these alluring creatures. George Raper was a young midshipman who had brought his watercolor paints with him and used them to create dozens of wonderful illustrations, many of which were in storage until recently (Groom, 2009). It is amazing, the number of artists who worked in the early days of colonization, when living conditions were rough everywhere and most time was occupied with eking out a living. For example, Mary Morton Allport arrived in what is now Tasmania in 1831, a rugged place at the time. Yet she managed to create beautiful illustrations of the plants she found there (Norton, 2009).

On the west coast, one of the earliest colonies was that on the Swan River near what is now the city of Perth. Rica Erickson (1969), herself a botanist, has written the biography of John Drummond, who arrived in 1828 with a group of colonists, not prisoners, and became the colony's first official botanist. This didn't do him much good monetarily, but he made some money sending specimens and seeds back to England. At the time Drummond was collecting, another early colonist was also doing so. Georgina Molloy came with her husband to take up farming, and despite the arrival of children, grueling work, and drought, she managed to send specimens back to England (Hasluck, 1955). Her aim wasn't to make money, but to share her wonder at the unusual species she encountered and to trade specimens for information about her finds.

## ○ Canberra

In Sydney I rented a car and headed south to Canberra, on my way to Melbourne. Australia is very British; their judges wear wigs, they always break for teatime, and they drive on the left-hand side of the road. When I had attempted this in Ireland, I took out the passenger-side mirror within an hour of leaving the rental office, but I managed to keep myself and the car unharmed on this trip. I wanted to drive to Melbourne from Sydney (about the distance from Connecticut to North Carolina) to get at least a little sense of what the country looks like. This was in late July, midwinter in the Southern Hemisphere. The dominant color in the landscape was brownish, but things didn't look nearly as bare as January in the northeast United States, one reason being that many Australian trees are evergreens, though of a very different kind from those in North America. Eucalyptus trees, of which there are about 700 species on the continent, are evergreens. Since they are angiosperms and not gymnosperms, they have flat leaves rather than needles. There are also a number of evergreen trees of the genus *Araucaria*, which includes the Norfolk Island pine. This tree, so tall and with a straight trunk, was another disappointment to the early colonists, since its wood is not useful as timber. However, it and other members of the genus add green to the landscape. Another reason things are greenish at this time of year is because winter is the time for rain in Australia. Though the country had endured years of drought, this winter, as luck would have it, was quite rainy. But it wasn't as bad as I expected, and it wasn't nearly as cold either. This is why palm trees are common, both native and exotic species, and a number of plants flower at this time of year.

In Canberra, I visited the Australian National Botanical Gardens, a much more recent creation than the one in Sydney: it opened its doors in 1972. Canberra itself wasn't established until well into the 20th century. After Australian states were federated in 1901 and became the Commonwealth of Australia, Melbourne was the temporary capital. However, there was so much wrangling between that city and Sydney as to which should serve this role permanently that Canberra was established as a compromise. Its architect was an American, Walter Burley Griffin. This botanical garden is very different from Sydney's. It doesn't have many expanses of lawn and is literally filled with plants. There are areas dedicated to various native plant groups, such as the eucalypts and the Proteaceae. The latter include the iconic genus *Banksia*, named for Joseph Banks. The arrangement is an effective way to organize a garden because it enables comparisons among species and also highlights the variations on particular plant themes. Other areas of the garden are arranged more ecologically, with one section mimicking a rainforest of tropical northern Australia and another the sandstone landscape near Sydney.

I drove on to Melbourne the next day, stopping at the Chiltern Box-Ironbark National Park. It's named for the box-ironbark ecosystem of eucalypts that used to cover this area. In the park, I saw the shafts of old gold mines and was warned to leave the animals alone. This was totally unnecessary advice since I didn't see any, except for birds such as cockatoos, which are very common and, in some cases, a nuisance. However, for me it was a great treat to see them; these are birds I never encounter in the skies of New York. After I left the park, I drove past a number of vineyards inviting motorists in for tastings. I decided that drinking and driving on the left *really* don't mix, so I got to Melbourne in one piece.

The next day I set out for yet another garden: the Royal Botanic Gardens Melbourne. This one is not as old as the one in Sydney, but it's again in the heart of the city. Here I encountered black swans (*Cygnus atratus*) for the first time. They are a native Australian species

and are really magnificent. There is also a "volcano" on the grounds. It was originally designed by William Guilfoyle, one of the 19th-century directors of the garden as a reservoir created to resemble the water-filled crater of a volcano, reminiscent of the ones once active in the area (Fox, 2004). There was a small island at the center, and Guilfoyle even had exhaust steam from the heating system piped in, to give the illusion of a seething volcano that might erupt at any moment. This elaborate scheme eventually fell into disrepair, but several years ago it was reincarnated, without the steam, as a showcase for arid plants.

## ○ Melbourne Museum

The Melbourne Museum is somewhat comparable to New York's American Museum of Natural History (AMNH) in that it combines zoology and geology with anthropology. Its striking architecture makes it look brand new, but it has been there for about 10 years. It includes the moving Bunjilka Aboriginal Cultural Center. "Bunjil" was a Creation Ancestor, and "Aka" means land or place. The name was selected after consultation with the local Aboriginal people from the Boon Wurrung and Woi Wurrung groups who lived in the Melbourne area. The term suggests the sense of a "creation place." The exhibits there combine history with music and Aboriginal art. Many of the artifacts could easily be in an economic botany exhibit illustrating the uses for native woods, vines, and bark.

The museum also has a wonderful Evolution Gallery that features dinosaur skeletons, one of which appears to be attempting to climb onto the second-floor balcony. There is a hall adorned with dozens of animals and a clever information system: you can look into a viewer, aim at a particular creature, and up pops information about it. There are many other displays, including a small bird exhibit featuring specimens collected by three 19th-century Englishmen whose names are probably familiar to you. The first is Charles Darwin, whose visit to Australia I'll discuss in next month's column. A couple of the birds he collected while there have managed to find their way back to the continent and into the museum's collection. Also there are some of Alfred Russel Wallace's birds, many of which were collected in New Guinea around the time that he was developing his theory of evolution. A much larger collection is that of the ornithologist John Gould, to whom Darwin turned for help in identifying the birds he had collected. It was Gould who brought to Darwin's attention the fact that the Galápagos Island finches Darwin had collected belonged to different species. In 1838, Gould and his wife, who drew illustrations for him, went to live in Australia for two years while they worked on what became his seven-volume *The Birds of Australia*. Gould gave a collection of 5000 bird skins to Frederick McCoy, the first director of the Melbourne Museum, as a reminder of his link to Australia.

## ○ The West

After Melbourne, I flew out to Perth in the state of Western Australia (WA), which makes up about a third of the continent. The following day, I set off with five other visitors and two guides on a six-day botanical tour up the coast to Shark Bay. The trip was led by Greg Keighery, Principle Research Scientist in the WA Department of Environment and Conservation. The tour coordinator and driver was Joe Frudist, an expert in natural history with a special interest in fungi. So the participants had the luxury of two highly knowledgeable people to guide us through the flora of the area. As someone who is not a botanist, my first reaction was to be completely overwhelmed as we made our first

stop and Greg began identifying plants at a dizzying pace. By this time in my trip, I could identify banksias and acacia – in most cases, but even some of these could be tricky because their genetic diversity is so great that they come in many guises. After several more stops, I began to pick up a few names as they were mentioned repeatedly.

In the afternoon, we went to Hi-Valley Farm, owned by Don and Joy Williams. They are sheep ranchers who bought 5000 acres of bush land from the government, for a dollar an acre, in the 1960s. They would not get the deed to land until a certain amount of it was cleared. They accomplished this rather daunting task and today raise sheep on the land. However, they didn't clear all of it. Some of it remains bush, and this land is perhaps even more valuable than the cleared area because it harbors such rich species diversity. It was here that I saw my first kangaroos in the wild, and where one of the farmers' dogs hunted down an echidna, but it was with the plants that the most obvious biodiversity lies. Don and Joy (who lives up to her name) took us out in their trucks, which were equal to the dirt roads. They pointed out dozens of species, many of them rare, including a stand of *Eucalyptus leprophloia*, one of the only known populations. Since this was the middle of winter, there weren't many plants in bloom, but the two managed to find a number of them. However, it wasn't the flowers that intrigued me – it was being in an environment where every plant was different from what I would see at home, and where almost every plant was native to the area. I felt privileged to have visited this place and to have met Joy and Don. I asked Greg Keighery if all ranchers were as well versed in botany, and he said definitely not. Joy noted that she learned about plants from her mother, and that Don was tutored by his father as they tended sheep, with his father pointing out which species made good eating for the sheep, which would not be eaten, and which were poisonous.

What impressed me about so many of the plants I encountered in the west were how unpalatable they seem. Many of them look downright dangerous, with thorns or other sharp projections from stems, leaves, and seeds or extremely tough leaves. The defenses are similar to those seen in the deserts of the American West, but the species are all different. It was an exciting experience, even if I am still struggling to digest the names. One of my favorite aids is the *Field Guide to the Wildflowers of Australia's South West* (Scott & Negus, 2003), though no guide gives the same experience as seeing plants like *Banksia* and its close relative, *Dryandra*, in flower. These plants are good examples of the taxonomic reorganization going on in the plant world. Many times on the trip, Greg would tell of name changes caused by such shifts. In the case of *Dryandra*, DNA sequencing has revealed such similarity with *Banksia* that *Dryandra* are now being reclassified into this genus.

As we traveled farther north, the weather became milder and we saw more and more green field in agricultural areas and more flowers in the bush. These included great masses of everlastings in bloom. First we encountered the yellow variety and then the white, but the two rarely mixed. My previous contact with these flowers was in autumn flower arrangements in which golden versions of these papery flowers are often prominent. Seeing them massed in nature is obviously a very different experience. As we drove along we would see thousands of everlasting flowers growing wild. We were lucky not only to be in the area at the right time of year, but also in the right year. During droughts, such displays just don't happen.

Shark Bay and the town of Denby are as far north as we ventured. The entire bay area is protected parkland and a World Heritage Area because of its biological, cultural, and geological significance. The last is based, in part, on the fact that sandstone masses meet here. This is obvious because there are bright red sands on one side of

the divide and white sands on the other. The bay is named after the fish that frequent it, drawn by the dolphins and dugongs, which also enjoy the bay because of the seagrass meadows. Nearby is Shell Beach, so called because there is no sand there, only tiny shells of the cockle *Fragum erugatum* over a large area. For the last night of our trip, we celebrated by eating at a restaurant built from shell bricks. These used to be manufactured in the area, and we found that they made for great acoustics, because the huge surface area provided by the masses of tiny shells really absorbed noise.

## ○ Birds of Paradise

When we got back to Perth, I flew across to Sydney again and visited the Australian Museum, which is also on the AMNH model. What I found most intriguing there was a temporary exhibit on birds of paradise. Geographically, this makes sense because many of these birds are native to New Guinea, and Papua New Guinea was an Australian Protectorate for many years. It also makes sense in terms of the museum's mission, because the exhibit combined biology with anthropology. I was familiar with what birds of paradise look like – the males' striking plumage, long tails, and head ornamentation – but I was less familiar with their behavior. Yet it's really the males' use of their plumage in courtship behaviors that makes them so interesting. The videos that ran in the exhibit were so fascinating that most visitors, like myself, watched them not once, but several times, just to see – and listen to – what these males do to attract a mate.

In an adjacent gallery was another take on bird-of-paradise plumage, namely how tribes in New Guinea use them in their rituals. On display are elaborate – very elaborate – headdresses that incorporate feathers, wings, and entire birds. These species are obviously relics of a time when populations of the birds were not as imperiled as they are today. While these artifacts are remarkable, here again, the videos steal the show. They present New Guineans dancing and singing while flaunting their headdresses and other body decorations much as the birds of paradise do. The juxtaposition of the two forms of display makes each more interesting and points to behavioral similarities that are nothing short of extraordinary. This was a rather small exhibit, but it was one of the most memorable I saw on my trip.

## ○ The Macleays

In Sydney, I reconnected with Malte Ebach, a biogeographer, whom I had originally met at the Natural History Museum, London, several years earlier. He is now on the faculty of the University of New South Wales. We had a great time discussing his research on the history of biogeography in Australia (<http://www.mcebach.net/>). He suggested I visit the University of Sydney's Macleay Museum, which houses natural history collections. I had never heard of it, or of three Macleays whose collections it contains. The eldest, Alexander Macleay, was an avid amateur entomologist who had amassed a large collection by 1828 when he arrived in Sydney to become Colonial Secretary. Macleay was then 58 years old, and his son, William Sharp Macleay, was a British diplomat serving in Cuba, where he continued his father's collecting ways and eventually joined the rest of the family in Sydney. He was accompanied by a cousin, William John Macleay, who outlived his relatives. He was heir to their collections, which he significantly augmented, branching out from insects to other animals, and even to plants. Toward the end of the 19th century, he decided to leave his collections to the University of Sydney, and he also provided money for a building to house them (Stanbury & Holland, 1988). Over the

