At this stage, Taylor recognized only "the furze or whin which is precisely the same as our own". Like Backhouse, he called on Alexander McLeay before going again to Woolloomooloo, for

> the walk is exceedingly beautiful the flowers I gathered by the way very numerous and all unknown except the furze, mallow & nightshade.[570]

Taylor visited the embryo Australian Museum before going to Parramatta where he experienced the first snow-fall there in living memory.[571] Yet he found "most of the beautiful wild shrubs & flowers...in full bloom",[572] and the approach of spring brought further botanical delights.[573] By this time, Taylor was conducting services at Sydney, Parramatta, Ryde, Cobbitty and Liverpool, a task which provided ample experience of the forests of Eucalyptus, of which he discerned "there are many varieties",[574] and he was soon at home in his new vegetative environment.[575]

Soon after being appointed "the protempore chaplain of Liverpool", Taylor met Backhouse and Walker, and "was much pleased with them" for they proved "very intelligent men".[576] Taylor maintained a vigorous itinerant ministry, often travelling far from Liverpool. He paid particular attention to the Liverpool Hospital, the "orphan school", "the Iron Gang", the Lansdowne Stockade, and the convicts at "The Quarry". He travelled to Cook's River and to the lower George's River where he "saw for the first time the Cabbage Tree..."[577] He made a pilgrimage to Kurnell and noted the Banks-Cook monument erected by the Philosophical Society. Like so many other naturalists he was greatly impressed by Botany Bay :

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570 op.cit.,p.159. 22 June 1836. The three known plants were probably Ulex europaeus, Malva parviflora and Solanum triflorum.

571 op.cit.,p.161. 28 June 1836. See also Backhouse : Narrative, p.394.

572 Taylor : op.cit.,p.162, 30 June 1836.

573 op.cit.,p.170. 10 Aug.1836.

574 op.cit.,p.190. 10 Oct.1836.

575 He spoke confidently of ironbarks, stringybarks, blue gums, apples, tea-trees, grass-trees, the Woody Pear, Native Cherry and "the Warratoa...one of the most elegant of the flowering shrubs...I have noticed". (op.cit.,p.193. 10 Oct.1836).

576 op.cit.,pp.200,202. 4 and 11 Nov.1836.

577 Taylor : op.cit.,p.231. 2 Feb.1837. Taylor possessed a Cabbage Tree hat, "more durable than straw & look equally as well..." op.cit.,p.232.

> many have asserted that the bay was unjustly named botany from the scarcity of plants growing there, but I should think that those who said so were no botanists, for I found a great variety in a very short walk...[578]

Taylor also travelled to the Hunter, and accompanied "Mr. Scott ...also a M.A. of Cambridge" to Ash Island.[579] He was fascinated by the trees of Ash Island, by the epiphytic ferns and by the fossil plants he found in a Newcastle coal mine.[580] He came to realise the true nature of epiphytes--

> the parasytical ferns having a stag horn shaped leaf and another having a straight leaf derive their nourishment in a very surprising manner for though they are attached to the stems of trees they draw no other support from them than bearing their weight...[581]

Thus careful examination of these plants revealed yet another instance "of the wonderful contrivances of an all wise Providence..." Taylor visited Threlkeld's mission at Lake Macquarie and later the "Valley of Palms" so named by the chaplain, Rev. C.P.N. Wilton, already mentioned. Here Taylor was "both surprised and delighted" to see "such a luxuriance of vegetation", and was "unwilling to leave..." After a visit to Maitland, Taylor returned to Liverpool on 4 July 1837. Three weeks later he made a trip up the Woronora River, then to Wiseman's Ferry and to Blackheath and Bathurst. All the while, he recorded a growing knowledge of and appreciation of the vegetation which he so keenly investigated. Like Clarke, he was primarily a geologist, so that his visit to the Newcastle mines was of particular interest.[582] On 4 September 1838, Taylor went

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578 op.cit.,p.238.

579 Alexander Walker Scott graduated from Cambridge in 1821. He has already been noticed. See this Chapter, p.561.

580 Taylor : op.cit.,p.263-266. 1-2 June 1837.

581 op.cit.,p.270. The ferns were Platycerium grande and/or P.bifurcatum and Asplenium nidus, the habit of which Taylor sketched.

582 Taylor felt that at Newcastle he found "convincing proof that the coal fields were not formed by the drift timber at the bottom of shallow seas but were actually turf grounds covered with trees... whose stumps still remain standing..." op.cit.,p.274. 24 June 1837. Taylor thus anticipated the published findings of later, better-known geologists, such as Prof.T.W. Edgeworth David. Taylor sent some of his Permian fossils to the Cambridge Philosophical Society to which Wilton also belonged.

to Sydney "with the intention of declaring to the Bishop my determination of proceeding to New Zealand", and he sailed on 19 February 1839.

Taylor exemplified the enthusiastic, scientifically trained amateur placed in an entirely new environment. He was forever seeking to discern differences and affinities between plants and to learn how they were classified. Had he remained longer in the Colony, he may well have published a work on N.S.W. comparable to those he wrote on New Zealand, where he was long remembered as "a man of considerable scientific attainments...an excellent geologist and enthusiastic botanist".[583]

The Rev.G.E.W. Turner arrived in Sydney in December 1838, and after taking duty at St. Anne's, Ryde during the terminal illness of the incumbent, was appointed to the parish himself in March 1839. During the subsequent thirty years, he carried on a quiet, yet industrious ministry, even distributing "to the poor, gratuitously, medicines for the alleviation or cure of...illness".[584] As mentioned earlier, Turner was Secretary of the Committee of Management of the Australian Museum and Botanic Gardens, 1847-1853,[585] and in the latter year he was elected to sit with two clerical colleagues, R.L. King and W.B. Clarke, on the Board of Trustees of the Museum, a service he rendered for the remainder of his life.[586] Turner made a botanical showplace of his parsonage grounds, "a model of neatness" which "contained a most interesting and valuable collection of plants...[587] and he delighted in receiving appreciative visitors to whom he gave "valuable information, both in respect to the history and management of the many beautiful plants which he possessed".[588] Fellow

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583 Woon : Wanganui,p.63.
584 Hort.Mag.,VI,1869,p.41.
585 See Chapter V,p.488.
586 Having joined the Management Committee in 1847, Turner was associated with the Museum for 22 years, as stated on his monument in St. Anne's churchyard. The first Board of Trustees also included others previously mentioned : Sir Thomas Mitchell, Dr George Bennett, J.C. Bidwill, P.P. King, Wm. Macarthur, W.S. and George Macleay. See JRAHS,1934, p.200.
587 Hort.Mag.,loc.cit.
588 ibid.

members of the Horticultural Society considered that

> as an ardent student of science he stood amongst the highest of our savans, the knowledge of which he sought rather for the pleasure which it afforded him than for any love of display. As a Botanist, the district of Ryde, and his description of its botany, stamps him as a master-mind in that science.[589]

In his later years, Turner became a keen microscopist, making

> some interesting discoveries with the stomata and minute hairs of plants, the results of which, we trust, will be given to the world.[590]

Regrettably, it appears that whatever Turner learned of plant morphology with the aid of his microscope went to the grave with him. He died at his Ryde parsonage on Sunday, 10 January 1869, following a fall from his horse when returning from Parramatta.[591] Fifty years later it was still remembered that "few scientists, who visited Sydney, left it without coming to see Mr. Turner".[592] On a memorial plaque within St. Anne's, Turner's parishioners proclaimed : "His cultivated taste found suitable enjoyment in the admiration and study of the work of the Creator". Like many other clergy of the time, Turner would have seen his botanical work in just that way.

Other clergy who made botanical investigations included the Rev. Thomas Hill Goodwin, who in 1855 established the Anglican Aboriginal Mission at Yelta, near Wentworth. In November 1858, he joined John Dallachy[593], then collecting for Mueller, on a trip up the Darling from Wentworth to Wilcannia. Dallachy was

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589 ibid.

590 op.cit.,p.42. Turner was probably studying the ways in which the presence of hairs and the working of leaf stomates prevented undue loss of moisture from plants in a country subjected very hot summers and drought conditions.

591 op.cit.,pp.41-42; SMH, 12 and 16 Jan.1869.

592 Ryde Church Paper, 1 Dec.1920,p.7.

593 John Dallachy (1820?-1871) formerly gardener to the Earl of Aberdeen, had also worked at Kew before going to Victoria, where he served for a time as superintendent of the Melbourne Botanic Gardens. Numerous species were named in his honour. See Vic.Nat., 1908,pp.106-108; see also J.H. Willis in Proc.Roy.Soc.Vic.,1960, p.247.

> very pleased with Mr. Goodwin; he is a very excellent man and good company. He is well informed on all subjects and is highly respected on the Murray.[594]

The partnership was certainly successful botanically, and Bentham acknowledged the specimens of either or both no less than ninety times in Flora Australiensis.[595] At a somewhat different level, the Rev. Philip P. Agnew, Chaplain to Cockatoo Island and Darlinghurst Gaol, sent specimens of "The Weeds, grasses and ferns, collected at Cockatoo Island" to one Mrs. Charles Kean, "as a souvenir of her visit to that place Dec.24th 1863".[596] The collections of the Rev.William Henry Hazell Yarrington[597] made later in the century, had much greater botanical impact, while "a fine collection from New South Wales", made by Rt.Rev. James Francis Turner[598], is still preserved at Oxford.[599] In 1870, Turner was perturbed to hear of the growing friction between Mueller and the Victorian bureaucrats, and he offered his moral and monetary support:

> I trust that there is spirit enough for the love of science amongst the members of these Colonies somewhere to enable us to have the honor of retaining your services--speaking for myself I should gladly guarantee my fair share of a yearly subscription for such a purpose should the Government withdraw.

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594 Letter of 8 Nov.1858, probably to Mueller, in Vic.Nat.,1908, p.107. Goodwin was Rector of Wentworth by the 1860s.

595 See Appendix I.

596 The 15 sheets of unnamed specimens comprised foliage only of a member of the Acacia decurrens group of Wattles, some grass leaves and some small pieces of ferns. The collection was set into a book "bound and lettered by a prisoner in Darlinghurst Gaol...so that the whole is in keeping". P.P. Agnew to Mrs. Kean, 29 Dec.1863. ANL.MK.1779.

597 Rev.W.H.H. Yarrington, M.A., LL.B.(Syd.) served at Yass and West Maitland before becoming Rector of St.Luke's, Concord-Burwood, 1897-1909. Some of his specimens are in the Melbourne Herbarium so presumably he corresponded with Mueller. Like Woolls, he also published some verse.

598 Rt.Rev.J.F. Turner,D.D., second Bishop of Grafton and Armidale, 1869-1892.

599 Clokie : Herbaria of Oxford,p.173.

In common with many of his clergy, Turner considered

> Museums and suchlike places are, when properly conducted and used, weapons of religion to every humblemindcd person, places of constant remembrance of God's love and merciful Providence over us and all his works.[600]

As one "fond of everything in nature as we call it, but especially flowers", Turner sought to purchase a full set of Mueller's Fragmenta and promised to send him "any kind of plant...likely in my mind to be new".[601]

There was thus a widespread interest in botany among N.S.W. clergy of the nineteenth century, and their contribution to botanical knowledge was most significant.[602] The point has not gone entirely unnoticed. In 1925, Richard Hind Cambage[603], then President of the Linnean Society of N.S.W., when reviewing the first fifty years of the Society's work, observed :

> It is of interest to note that of the first fifty botanical papers...published by the Society...no less than thirty-four were written by clergymen.[604]

Why was the contribution to botanical knowledge by the clergy so disproportionate to their numbers? First, despite the often bitter controversy provoked by the appearance in 1859 of Darwin's Origin of Species[605], many clergy shared something of Woolls's pantheistic and

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600 Turner to Mueller, 28 Mar.1870. Turner's letterbook, Diocesan Registry, Armidale.

601 ibid. In this same letter, Turner sketched two of his discoveries which were clearly the Christmas Bell, Blandfordia grandiflora and Goat's-foot, Ipomoea brasiliensis.

602 A further, if minor, contribution towards the end of the century, was the discovery by the Rev.W.F. Frazer of Murrurundi, of a species of Dodder, Cuscuta tasmanica, formerly known only from Tasmania and Victoria. Ag.Gaz.NSW,1891,p.289.

603 For R.H. Cambage (1859-1928), teacher, surveyor, historian and botanist, see this Chapter, p. 716.

604 Proc.Linn.Soc.NSW, 1925,p.xiv. Of these papers, Woolls contributed 18 and Tenison-Woods 10.

605 See Ann Mozley's important paper, "Evolution and the Climate of Opinion in Australia, 1840-1876", Victorian Studies,June 1967, pp.411-430.

teleological views; second, the clergy generally had a good educational background (often including Latin to give access to basic systematic works); third, they often had the leisure in which to pursue botanical study at a serious level; fourth, many had the opportunity, if not the obligation, to travel widely throughout many ecological areas of the Colony, and finally, as may be seen by the number of Cambridge graduages[606], some had been influenced by the teaching or the tradition of the two celebrated clerical scientists, the Rev. Adam Sedgwick[607] and the Rev. John Stevens Henslow[608] who had inspired Darwin himself.

Religious laymen often held views shared by their pastors. Nearly thirty years before the appearance of Darwin's classic, John Henderson observed :

> it becomes a subject of deep and general interest, to ascertain the source, from whence they [the vegetable productions of N.S.W. and Van Diemen's Land] may have primarily originated. Hitherto, investigations of this description, have been treated by the Church, as little less than impious; and as tending to invalidate the truth of the Christian revelations,

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606 See the foregoing biographical footnotes.

607 Rev. A. Sedgwick (1785-1873) son of a Yorkshire clergyman, was ordained in 1818 and in the same year succeeded the Rev. John Hailstone as Professor of Geology at Cambridge, a post he held almost until his death.

608 Rev. J.S. Henslow (1796-1861) graduated in mathematics in 1818, but turned to natural history apparently as a result of joining some of Sedgwick's geological excursions. In 1822, Henslow became Professor of Mineralogy at Cambridge. Two years later, he was ordained, and in 1827 became Professor of Botany, a subject he enlivened and popularized through his enthusiastic teaching. In 1821, Henslow and Sedgwick founded the Cambridge Philosophical Society to which Rev. C.P.N. Wilton and Rev. R. Taylor belonged. In 1832, Henslow took a parish in Berkshire, and in 1837 became Rector of Hitcham, Suffolk, where he lived from 1839 until his death in 1861. Henslow supported Charles Moore's candidature for the Directorship of the Sydney Botanic Gardens. See Chapter V, p.491. For an appraisal of Henslow and his methods, see W.T. Thiselton-Dyer in Report of the Sixty-fifth Meeting of the British Association for the Advancement of Science, 1895, Lond.,1895, pp.838-841.

but

> I conceive, that the discovery of every new power in the universe, of productions in order to supply its wants and defects, is calculated to improve our knowledge and estimation of the unbounded wisdom of its Creator.[609]

In 1848, a contributor to the Sydney Guardian maintained :

> In truth, all the works of nature may be simply regarded as so many different methods, in which the all-wise Creator intends to convey some idea of his majestic attributes; and we cannot doubt but that the most minute, as well as the most stupendous of the works of God, were designed and are calculated, to glorify Him who made them all. Man was, beyond dispute, created for this very purpose.[610]

Three years later, John Hutton Balfour, Professor of Medicine and Botany at Edinburgh, published some of his introductory lectures in botany as Phyto-Theology; or Botanical Sketches, intended to illustrate the works of God in the Structure, Functions, and General Distribution of Plants.[611] In 1875, David Moore pursued the argument from Belfast with his Design in the Structure and Fertilization of Plants a Proof of the Existence of God.

Mueller reviewed this whole issue during an extraordinary address in the West Melbourne Presbyterian Church in August 1877.[612] He attempted a complete historical survey of all clergy who had made some contribution

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609 Henderson : Observations, p.151.

610 The Sydney Guardian : a Journal of Religious, Literary, and Scientific Information. Under the Superintendence of clergymen of the United Church of England and Ireland. Vol. I,No.6, 1 Nov. 1848,p.92.

611 One plant figured was the Australian Trigger Plant, Stylidium. See also J.H. Balfour : Botany and Religion, or Illustrations of the Works of God in the Structure...of Plants, 4th Ed. Edin.,1882. As early as 1825, John Shute Duncan had published Botano-Theology ...republished as Botanical Theology, Oxf.,1826.

612 F. Mueller : On the Advancement of the Natural Sciences through Ministers of the Christian Church : A Lecture delivered...on the 6th August 1877, Melb.,1877.

to natural science, from the mediaeval monks to Henslow, Clarke, and Wolliam Woolls, who "investigated the flora of New South Wales with a perseverance which is beyond all praise".[613] Mueller was not surprised that such men "educated by long years' studies", with "keen mental penetration" and "thoughts...trained to logical precision... should have sought to unfold...the marvels of God's work in Nature". It was to be expected that

> imbuing admiration of the wonders around them, some may wander from the religious sanctuary beyond the threshold of the temple, to seek for the flowery wonders of the field or the structures of grandeur in the forest...[614]

In fact, one duty of the clergy was to promote such enquiry, to the glory of God.

Just a month later, Mueller's irascible fellow countryman, Johann Ludwig Gerard Krefft[615] published the first issue of his Nature in Australia[616] with the slogan, "Where Faith begins, Science ends". Mueller was doubtless saddened[617], but he should have been happy enough with the overall contribution the clergy of N.S.W. had made, and were still making, to his beloved botanical science.

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613 op.cit.,p.33.
614 op.cit.,p.4.
615 J.L.G.Krefft (1830-1880), curator of Aust.Museum, 1860 until dismissed Aug.1874 after dispute with the Trustees, one of whom he successfully sued.
616 Krefft's Nature in Australia : A Popular Journal for the Discussion of Questions on Natural History. Vol.I,No.1,8 Sept.1877.
617 In his address, Mueller warned : "Above all, great naturalists, whose doctrines of observations are more captive still than the expositions of scholastic reasonings, should never try to undermine Christian faith...lest the resentful Nemesis may follow the sceptics to their last days". Mueller : op.cit.,p.34.

Other Writers and Other Teachers

Before the publication of Flora Australiensis was completed in 1878, both amateur and professional botanists felt the need for readily-accessible and comprehensible botanical works as guides to field and herbarium studies. The First Fleeters'published journals certainly contained many, if scattered, botanical observations, descriptions and illustrations, but they were principally concerned with the everyday events of the growing settlement.[618] To the naturalist, the most useful was Surgeon John White's Journal of a Voyage to New South Wales,[619] but even this described only eight species of plants in detail. In 1793, Sir James Edward Smith published the first work devoted entirely to Australian plants, but it was necessarily very limited, both in the range of plants described and in its distribution.[620] In January 1809, Robert Brown read his comprehensive paper "On the Proteaceae of Jussieu" to the Linnean Society of London, but it was not printed until February 1810. Meanwhile in August 1809, Richard Anthony Salisbury[621] anticipated the appearance of Brown's paper by publishing many of Brown's plants under other names.[622] Nor did Brown have a change in fortune when his Prodromus was published in April 1810. Although acclaimed by a few professional botanists and scholars, it met with a generally cold reception.[623] The prospect of

618 e.g. the accounts based on reports and diaries of Phillip, Hunter, Collins and Tench. See Thesis I, passim.

619 Lond., 1790. The botanical information on pp.221-236 was supplied by J.E. Smith to whom White's specimens were referred.

620 J.E. Smith: A Specimen of the Botany of New Holland, Lond., 1793. See Thesis I, p.130. Twenty-seven species were described. Smith's later work, Exotic Botany, 2 vols., Lond., 1804-1805, described 37 species.

621 For R.A. Salisbury, F.R.S., F.L.S. (1761-1829) see H.R. Fletcher: The Story of the Royal Horticultural Society, 1804-1968, Lond., 1969, pp.34-36, where Salisbury's personal and botanical adventures in nomenclature are described.

622 See W.T. Stearn's Introduction to the facsimile edition of Brown's Prodromus, 1960, p.xxxii.

623 R. Brown: Prodromus Florae Novae Hollandiae et Insulae Van Diemen...Lond., 1810. Brown printed the edition of 250 copies at his own expense (£93-14-4½). After the sale of 26 copies, he despairingly withdrew the remainder and thenceforth the work was available only as a gift from the author. See Stearn's Introduction, op. cit., p.xxx and Thesis I, pp.155-157.

reading terse Latin descriptions of some 2048 species of plants from New Holland was hardly attractive to the general reader, even if he had heard that three-quarters of these species were new to science. The book contained not a single illustration, and even the pagination was peculiar.[624] While no guide for beginners, the work remains a cornerstone of Australian taxonomic botany.[625]

Ferdinand Bauer's companion work, Illustrationes Florae Novae Hollandiae[626] was doomed by its very magnificence to remain a mere fragment of fifteen plates, but the work of both Brown and Bauer finally gained more general recognition through the publication in 1814 of Flinders's A Voyage to Terra Australis. Ten more of Bauer's plates[627] appeared in the folio atlas, and Brown's "General Remarks, geographical and systematical, on the Botany of Terra Australis" were appended.[628] In this important essay, Brown reviewed the localities in which he had collected "nearly 3900 species" of Australian plants, and he acknowledged the collectors whose work enabled him to have an additional 300 species at his disposal "for the commencement of a Flora of Terra Australis."[629] Brown described several new "natural orders"

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624 The Prodromus began at p.145 for Brown estimated that 144 pages to be issued later, would be required to describe the remainder of the non-flowering plants (i.e. apart from the ferns, which contrary to later practice, he included in the Monocotyledons). These pages were never issued.

625 Brown was doubtless moved by the solitary review in the Monthly Magazine, June 1810, which praised his work. (Stearn: op. cit., p.xxxi) and by such requests as that received from Dr Francis Boott. Boott (who later attended George Caley in his last illness in May 1829) wrote to Brown 9 Mar. 1818 seeking to "purchase one of your New Holland Floras or are they out of print? I understood you to say there were no copies in the shops." On 13 May 1819, Boott wrote again: "I beg if you ever meet with an unappreciated copy of your Prodromus to remember me. I have sought for it everywhere..." Apparently Brown had by this time disposed of his remaining copies. Brown: Correspondence, ML. Uncat.MSS, Set 226. Presumably this was the same F. Boott whose Illustrations of the Genus Carex was published in London, 1858-1867.

626 Lond., 1806-1813. For Bauer see L.A. Gilbert in Aust. Dict. Biog., 1, p.73.

627 These included Native Teak, Flindersia australis and Bolwarra, Eupomatia laurina. See Thesis I, p.158.

628 M. Flinders: A Voyage to Terra Australis. Lond., 1814, II, pp.533-594. See also Brown's "Descriptions of plants figured in the Atlas", pp.595-613.

629 op. cit., II, pp.535-536.

(families), and took care to indicate where, in grouping plants according to their affinities as he saw them, he was at variance with other authors. He discussed the relative sizes of principal families and genera, in terms of the number of species, and considered their range and distribution. He also attempted a comparison of the Australian flora with those of South Africa, New Zealand and Europe, thereby making a pioneer contribution to plant geography. In 1820 both Banks and his royal patron died, thereby dashing the hopes of the botanical fraternity for the publication of the 700 exquisite plates Banks had had prepared for his proposed illustrated botany of the Endeavour voyage.[630]

Robert Brown made two more valuable contributions to Australian botanical literature. In 1830 he issued a Supplementum to the Prodromus[631] describing further species of Proteaceae which came to him through the collections of George Caley, Allan Cunningham, Charles Fraser and Franz Sieber.[632] Nineteen years later he supplied the Botanical Appendix to Sturt's published account of the expedition to the Stony Desert, 1844-1846.[633] Having described the species believed to be new, Brown briefly extended the views he had expressed in

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630 About 300 of the illustrations were published 80 years and more after Banks's death in James Britten (Ed.): Illustrations of Australian Plants collected in 1770 during Captain Cook's Voyage round the World in H.M.S. Endeavour...Lond., 1900-1905, 3 vols., folio.

631 Supplementum Primum Prodromi Florae Novae Hollandiae exhibens Proteaceas Novas...Lond., 1830.

632 Some W.A. specimens collected by William Baxter were also included. Baxter apparently collected in Australia, 1823-1825 and 1828-1830 for Francis Henchman, "a very successful importer of New Holland plants." In 1829 he met Charles Fraser, who obtained Gov. Bourke's approval for him to receive normal rations and other assistance in return for supplying half of the results of his collecting to the Sydney Botanic Gardens, a promise he was later loath to keep. See Jour. W.A. Nat. Hist. Soc., 1909, pp.6-10.

633 See Chapter II, p.125 and Appendix V.

Flinders's Voyage. The work of the inland explorers and coastal survey expeditions undertaken since Brown left Australia some forty-five years earlier, had, he believed, brought "the whole number of Australian plants at present known" to nearly 7000 species.[624]

Joseph Dalton Hooker, who, as mentioned, made a brief visit to N.S.W. in 1841, pursued many of the lines of enquiry indicated in Brown's "General Remarks" and in 1859 published the celebrated "Introductory Essay" to his Flora of Tasmania. Having conceded that the Australian flora is "the most remarkable that is known", Hooker set out to analyse its botanical characteristics with particular reference to the great number of endemic species. He hoped that by so doing he might formulate a hypothesis to account for the distinctive features of the flora. Were they due to climatic influences, or to "some other attribute of Australia", or to "a separate creative effort from that which contemporaneously peopled the rest of the globe with its existing vegetation"[635]? Hooker, like his friend Charles Darwin, was interested in origins, and while compiling his analysis, he "profited so largely" from reading the Origin of Species in manuscript.[636] Although agreeing that the Australian flora was indeed "peculiar" in many respects, Hooker warned that "it is much easier to see peculiarities than to appreciate resemblances." With an increasing amount of material for examination, owing to the efforts of explorers and collectors, it was possible to make a more general survey than hitherto. As Hooker suspected, the vegetation in its essential aspects, was "not fundamentally different from that of other parts of the globe", for,

> the peculiarities...great though they be, are found to be more apparent than real, and to be due to a multitude of specialities affecting the species, and to a certain extent the genera, but not extending to the more important characteristics...[637]

This was not to deny that the "very peculiar habit" of many plants caused them to have a "grotesque appearance", while the "anomalous

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634 Sturt: Central Australia, II, Appendix, p.91.
635 Hooker: Introductory Essay, p.xxvi.
636 op. cit., p.cxxviii.
637 op. cit., p.xxvii.

organs" of "a great many of the species" and the "singular structural peculiarities" of others, understandably supported the impression of the uniqueness of this Antipodean vegetation. Yet seen in its global context, the Australian flora had sufficient in common with other regional floras to indicate that while it was indeed peculiar, it was "not an aberrant or anomalous botanical province of the existing Vegetable Kingdom."[638] This by no means detracted from its interest, but it did help to make the problem of origins a little clearer while no less fascinating.

Hooker estimated that 8000 species of flowering plants indigenous to Australia were then known,[639] and he predicted that this number might be increased by one or two thousand more species[640] by the time the continent had been completely explored. He analysed the relative sizes of the two main classes, Monocotyledons and Dicotyledons, and found the proportions of families, genera and species within them to be "the same as those which prevail in other Floras of equal extent."[641] Hooker also examined the distribution of characteristic families of plants over the continent, considered the extent to which these were represented elsewhere in the world, and found that the flora of south-eastern Australia and south-western Australia had "a greater specific difference...than between Australia and the rest of the globe."[642] He also found that changes in vegetation according to latitude, altitude and proximity to the sea, were "in every respect analogous to what occur in other parts of the globe."

Thus while Hooker acknowledged the distinctive aspects of the Australian flora, he saw it as part of an essential unity of the world-wide Plant Kingdom. He discerned affinities between the floras of Australia, South America and South Africa, and appreciated that the distribution of species and the origin of species were inseparable issues. The appearance of Hooker's painstaking botanical analyses

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638 op. cit., p.xxviii.
639 ibid.
640 op. cit., p.xxx. The present estimate is that there are about 12,000 species of vascular plants indigenous to Australia. Aust. Encyc., 7, p.140.
641 Hooker: op. cit., p.xxviii.
642 ibid.

almost contemporaneously with Darwin's Origin of Species and with Alfred Wallace's studies of animal distribution, could not have been better timed if contrived. To his credit, Hooker also included an outline of "the Progress of Botanical Discovery in Australia"--a "rapid sketch" in which he paid tribute to "the labours of those who have mainly contributed to develop the botanical riches of Australia.[643] For the first time, a professional botanist deemed it worthwhile to make a historical review of the collectors and observers who had provided the necessary raw materials for scientific study. Having been one of them, Hooker appreciated their worth.

The first part of Mueller's Fragmenta Phytographiae Australiae was published in Melbourne about a year before Hooker's Introductory Essay. Thus the continuity of contributions to Australian botanical literature was maintained, not only by the production in London of Flora Australiensis, 1863-1878, but also by an increasing number of significant botanical works produced within Australia itself, especially in Victoria. Between 1858 and 1882, Mueller's Fragmenta filled twelve volumes, with some fine lithograph plates depicting new species. As its name suggests, the Fragmenta suffered from lack of overall organization, but it reflected the way in which the botanical investigation of newly-explored country developed. As species were referred to him, Mueller described them, regardless of where they should be located in any "natural" system. This meant that his descriptions were rather difficult to find without going through the index to each volume, and references to some species were scattered through several volumes. Nevertheless, the work placed on record botanical discoveries as they were made, and despite criticism that it was a "fugitive work" it did fulfil a need at the time, and Bentham was glad to receive the sheets of the work as they were issued from the press.

In N.S.W. William Woolls took the initiative in 1867 with A Contribution to the Flora of Australia, a work which must have done

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643 op. cit., p.cxii. Despite its errors, this historical survey is still of value and interest. As the only study of its kind, it was long used for brief historical introductions by other authors. Bentham referred to it in the Preface to Flora Australiensis and 30 years later, Moore drew heavily on it for his preface to the Handbook of the Flora of New South Wales, Syd., 1893.

much to popularise botanical enquiry. This point did not go unnoticed at the time :

> ...we must congratulate the author on his success, and trust that the present contribution will not be the only one he will contribute to redeem our unrivalled Flora from the oblivion it had apparently seemed doomed.[644]

Woolls's second collection of botanical papers published in 1879[645] was similarly valuable for promoting enquiry at the popular and local level. Aspiring students might graduate to the Fragmenta later, if they had sufficient Latin. As already noted, Charles Moore published his Census in 1884 and his Handbook in 1893.

Many basic works, published overseas, and as difficult in themselves as they were inaccessible to the Australian worker, nevertheless long remained essential for local taxonomists and for the more ambitious field botanists.[646] Although many of these works contained Australian references, they were necessarily produced for the European scientific community, and not for the particular guidance of amateur field workers in the Australian bush. While it is not relevant here to survey this botanical literature, some works produced in England by or for horticulturists, deserve mention, especially William Curtis's Botanical Magazine which since it was established in 1787 has figured many Australian plants in its thousands of coloured plates, and remarkably, the current volume is no exception.[647] Other botanical periodicals have also had considerable Australian significance, if they have not shared the Botanical Magazine's extreme longevity.[648] Although many of these works served as horticulturists' catalogues, they also

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644 Hort. Mag., V, 1868, p.37.

645 W. Woolls: Lectures on the Vegetable Kingdom, Syd., 1879..

646 Note for example the works of Brown, Aiton and Persoon requested by Charles Fraser in 1820. See Chapter II, p.59.

647 Vol. 178, Part I, 1970, depicted the N.S.W. Tongue or Duck Orchid, Cryptostylis subulata.

648 e.g. Henry Andrew's Botanist's Repository, Lond., 10 vols, 1797-1810; James Ridgway's Botanical Register, Lond., 33 vols., 1815-1847; Conrad Loddiges's Botanical Cabinet, Lond., 20 vols., 1817-1833, with 2000 coloured plates of plants including over 220 Aust. species; J.C. Loudon's Gardener's Magazine, Lond., 1826-1843; Hooker's Botanical Miscellany, Lond., 3 vols., 1830-1833.

recorded, described and depicted N.S.W. species with the discoveries of collectors throughout the world. One single-volume work devoted entirely to "a Selection of Handsome, or Curious Plants, Natives of New Holland, and the South Sea Islands" was Robert Sweet's exquisite Flora Australasica[649] which depicted fifty-six species including N.S.W. plants raised from seed sent by Charles Fraser, Allan Cunningham and other collectors.

It is doubtful whether the first known N.S.W. teacher of botany, Lieut. William Dawes[650] would have had more than a "botany primer" to assist him in his tuition of Mrs Elizabeth Macarthur, 1790-1791.[651] As shown, William Woolls (and probably Rev. James Walker also) and Ludwig Leichhardt introduced children to botany as early as the 1830s; the Rev. T.V. Alkin did likewise in the 1870s and 1880s. Reference has also been made to the botany lectures given by Charles Moore, William Carron and William Woolls long before the subject was taught at Sydney University. In 1871, Woolls declared,

> I would fain hope that as education becomes more widely disseminated, and natural history in all her departments, is allowed to assume her proper standing in our colleges and universities, we shall hear less and less of those objections which arise from a misapprehension of nomenclature in general, and an entire ignorance of the learned languages.[652]

He also appreciated the wider implications of an education in natural history and the classics.

From the 1860s, the spate of press articles describing bush walks, extolling forest beauties, prescribing plant remedies, recommending

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649 Lond., 1827-1828.

650 For Lieut. Wm. Dawes (1762-1836), marines officer, engineer and pioneer scientist of N.S.W., see Aust. Dict. Biog., 1, pp.297-298.

651 Wishing "to fill up a small vacancy in my time", Mrs Elizabeth Macarthur attempted astronomy under Dawes's tuition, but decided in favour of "some easy science". By March 1791, "under the auspices of Mr Dawes," she had "made some small progress in Botany" and had "arrived so far as to be able to class and order all common plants." Mrs Macarthur felt that "no country can exhibit a more copious field for botanical knowledge than this." E. Macarthur to Miss Kingdon, 7 Mar. 1791, in S. Macarthur Onslow: Some Early Records of the Macarthurs of Camden, Syd., 1914, pp.28-29.

652 SMH, 6 Jan. 1871.

particular fodder plants and warning against plants considered to be noxious, must have been encouraging to promoters of botanical enquiry, but basic training of the growing numbers of urban youth was clearly needed. Once again the lead came from Victoria. In 1862, T.S. Ralph published an Australian edition of his Elementary Botany for the Use of Beginners, and in 1873, Mueller began to issue an unusual work, comprising

> pressed and dried plants with printed notes in atlas-form under the title of 'Educational Collections', the fascicles of which are accessible in the mechanic institutes and free libraries of each district.

In 1877, two years after completing two folios of these "Educational Collections", Mueller published his Introduction to Botanic Teachings at the Schools of Victoria through references to leading native plants.[653] This was a brief, and in Mueller's view, a clearly inferior substitute for his proposed Victorian School-Flora which "on Ministerial request the author was induced to postpone." Nevertheless, Mueller produced a well-illustrated book with an enlightened approach according to his belief

> that the use of a grammar-like publication for initiating into a study of plants is alike wearisone to the teacher and children.[654]

In 1878, Mueller's adversary, William Robert Guilfoyle[655] produced his First Book--Australian Botany specially designed for the Use of Schools. This readily sold out, and in 1880 he issued The A.B.C. of Botany, "as an introduction" to the previous work. In 1884 Guilfoyle

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653 The above description of F. Mueller: Educational Collections of Australian Plants...Melb., 1873-1875 (2 folios with 100 species of pressed plants) is from Introduction to Botanic Teachings, p.5.

654 Mueller: Introduction to Botanic Teachings, p.3. Mueller's view is especially interesting since in 1873 he lost to W.R. Guilfoyle the directorship of the Melbourne Botanic Gardens, which it was claimed, he had tried to make into a living textbook of botany, without much regard for any aesthetic appeal.

655 For W.R. Guilfoyle (1840-1912) see Chapter V, p.510 and Aust. Encyc., 4, p.398.

PATRONS AND PRESIDENTS

SIR WILLIAM DENISON, K.C.B. (1804-1871), who as Governor first of Tasmania, then of N.S.W., encouraged the foundation of learned societies in both colonies between 1847 and 1860.
Photo: Mitchell Library, from a painting by W.M. Tweedie, 1863.

SIR WILLIAM MACLEAY, M.L.C., F.L.S. (1820-1891) patron of science, benefactor of Sydney University and first President of the Linnean Society of New South Wales, 1874-1877. His garden at Elizabeth Bay attracted many botanical visitors, some of whom, like J.D. Hooker, hoped to discuss with Macleay the "Quinary System" of classification he had once advocated.
Photo: Linnean Society of N.S.W.

WILLIAM JOHN STEPHENS, M.A., F.G.S. (1829-1890), Professor of Geology, Sydney University, 1880-1890, President of the Linnean Society of New South Wales, 1877-1879 and 1885-1890.
Photo: Linnean Society of N.S.W.

published a second edition of Australian Botany in answer to popular demand.[656] Neither Mueller nor Guilfoyle saw fit to mention the other in his prefatory remarks or acknowledgements, but Guilfoyle did concede in a footnote that Mueller was "undoubtedly one of our greatest authorities on Australian Botany."[657] They at least shared a common interest in botanical education, even if the mere mention of the Melbourne Botanic Gardens and its Director was sufficient to make the Government Botanist of Victoria dissolve into tears.

In N.S.W., Professor W.J. Stephens,[658] President of the Linnean Society, considered Mueller's Introduction to Botanic Teachings was "too technical" despite the author's good intentions. Stephens suggested how "a sufficient hand-book of Botany might perhaps be drawn up" for New South Wales, with particular reference to local areas. Such a

> Handbook would only direct the teacher in the particular opportunity which presents itself. Possibly half-a-dozen groups [i.e. presumably, families of plants] would be enough in any one school, differing in arrangement according to the climate and soil of the neighbourhood.

Stephens

> dwelt with considerable length upon the Botanical Primer, because the materials for its construction are ready at hand, requiring only selection and adaptation to fit them for their proper position in the edifice.

He advocated a work which described plants

> with the utmost possible preciseness and accuracy, but in the vernacular and not the botanical dialect, except

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656 This was an interesting book of nine lessons, chiefly on plant morphology and physiology, with chapters on Australian vegetation, plants of economic value, hints on collecting and preserving, and a botanical glossary. Both of Guilfoyle's elementary works were well reviewed, not only by Melbourne and other Victorian papers, but also by reviewers in Queensland, South Australia and England, and by the Town and Country Journal, Syd., 24 Aug., 1878, the Sydney Telegraph, 7 Feb. 1880 and by the Australasian Schoolmaster and Literary Review, 17 Mar. 1880.

657 Guilfoyle: Australian Botany (1884), p.60.

658 William John Stephens, M.A., F.G.S. (1829-1890), headmaster of Sydney Grammar School, 1855-1865 and of Eaglesfield School, 1865-1880, Professor of Geology and Palaeontology at Sydney University, 1880-1890, President of Linnean Soc. N.S.W., 1877-1879 and 1885-1890. Proc. Linn. Soc. NSW, 1890, pp.900-902.

> where the technical term is absolutely necessary. Thus we should not speak of racemes, corymbs, panicles, or cymes; still less...use such terms as monochlamydeous, monocotyledonous, dioeceous, hermaphrodite, hypogynous. But we should adopt, of necessity, the words calyx, corolla, stamen, anther, and the like. No lesson should ever be given without a specimen before the eyes of the class...[659]

No one hastened to accept the challenge.

The recognition of the need for such education grew with the demand for conservation measures to be taken.[660] There were claims that it was the duty of the state to teach "the Science and Technology of Plant Life" since upon such knowledge depended so many primary industries and the establishment of aesthetic surroundings.[661] In making his report on the elementary schools of England for 1876, Matthew Arnold, one of Her Majesty's inspectors, recommended:

> I should like to see what the Germans call Natur-Kunde -- knowledge of the facts and laws of nature -- added as a class subject to grammar, geography, and English history, and I would require the teaching of all four as class subjects in every elementary school to all scholars above the Third Standard, girls as well as boys...If we have Natur-kunde as a part of the school course, we do not require for such children animal physiology, physical geography, and botany, as extra or specific subjects.[662]

By the 1880s this view was being reflected in N.S.W. In 1884, inspectors examined pupils' proficiency in Nature Study for the first time,[663] and by 1885 "the popular Science Lectures" given in "the large hall of the Sydney School of Arts" were "becoming more appreciated

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659 Proc. Linn. Soc. N.S.W., , 1877-1878, pp.390, 395-396, address of 28 Jan. 1878.

660 See Chapter IV, p.431.

661 See Lewis A. Bernays: The Duty of States in the Teaching of the Science and Technology of Plant Life--an Inaugural Address delivered at the Town Hall, Brisbane, on the 23rd April 1875 on occasion of the First of a Series of Conversaziones to be held under the auspices of the Queensland Acclimatisation Society, Bris., 1875.

662 M. Arnold: Reports on Elementary Schools, 1852-1882, Lond., 1889, pp.191-192.

663 Report of the Minister of Public Instruction for the year 1885, Syd., 1886, p.22.

by the industrial classes for whom they are specially arranged."[664] By the time of Woolls's death in 1893, J.H. Maiden had taken up the cause at the individual level. He not only called for an institute of botanical research,[665] but also wrote articles for children in the hope that such introductory information might

> be used as a stepping-stone to the fascinating science of botany...which is available to even young children, and to the very poorest.[666]

However, the educational demands of commerce, industry, most professions and society generally, were most emphatically directed towards proficiency in the "three R's" and practical skills, and primary school "nature study" and indeed, its successor, "natural science", long remained "cinderella subjects" bereft of the motivation and status, however questionable, of being "examination subjects".

Learned Men and Learned Societies

It was natural that men of like scientific mind would ultimately meet to discuss common interests. Out of such meetings august learned societies developed in N.S.W. as they had in England and elsewhere. Very often the success of these societies depended not only upon the enthusiasm of members, but also upon the strength and effectiveness of patrons. Research is proceeding into the often obscure histories of these societies,[667] and only a brief review of their development and contribution to botanical knowledge is attempted here.

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664 op. cit., p.63. Lectures were given four evenings each week, and numbered about 190 per year. Total attendance was then over 40,000 for the year, or about 200 at each meeting. Botanical topics were covered chiefly in agriculture. See also Report... for...1886, Syd., 1887, p.43.

665 Proc. Roy. Soc. N SW, 1897, pp.60-61.

666 Ag. Gaz. N SW, 1898, p.349.

667 Michael E. Hoare, Research Associate of the Aust. Academy of Science, is currently working on the history of learned societies in Australia, 1820-1914, and he has already published informative papers on Societies in Victoria and Tasmania. See Records of Aust. Academy of Science. Vol. I, No. 2, Dec. 1967, and No. 3, Nov. 1968.

In June and July 1821, when N.S.W. had a population of nearly 30,000, seven men subscribed themselves as the original members of The Philosophical Society of Australasia.[668] They, and subsequent members, were associated chiefly with government administration, medicine, law, the armed services, and land interests. Some members have already been mentioned.[669]

Notwithstanding "the novel and endless variety of...animal and vegetable productions" which characterised N.S.W., it had to be admitted that "we are lamentably deficient" in knowledge, even after "upwards of thirty years" of investigation following settlement. The foundation members were concerned that "little has been done to awaken a spirit of research or excite a thirst for information amongst the Colonists." This ignorance could perhaps be attributed to

> the want of some nucleus, which might gather round it the many valuable facts, that are floating about, and which, if collected and embodied in a proper shape, might be offered with advantage to the public.[670]

It almost seemed as if after

> the progression of science for nearly three thousand years...Nature has been leading us through a mazy dance of intellectual speculation, only to laugh at us at last in this fifth continent.[671]

The members decided to correct this state of affairs by meeting weekly in "each other's Houses in Sydney, alphabetically", where sustained only by tea or coffee, they would hear and discuss prepared papers. Failure to produce a monthly paper would incur a fine of ten pounds, while the penalty for late or non-attendance without an

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668 The sesquicentenary of this Society's foundation is being marked at the time of writing by a lecture to the Royal Society of N.S.W. by Dr David F. Branagan of Sydney University. No copy of this lecture is yet to hand.

669 The original members were Dr James Bowman, Dr Henry Grattan Douglass, Barron Field, John Oxley, Major Frederick Goulburn, Capt. Francis Irvine and Edward Wollstonecraft. Later members were Dr Patrick Hill, William Howe, Alexander Berry, Phillip Parker King, Dr Donald Macleod, Christian C.L. Rumker (Gov. Brisbane's astronomer) and Robert Townson. The Rev. Samuel Marsden was nominated by Field and Goulburn, but he later declined membership.

670 Original minutes, quoted in Proc. Roy. Soc. NSW, 1921, pp.lxvii-lxviii.

671 op. cit., p.lxvii. This has the mark of Field's lyrical pen.

acceptable reason, was five shillings. Members were to catalogue their libraries so that mutual borrowing of books could be arranged, and plans were made for establishing a museum, and for contacting twenty other learned societies throughout the world. A week after his arrival in the Colony on 7 November 1821, Banks's "more Scientific Governor", Sir Thomas Brisbane, was invited to be President. He immediately accepted, but as Barron Field sadly recorded, the

> infant society soon expired in the baneful atmosphere of distracted politics, which unhappily clouded the short administration of its President.

Field hoped that the Society had merely gone into a state of "suspended animation" from which it would "be resuscitated by the new colonial government".[672] Three members, Field, Goulburn and Wollstonecraft, met formally at Field's house on 14 August 1822, but thereafter activities of the Philosophical Society of Australasia are obscure.[673] The good intentions of this group of the Colony's gentlemen may still be appreciated in the declared aims and regulations, in the minutes of meetings,[674] in some of the papers preserved in Field's Geographical Memoirs, and in the Banks-Cook memorial plaque which the members erected at Kurnell in March 1822.[675]

Some members of the Philosophical Society also joined the Agricultural Society of N.S.W. which was founded on 5 July 1822.[676] On 22 February 1826, this body was renamed the Agricultural and Horticultural Society of N.S.W., a step which left the executive unchanged.

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672 Field: Geog. Memoirs, pp.v-vi.

673 The "lineal descent" from the Philosophical Society sometimes claimed for the Royal Society of N.S.W. seems to be based on flimsy evidence.

674 The minutes of 1821-1822 were reprinted in Proc. Roy. Soc. NSW, 1921, as an Appendix, pp.lxvii-cii.

675 See Syd. Gaz., 22 Mar. 1822. The plaque bears the date 1821 which was when the text was prepared after considerable discussion.

676 Brisbane was patron; Goulburn (and later Alex. McLeay) vice-patron; Sir John Jamison, then Barron Field, was president; Rev. Samuel Marsden, William Cox, Robert Townson and Hannibal Macarthur were vice-presidents. Other members included Alex. Berry, Edward Wollstonecraft, John Oxley, P.P. King, Rev. Thos. Hassall, Dr H.G. Douglass, Charles Throsby and many other well-known colonists, many of whom were keenly interested in natural history.

As mentioned earlier, Brisbane granted land to this Society for experimental work,[677] but strained by bad seasons, poor markets, public attacks in the press[678] and overmuch preoccupation with social activities at the expense of scientific pursuits, this society also succumbed in or about 1836.[679] Other societies, more or less "learned", and with a greater or lesser concern for botanical enquiry, were duly founded. Their development demonstrates a rather uncertain genealogy and some outright extinctions.[680]

Sir Thomas Brisbane was not the last Governor to support scientific bodies. When the Australasian Botanic and Horticultural Society was formed in mid-1848, Sir Charles FitzRoy accepted the presidency. This society was

> established for the purpose of promoting Botanic and Horticultural Science, and the encouragement of the Manufactures and Productions of the Colony.[681]

Despite a very promising membership,[682] it was felt that after its first year of existence, "in relation to the advancement of Botanical Science, the Society has but little ground for congratulation..."[683]

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677 See Chapter V, p.442.

678 See for example, the letter to Syd. Gaz., 30 July 1829.

679 See H.M. Somer: "Short History of the Royal Agricultural Society of New South Wales", JRAHS, 1923, pp.309-332.

680 e.g. the Australian Society to promote the growth and consumption of Colonial Produce and Manufactures, 1830-1836; the Australian Floral and Horticultural Society (also known as the Sydney Horticultural Society), 1836-1848; the Australasian Botanic and Horticultural Society (founded June 1848) which amalgamated in Dec. 1856 with the Horticultural Improvement Society of N.S.W. (founded Nov. 1854) to form the Australian Horticultural and Agricultural Society; the Australian Philosophical Society, 1850-1855 (see SMH, 24 Jan. 1850) which developed into the Philosophical Society of N.S.W., 1855-1866. See J.H. Maiden in Proc. Roy. Soc. N SW., 1918, pp.215-361. Some societies in England also had comparatively short histories--e.g. the Society for Promoting Natural History Records existed from 1782 until 30 May 1822 when it was "resolved to hand all its assets to the Linnean Society of London." Foreword to Papers of Linnean Soc. of London, ML. FM4/2699.

681 Australasian Botanic and Horticultural Society : First Annual Report...Syd., 1849, p.5.

682 including Alex. McLeay, George Bennett, J.C. Bidwill, Rev. W.B. Clarke, Rev. G.E. Turner, Wm. Macarthur, Charles Moore, T.S. Mort, Sir Thomas Mitchell, James Norton and T.W. Shepherd, all mentioned elsewhere in this study.

683 First Annual Report, pp.5-6.

It was later considered that this Society would have succeeded

> but for a short-sighted policy in its early career which excluded practical men from any participation in its government, and in a short time it dwindled down to nothing but an exhibition society; but nothing was done for the advancement of either Horticulture or Agriculture.[684]

Some of these "practical men and others interested in the welfare of the colony" resolved this situation in November 1854, by forming the Horticultural Improvement Society of N.S.W. On 15 January 1855, rules were adopted and a council of 21 elected, with the new Governor, Sir William Denison as president, and the Hon. Sir Charles Nicholson, Speaker of the Legislative Council, and Sir Thomas Mitchell, Surveyor-General, as vice-presidents.[685] During its short independent existence, this Society held regular monthly meetings at which nearly fifty papers were read.[686] In the spring of 1856 "communications were received from the Australasian Botanical and Horticultural Society, with a view to amalgamating the two Societies", and on 8 December 1856, under the chairmanship of Denison, a joint meeting was held. The result was the formation of the Australian Horticultural and Agricultural Society and on 20 January 1857, Denison addressed the inaugural meeting of this new body.[687]

Sir William Denison was well-known as a patron of scientific societies in Van Diemen's Land when he arrived in Sydney in January 1855. He believed that

> the great evil of these colonies is the absence of scientific men. Many of the settlers have had some education, but there are but few or none...who can fairly be called men of science, and the consequence

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684 Syd. Mag. Sci. and Art, I, 1858, p.2.

685 ibid. Mitchell died 5 Oct. 1855.

686 Authors included Wm. Carron, T.W. Shepherd, P.L.C. Shepherd and Thomas Mitchell.

687 The effects of the Australasian Botanical and Horticultural Society included two cases of herbarium specimens, Hooker's Botanical Miscellany (3 vols.); Hooker's Journal of Botany (4 vols.); Loudon's Magazine of Gardening (9 vols.); Lindley's Botany (2 vols.); Paxton's Botanical Dictionary (1 vol.). The effects of the Horticultural Improvement Society included "Specimens of Plants" and 13 volumes. Syd. Mag. Sci. and Art, I, 1858, appendix pp.12 and 13. The Council of this Society was also very promising. It included various men mentioned elsewhere in this study: Wm. Carron,

> is that the half-educated, with but a smattering of knowledge, are able to lead the more ignorant by the nose.[688]

Clearly the new Governor was no advocate of "popular" science, but he energetically supported the societies which he agreed to serve as president, and this point was acknowledged.

Even the Australian Horticultural and Agricultural Society was soon beset by difficulties :

> It is a frequent subject of remark in this colony that societies for the promotion either of science or art fail, after an existence of a very few months or years, to sustain the interest with which they commenced. A rather striking exemplification of the truth of this remark is...furnished by the state of the Australian Agricultural and Horticultural Society...

Meetings had fallen to a bare dozen or so, "the last Exhibition...was a lamentable failure", and "stimulants...to awaken greater activity" were sorely needed. A likely cause was the "impression...that the practical men--that is the gardeners--do not...have a sufficiently active share in the management..." Nevertheless,

> we cannot omit to mention (not out of any spirit of sycophancy, but as an honest tribute of admiration) the great and steady interest...manifested in the welfare of the Society by Sir William Denison, the President. At the Monthly Meetings he is always in his place, and though only half a dozen members may be present, he shews no diminution of attention.[689]

One great problem was that too many members joined merely to gain admission to the Society's exhibitions, at which "the working classes are scarcely ever seen. This is not the case in England..."[690]

Denison had other roles to play. On 30 July 1855, when the existing, but languishing Australian Philosophical Society reconstituted itself the Philosophical Society of N.S.W., Denison was invited to be

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687 cont'd. John Baptist, Michael Guilfoyle, Capt.E.W.Ward, T.W. and P.L.C. Shepherd. See Syd. Mag. Sci. and Art, I, 1858, appendix. This new Society later gave rise to the Horticultural Society of N.S.W. and the Agricultural Society of N.S.W.

688 Denison to Admiral Beaufort, 5 Feb. 1849, referring more specifically to Van Diemen's Land, where "I have set on foot a scientific society..." Denison: Vice-Regal Life, I, p.107.

689 Syd. Mag. Sci. and Art, II, 1859, pp.189-190.

690 op. cit., p.190.

president of that body also. He accepted, and chaired the first formal meeting on 9 May 1856. The Governor was pleased.

> I have got my Philosophical Society to work at last; everything slumbered during the heat of political strife, but when the elections were over, I made a move : I determined that I would not be President of an effete body, so I called the members together, read a paper on railroads, got them to agree to meet regularly once a month for eight months of the year, and shall now, by the help of occasional papers from myself, and of suggestions to others, manage, I dare say, to generate, first, an appetite for writing, and then a taste for observation, in order to have something to write about.[691]

Denison could not be accused of underestimating his own contribution towards the encouragement of colonial scientific enterprise.

In 1857, the Philosophical Society of N.S.W. and the Australian Horticultural and Agricultural Society co-operated to launch the Sydney Magazine of Science and Art,[692] a short-lived but valuable journal which published "Transactions which would otherwise have been buried in the columns of a daily newspaper."[693] It also served as a forum where opinions could be declared--and attacked, sometimes in terms hardly likely to encourage further utterances by even the most dedicated enthusiast.[694]

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691 Denison: op. cit., I, p.354.

692 Syd., Vols. I and II, 1857-1859. See the long and interesting lists of members of the Australian Horticultural and Agricultural Society appended to both volumes. Some parts are dated 1857, but the title-page for Volume I is dated 1858.

693 Syd. Mag. Sci. and Art, I, (1857) 1858, p.iii. These included T.W. Shepherd's interesting papers, an extract from one of which appears at the beginning of this study as an appropriate statement of some of the aims and problems here investigated.

694 e.g. Lewis Markham of Armidale submitted a paper dealing with Genesis and "The Origin of Vegetation" in which he stated "Decomposition created vegetable substance, and from vegetable substance sprung animated nature..." He was blasted unmercifully by the Rev. W. Scott, Colonial Astronomer, who regretted that Mr Markham lived in the country, "shut out from all intercourse with men of science...and having access to a very limited supply of scientific works, he has not a fair chance of correcting his errors, or of discovering when he is pursuing a theory that has been already tested and condemned. Popular scientific works, the scum of science, which by their specious pretences and plausible perversions of facts have obtained a certain amount of favor with the unlearned, and are much more likely to find their way here, after their popularity has been exploded..." Aust. Mag. Sci. and Art, II, 1859, pp.16-17, and pp.230-231. Such an arrogant attitude may well help to explain the rise and fall of some of the early scientific societies.

On 12 December 1866, having received authority from London, the Philosophical Society of N.S.W. became the Royal Society of N.S.W. The Governor was to be president, ex officio, and the Rev. W.B. Clarke, who had taken such a lead in the affairs of the old society, was elected vice-president. Clarke made the history of the society the subject of his inaugural address.[695] The reconstituted Society's object was

> to receive at its stated meetings, original papers on subjects of Science, Art, Literature, and Philosophy, and especially on such subjects as tend to develope (sic) the resources of Australia, and to illustrate its Natural History and Productions.[696]

Botanical enquiry hardly featured during the Royal Society's earliest years,[697] a shortcoming which was obvious to those with such interests. By mid-October 1874, Dr H.G. Alleyne[698] and Commander Thomas Stackhouse, R.N.[699] were "trying to get up a Society of Natural History."[700] On 29 October, a meeting was convened, and after Stackhouse

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695 Proc. Roy. Soc. NSW, 1867, pp.1 et seq. See also the Society's centenary volume, A Century of Scientific Progress, Syd., 1966, pp.9-32; Sir Alfred Roberts in Proc. Roy. Soc. NSW, , 1889, pp.1 et seq., and J.H. Maiden in Proc. Roy. Soc. NSW, 1918, pp.215-361. See also W.R. Browne: "The Royal Society of New South Wales", in Proc. Royal Aust. Chemical Institute, 1961, pp.100-109.

696 See the introductory statement in early volumes of Proceedings.

697 Papers and discussions concerned a diversity of subjects--geology (especially), earthquakes, supplies of coal, iron and fresh water, Polynesian migrations, astronomy, geometry and trigonometry, the electric telegraph, hospital accommodation and even the incidence of pauperism in N.S.W. It is interesting to note that the centenary volume abovementioned, was compiled very largely from the writings of geologists, agriculturists, chemists and men interested in transport and communication, rather than by botanists. There has developed a tacit agreement between the Royal and Linnean Societies whereby the latter Society would concern itself chiefly with the biological aspects of natural science.

698 H.G. Alleyne, M.D., President of the Medical Board. He served on the Society's Council from 1874 to 1881, and died the following year.

699 Thomas Stackhouse served as secretary, 1874-1879. He retired to Yamba on the Lower Clarence where he enjoyed botanical pursuits for a few years before his death at Maclean, 24 Sept. 1886.

700 Wm. Macleay's diary, 13 Oct. 1874 in Proc. Linn. Soc. NSW, 1904, p.8.

proposed the title "Banksian Society", it was resolved on the motion of Professor W.J. Stephens that the new body should be the Linnean Society of N.S.W.[701] and it has been so known ever since.[702] William Macleay,[703] who was elected president, later maintained that "the Society was formed chiefly through the exertions of Captain Stackhouse, R.N.",[704] and Macleay's diary entries support this contention.[705] Without the patronage and active support of the Macleays, the Society would probably have perished,[706] despite a promising foundation executive, which included Sir William Macarthur, Capt. A.A.W. Onslow and Edward Pearson Ramsay, all previously mentioned for their interest in natural history. The Society's first object was to cultivate and study "the Science of Natural History in all its branches." In his first annual address, 31 January 1876, William Macleay, a zoologist, regretted that the papers contributed were preponderantly zoological, rather than botanical or geological. Nevertheless, he considered that the Linnean Society was "the only exclusively natural history Society in New South Wales" and indeed in Australia. He did not think that "the Royal Society of Sydney" had produced papers of a uniformly "scientific character" and the publication even of these had been lamentably spasmodic. This was difficult to understand, since it was "a well-established society, possessing ample funds" and having "among its office-bearers and members the most scientific men in the community." Yet, the

> irregularity and uncertainty in publication...makes it as a society useless as a record of zoological, botanical, or geological discovery.[707]

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701 A.B. Walkom: The Linnean Society of New South Wales--Historical Notes of its First Fifty Years, Syd., 1925, p.10.

702 For the history of the Society, see Walkom's work abovementioned, and Proc. Linn. Soc. NSW, 1908, pp.5-10, and 1925, pp.xiii-xviii.

703 William John Macleay, M.L.C., F.L.S. (1820-1891), benefactor of the Linnean Society and of Sydney University, was a nephew of Alexander McLeay and a cousin of William Sharp Macleay. He founded and subsidised the Entomological Society of N.S.W., 1862-1873.

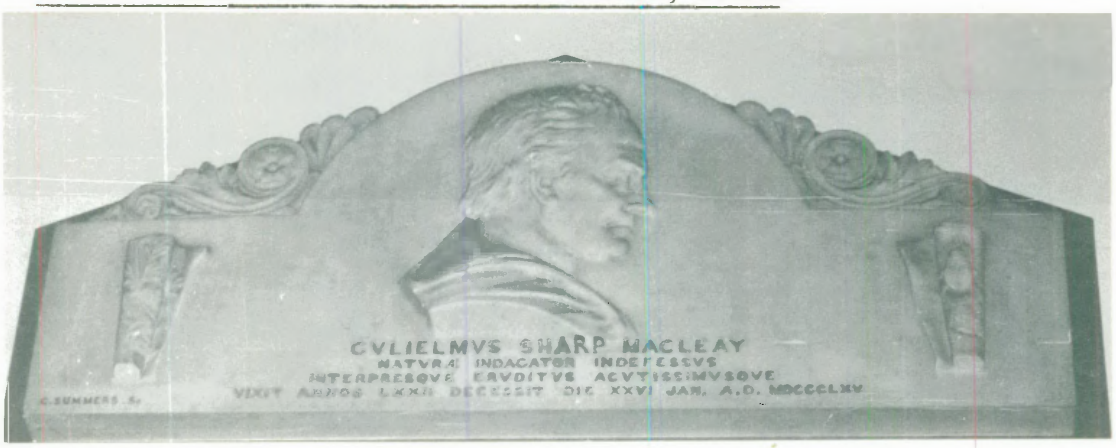
704 SMH, 2 Nov. 1885.

705 Proc. Linn. Soc. NSW, 1904, pp.809.

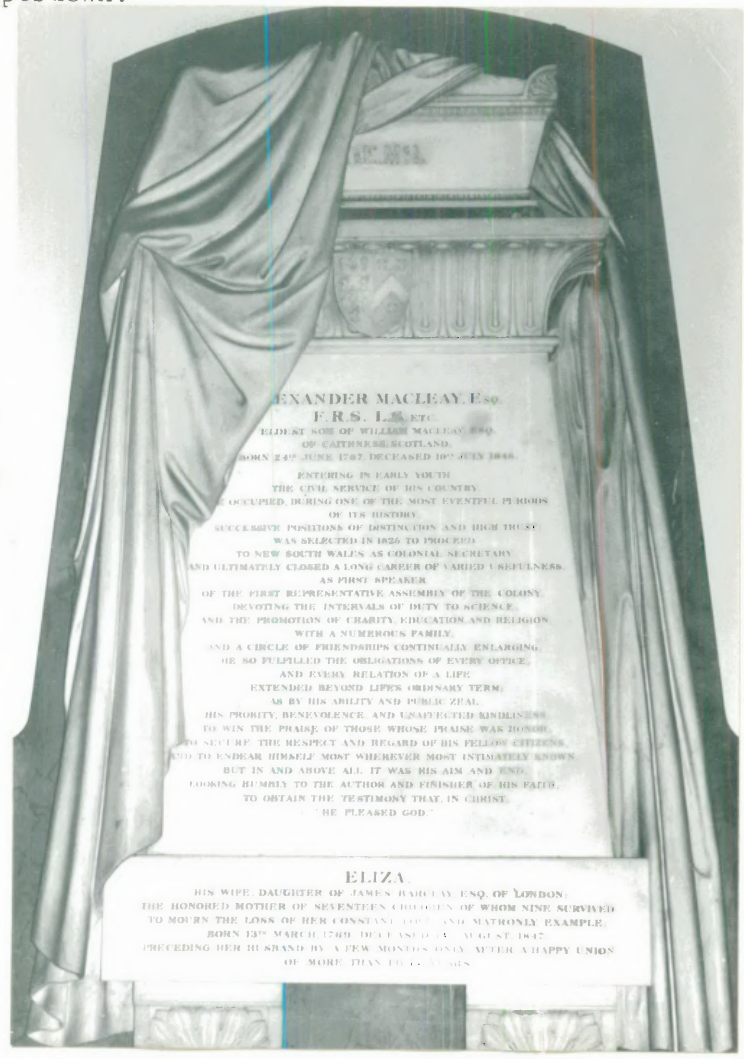
706 See the two long papers, "The Society's Heritage from the Macleays", Proc. Linn. Soc. NSW., 1920, pp.567-635 and 1929, pp.185-272.

707 Proc. Linn. Soc. NSW, 1875-1876, pp.84-85.

MACLEAY MEMORIALS IN ST. JAMES'S CHURCH, SYDNEY



MEMORIAL TO WILLIAM SHARP MACLEAY, M.A., F.L.S., F.R.S. (1792-1865), son of Alexander McLeay. Inheriting Elizabeth Bay House in 1848, W.S. Macleay developed the already famous garden until it became a scientific showplace. He served on the committee of the Australian Museum before becoming a Trustee, 1842-1862. The Latin inscription describes him as "a tireless investigator and a learned and most astute interpreter of Nature." He died, unmarried, at Elizabeth Bay on 26 January 1865 and was buried in the family vault at St. Stephen's Cemetery, Camperdown.



MEMORIAL TO ALEXANDER McLEAY (his spelling) F.R.S., F.L.S. (1767-1848). The inscription outlines his career and pays tribute to his personal qualities, including his interest in science. For portrait, see Chapter V, p.466.

Photos.: L.G., 19 Aug. 1969, with permission of the Church authorities.

The Rev. W.B. Clarke himself took up the challenge so clearly issued. On 1 November 1876, Clarke, then in his 79th year, and still vice-president, delivered to the Royal Society his celebrated paper on "Effects of Forest Vegetation on Climate"[708] which contained one of the earliest and strongest pleas for conservation as we now understand it.

In his second annual address, Macleay urged that greater emphasis be placed on botanical enquiry, for it was

> rather anomalous that a Society named after the most illustrious botanist the world has ever produced, should not have apparently a single working botanist among its members.[709]

F.M. Bailey provided the Society's first botanical paper, from Queensland, the following year.[710]

At the outset, Macleay had drawn attention to the basic needs of natural science as he saw them:

> I am convinced that we cannot do better in the present state of Natural History in Australia than confine our attention to observing cataloguing, and describing. The synthetical work may well, I think, be left for the present to the legion of writers who aspire to what is foolishly called 'high science'.[711]

There was, however, growing disagreement with such a view. Some, including the Rev. J.E. Tenison-Woods, who shortly became president himself, felt that the basic field work had been sufficiently performed to enable more interpretative work to be undertaken. The results of botanical field work had been recorded in Flora Australiensis, and the time had come to investigate the difficult problems of plant distribution and plant geography in more detail.[712]

Although N.S.W. botanists were slow to rally,[713] they certainly

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708 Proc. Roy. Soc. NSW, 1876, pp.179-214. The paper was keenly discussed, much of the opposition to Clarke's conclusions coming from Charles Moore, who pursued some of his arguments further in his own vice-presidential address of 1880. Proc. Roy. Soc. NSW, 1880, pp. 15 et seq.

709 Proc. Linn. Soc. NSW, , 1876, p.415, where the date of the address is wrongly given as 1876 instead of 1877.

710 F.M. Bailey: "A General Account of the Flora of Tropical Queensland", Proc. Linn. Soc. NSW, 1877, pp.276-286.

711 Proc. Linn. Soc. NSW, 1875-1876, p.93.

712 Proc. Linn. Soc. NSW, 1879-1880, pp.117-118.

713 Almost all of the earliest botanical contributions by F.M. Bailey, Rev. J.E. Tenison-Woods and Rev. B. Scortechini, dealt with Queensland.

came to the fore from 1880. In that year Mueller provided "Notes on Plants, Collected by Mr Edw. Reader, in the Vicinity of Mount Dromedary"[714] and then followed a flood of botanical contributions from William Woolls and Edwin Haviland[715] whose output was first supported, and then continued by Alexander G. Hamilton,[716] J.H. Maiden,[717] and from 1900, by R.H. Cambage.[718] By 1884, the Linnean Society's first eight volumes of Proceedings contained some fifty botanical papers and a strong emphasis upon botany has been maintained, while the other branches of natural history have not been neglected.

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714 Proc. Linn. Soc. NSW, 1880-1881, pp.286-287.

715 Edwin Haviland, F.L.S. (1823-1908) was a Sydney businessman, and "one of the best New South Wales botanists of his time." This accomplished amateur contributed 19 papers to the Linnean Society. He was chiefly concerned with plants growing in the vicinity of Sydney, and was one of the first to study flowering seasons. He died at Petersham 22 May 1908. His son, Archdeacon Haviland of Cobar, possessed "in some degree his father's botanical tastes." SMH, 25 May 1908. For Haviland's long correspondence with Henry Deane, see Deane Papers, ANL. MS 610, Series 4.

716 Alexander Greenlow Hamilton (1852-1941) came to N.S.W. in the mid-1860s and taught in country schools before becoming lecturer in botany and nature study at Sydney Teachers' College, 1905-1919. He died at Chatswood, 21 Oct. 1941 after an association with the Linnean Society of some 56 years.

717 See Proc. Linn. Soc. NSW.--Index to Volumes I-L (1875-1925), Syd., 1929.

718 Richard Hind Cambage (1859-1920) belonged to the group of surveyor-naturalists. He was born At Milton, N.S.W. 7 Nov. 1859, and in 1882 joined the N.S.W. Public Service as a draftsman in the Dept. of Lands. In 1885 he became a mining surveyor, and in 1916 Under Secretary for Mines. He died at Burwood, Sydney, 20 Nov. 1928. He published a long series of papers on the botany of his travels in the interior of N.S.W. Like many others "he received his first botanical lessons" from Woolls "for whom he made plant collections" between 1880 and 1890. "From constant observation, aided by an intelligent use of a surveyor's tomahawk, his knowledge soon eclipsed that of Jem, the Splitter, and of whom Cambage himself continually said:

'His knowledge was this--he could tell in the dark
What timbers would split by the feel of the bark.'"

See Proc. Linn. Soc. NSW, 1934, pp.435-447, with list of publications, and Proc. Linn. Soc. NSW, 1929, pp.v-vi. See also Aust. Encyc., 2, pp.241-242 and Serle: Aust. Biog., I, pp.141-142.

Thus by 1880, there were two scientific societies well established in N.S.W.[719] providing the means by which the more competent amateurs could join the professionals in investigation and discussion. More important, the results of botanical enquiry could now be placed on permanent record in appropriate journals. For writers of more "popular" articles, the daily press and papers such as the Town and Country Journal, gladly catered, and thus more botanical observations, opinions and proven knowledge were disseminated. Some writers, like Woolls, wrote voluminously for both kinds of publication and addressed their readers accordingly.

The Grand Synthesis

In June 1859, Sir William Denison proposed that

> the Imperial Government should take upon itself the task for compiling 'A Natural History of the British Colonies.'[720]

To assist the project,

> each colony should take upon itself the cost of employing competent persons to investigate its own natural history in all the various branches, while the mother country should take upon itself the task of collating and comparing the different works sent in....[721]

The idea was "warmly approved" by the Royal and Geographical Societies in England, but Denison was mortified by the Government's counter-proposal that any such work

> should be published in small octavo, without any illustrations...I felt certain that a niggardly scheme like this would be rejected at once by the colonies...[722]

This proposal of a well-printed, well-illustrated work did credit to

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719 The Linnean Society suffered a tremendous setback when its effects were lost in the Garden Palace fire of Sept. 1882. (See Chapter V, p.518.) It was then that the full significance of the Macleay patronage was appreciated.

720 Denison to Sir E.B. Lytton, 20 June 1859. Denison: Vice-Regal Life, I, p.455.

721 Denison; loc. cit.

722 op. cit., p.456.

THE GRAND, YET UNEASY PARTNERSHIP

GEORGE BENTHAM (1800-1884) as he appeared when he began work on the monumental Flora Australiensis, to which taxonomists are still bound to refer, for it remains the only work dealing with the flora of the entire continent. A nephew of the celebrated Jeremy Bentham, he collected his first herbarium specimens when he was 18 and moved among a notable circle of people, including J.S. Mill, Humphrey Davy, Robert Brown, Aylmer B. Lambert, Conrad Loddiges, John Lindley, William and Joseph Hooker, Alphonse de Candolle and his father A.P. de Candolle, Once entrusted with the compilation of Flora Australiensis, he corresponded with Mueller for some twenty years, not always in the most friendly tone.
Photo: taken for Royal and Linnean Societies, 1864. Reproduced from Proc. Roy. Soc. NSW, , 1908.

Baron Ferd von Mueller
K.C.M.G. M.D. F.R.S.
To Walt. Campbell Esq. as a token of
remembrance from Baron von Mueller 1892

BARON SIR FERDINAND VON MUELLER (1825-1896) arrived in Adelaide in 1847, and became Government Botanist of Victoria in 1853. Essentially a modest, dedicated man who cared more for his work than for his personal appearance, Mueller derived great pleasure on occasions from wearing the orders and honours showered upon him by rulers and learned societies throughout the world. Such occasions afforded some satisfaction in the face of two bitter disappointments from which he never fully recovered : his dismissal from the Directorship of the Melbourne Botanic Gardens, and the decision that George Bentham should be responsible for the compilation of Flora Australiensis. His contribution to Australian botany is virtually incalculable.

Photo: from a lithograph in possession of the author. It was originally presented by Mueller in Sept. 1892 to Walter Scott Campbell, one-time N.S.W. Director of Agriculture, who is mentioned elsewhere.

Denison, who hoped that the work would "do credit to itself, and justify the outlay on the part of the colonies.[723]

Botanically, Denison's suggestion was not new, but it gave weight to recommendations already made and pursued by the Director of Kew Gardens, Sir William Jackson Hooker, who urged on economic, medical and scientific grounds that the botanical resources of the Empire should be surveyed. The Exhibitions of 1851 and 1855 gave further support, for "the fact was well known that the displays of timbers...were...rendered almost useless"[724] because the same name was "applied to several trees in one Colony, and to others in other colonies."[725] The cataloguing of the vernacular names of botanical resources of the colonies was demonstrably futile; nothing less than a comprehensive systematic survey was required. In 1857 the Government agreed to "a scheme for the preparation of a series of floras of British colonies and possessions."[726]

The Hookers, father and son, strongly urged Mueller to go to England where he could combine his wide field experience with the immense Australian resources of the Kew herbarium to produce a work on the Australia flora. Although workers throughout the continent were still exploring, collecting and observing,[727] the results of their labours could, it was argued, be seen in their proper perspective only by comparing them with the notes and specimens in the classic collections of Banks, Brown, Cunningham and others. To work in isolation from the great libraries and historic collections of England

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723 ibid.

724 Allan : Hookers, p.200.

725 W.J. Hooker, quoted in Allan: loc. cit.

726 Encyc. Brit., 3 (1969 ed.), p.485. Many comprehensive floras were published in England during the nineteenth century, especially after 1840--e.g. W.J. Hooker: Flora Boreali Americana, Lond., 1840; G. Bentham & J.D. Hooker: Flora Nigritiana, or...Plants of the River Niger, the Island of Fernando Po, and the adjacent parts of Western Tropical Africa...Lond., 1849; J.D. Hooker: Flora Novae Zelandiae, Lond., 1853-1855; J.D. Hooker: Flora Tasmanica, Lond., 1855-1860; J.D. Hooker: Flora of British India, Lond., 1855-1897; G. Bentham: Handbook of the British Flora, Lond., 1858; G. Bentham: Flora Hongkongensis, Lond., 1861; Daniel Oliver: Flora of Tropical Africa, Lond., 1868-1877; J.G. Baker; Flora of Mauritius and the Seychelles, Lond., 1877.

727 See for example the latter part of Chapter II.

and the Continent, was, to the Hookers, little short of disastrous. Species simply could not be satisfactorily determined without reference to previous collections, the problem of synonymy was already enormous, and "the slap-dash type of publication has brought the science into terrible confusion."[728] On the other hand, the collections which Mueller had transmitted to Kew were "truly wonderful" and the knowledge "displayed in naming and arranging them is very great."[729]

The Hookers had first enjoined Mueller to visit England when he was collecting with A.C. Gregory's expedition in 1855. Their entreaties were repeated several times during 1856 and 1857, and in December 1858, J.D. Hooker made a final plea:

> we do look with the greatest anxiety to your visiting England, and throwing your magnificent materials into a connected whole.[730]

Mueller had cherished the idea of writing a Flora of Australia, and there seems no reason to doubt that the Hookers were genuine in their desire that he should do so, although the possibility that they wished to have some oversight, however unobtrusive, over the Empire-wide scheme they had initiated, cannot be dismissed.[731] The problem was to combine knowledge of the living plants in the field with that of the herbarium specimens on which the original descriptions in the foundation works of Australian botanical taxonomy were based. Mueller remained unconvinced that the work could not be undertaken and completed within Australia. He did not go to England. He was interminably busy

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728 J.D. Hooker to Mueller, 22 June 1858, quoted in Charles Daley: "The History of the Flora Australiensis", Vic. Nat., July 1927, p.74. Original in Melbourne Herbarium. There was no suggestion that Hooker considered Mueller's work was, or could be, "slap-dash"--he was merely drawing attention to the problems caused by men working in complete isolation, and to some works which were "slap-dash".

729 ibid.

730 J.D. Hooker to Mueller, 20 Dec. 1858, in Vic. Nat., Aug. 1927, p.91.

731 Note Sir Henry Barkly (Gov. of Vic.) to Sir John Young (Gov. of N.S.W.), 3 Aug. 1861: "My friend Sir William Hooker and his Son have had the Superintendence of all Colonial Floras yet published, and as Government Botanists of Great Britain do not admire Colonial Independence." Macarthur Papers: Misc. Letters: W.S. Macleay, 1815-1863. ML.A4304, p.429.

administering the Melbourne Gardens, exploring and collecting, cataloguing and writing, and maintaining contact with a host of correspondents. Perhaps there were clear official obstacles to his obtaining leave, perhaps he bowed to his haunting fear of contracting tuberculosis which had carried off his parents and a sister, perhaps he preferred to work alone with his own materials in any case, and without the interruption of a long voyage.

The Hookers, no doubt sensing the possibility of a lag in Government interest, considered it imperative that work on the Australian flora should not be delayed any longer. Accordingly, the matter was discussed with George Bentham,[732] with whom Joseph Hooker had already begun the monumental Genera Plantarum in 1857.[733] By March 1859, Bentham was considering the project,[734] and just as well, for the Government attitude did change. If the Australian Colonies wanted self-government under their new constitutions, then this should include financial responsibilities. Early in June 1860, Bentham was advised that the Treasury had sanctioned a grant for his Flora Hongkongensis, but that the question of other floras had been deferred.[735]

The onus of financing the Flora of Australia was thus thrust upon a group of unfederated Colonies, quite unaccustomed to thinking of co-operation in any national project. Five of the six colonies were juggling with the problems of self-government under their new constitutions while governments rose and fell with almost alarming frequency. There were, therefore, two delicate issues to be resolved--Mueller had to be inveigled into co-operating with Bentham to the point

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732 For George Bentham, F.L.S., F.R.S., C.M.G. (1800-1884) see N.T. Burbidge in Aust. Dict. Biog., 3, pp.146-147, where it is claimed that Flora Australiensis "represents a prodigious intellectual effort never equalled." See also B. Daydon Jackson: George Bentham, Lond., 1906.

733 Allan: Hookers, p.213, quotes Bentham's diary, 24 Feb. 1857: "Began Genera Plantarum with Hooker." Described as "the most outstanding work of the century" (Allan: op. cit., p.214) it was published in three volumes between 1862 and 1883.

734 Jackson: Bentham, p.180.

735 op. cit., p.186.

of supplying the necessary field data and botanical specimens, and the colonial parliaments had to be persuaded to co-operate with one another for the sake of a project which must have seemed to be making an unnecessary call upon limited resources. In the meantime, Bentham was left wondering. He decided to keep his "engagements open" until the end of 1861, when failing the receipt of a commission to proceed with the Australian Flora, he would "enter into further engagements for the Brazilian flora."[736]

Mueller corresponded regularly and forcefully with Bentham and the Hookers during this crucial period.[737] All three endeavoured to soothe him. Bentham praised his "indefatigable zeal and industry," his "high scientific ability" and his "high botanical reputation." The Hookers hastened to assure the injured Mueller that no one in Britain wished to disparage his labours, "either as traveller or botanist". Their "only desire" was to see that the work was "well done by whoever by position and attainments, is the best qualified to do it well."[738] In exercising the "tact" required "to seize prominent characters, and to make diagnoses, both brief, diagnostic and accurate", Bentham had "had 40 years' experience, and you none," Joseph Hooker stated bluntly. The task should not be underestimated. The arrangement of "a plan that is to include 8000 species" was a tremendous undertaking, far beyond the time resources of the Government Botanist of Victoria with his "multifarious duties". Even Bentham, "who has nothing (or little) else to do" and who "works all day at Kew", had calculated "that the Australian Flora would take him seven or eight years at least" for "he rarely describes more than five species a day,including all arrangements, comparisons and genera, etc." Such painstaking care was essential "so that his work should last, and the book be a standard for all time."[739] Such prophetic words from afar were somewhat wasted on

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736 Bentham to Mueller, 16 May 1861 in Vic. Nat., Aug. 1927, p.92.

737 The details of this, and other correspondence, are in the valuable paper by Charles Daley (1859-1947), "The History of Flora Australiensis" in Vic. Nat., July-Dec. 1927 (pp.63-74; 91-100; 127-138; 153-165; 183-187; 213-221) and Jan.-Feb. 1928 (pp.248-256; 271-278) with supplementary letters in the issue of Nov. 1930, pp.113-115. The originals are in the Melbourne Herbarium.

738 J.D. Hooker to Mueller, 24 May 1861, in Vic. Nat., Aug. 1927, p.95.

739 ibid.

Mueller, but he agreed to step down and be a mere collaborator, albeit a necessary one. In August 1861, after his reluctant decision, the letter he received from William Woolls was doubtless consoling, even if it presumed a little too much :

> I have just returned from Sydney after...a very pleasant day with Mr Macleay. He showed me Mr Bentham's letter to Sir W. Hooker, and two letters of Dr Hooker to himself, in all of which, honourable mention is made of you. Mr Macleay...expressed a very high opinion of your abilities as a Botanist. It appears that the Governor has agreed to put £50 on the estimates towards each volume of Mr Bentham's book, and His Excellency hopes that you will associate yourself as much as possible with that gentleman's labour. Mr Macleay was much pleased to find that there is a good understanding between yourself and Mr Bentham, as he says Mr Bentham wants your local observation & personal experience of the Australian plants, and you would want for the identification of many species Mr Bentham's power of referring to the classical herbaria of Brown, Cunningham, &c...I am glad that I have seen Mr Macleay about this matter in which you are so deeply interested, and I hope that men of science in all parts of the world will appreciate your good feeling in assisting Mr Bentham, when you are fully competent to publish a work on Australian botany yourself![740]

The tactful schoolmaster had made the whole business appear to be a pleasant and mutually beneficial arrangement, but, as the Governor of Victoria pointed out to the Governor of N.S.W. on the very same day, "there are a good many wheels within wheels in the question."[741]

In September 1861, Joseph Hooker wrote to Mueller expressing the gratification (if not the relief) of all at

> the liberal spirit in which you have met the wishes of your friends here...we shall make every arrangement for the fullest and most prominent acknowledgement of your Herbarium, name, services, etc., and in the title-page and throughout the body of the work.[742]

Mueller was told of the wisdom of his decision, and of the fact that the expense involved in sending his vast collections to England on loan,

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740 Woolls to Mueller, 3 Aug. 1861, from the original in the Library at Kew.

741 Sir Henry Barkly to Sir John Young, 3 Aug. 1861. Macarthur Papers, ML. A4304, p.429.

742 J.D. Hooker to Mueller, 22 Sept. 1861, in Vic. Nat., Aug. 1927, p.97.

should be met "one way at any rate."[743] The bitterly disappointed Mueller found some solace, even if he alarmed his English friends, in continuing the publication of his Fragmenta, begun in 1858, and in The Plants Indigenous to the Colony of Victoria.[744]

The trio at Kew discussed the delicate matter of a title-page, and decided upon the following form :

> Flora Australiensis / A Description / Of the Flowering Plants and Ferns / Of the / Australian Colonies / By / George Bentham, President Linnean Society / With the Assistance of Notes and Descriptions / Communicated by / Ferdinand Mueller, Ph. and M.D., F.R.S. / Government Botanist of the Colony of Victoria / Director of the Botanical and Zoological Gardens of Melbourne / Published under the authority of the Colonial Governments...[745]

As finally published, Mueller's styles and titles appeared in a more abbreviated form, but on the title-pages of the Fragmenta his personal honours list seemed to grow appreciably longer in each issue.[746]

By April 1862, Bentham had completed his preliminary studies of Australian botany, and had begun regular work on Flora Australiensis[747] at the rate of about eight hours a day and thirty to forty species a week.[748] In April and May 1862, the first two boxes of specimens from Mueller arrived in England, and so the correspondence and the despatch and return of specimens in great zinc-lined iron boxes[749] proceeded until the last sheets of the seven-volume work were in the press sixteen years later.

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743 ibid.

744 Melb., 2 vols. 4to. I (text and lithograms) 1860-1862 and II (lithograms only) 1864-1865. The work was dedicated to Charles Joseph LaTrobe, former Lieut.-Gov. of Victoria, Sir W.J. Hooker, "the nestor of botanists" and to Sir Henry Barkly, Gov. of Vic., for his "unceasing encouragement."

745 Bentham to Mueller, 15 Oct. 1861, in Vic. Nat., Aug. 1927, p.98.

746 See the title-pages of Flora Australiensis. Vol. I (1863) and of Mueller's Fragmenta, Vol. X (1876-1877) reproduced on pp.

747 Jackson: Bentham, p.192.

748 Bentham to Mueller, 24 Mar. 1862, Vic. Nat., Aug. 1927, p.99.

749 The boxes measured 27 1/2" x 20" x 20", and three are still preserved at the Melbourne Herbarium, South Yarra. In these boxes thousands of specimens were despatched to Bentham, and returned to Mueller, without any serious loss.

FLORA AUSTRALIENSIS:

A DESCRIPTION

OF THE

PLANTS OF THE AUSTRALIAN TERRITORY.

BY

GEORGE BENTHAM, F.R.S., P.L.S.,

ASSISTED BY

FERDINAND MUELLER, M.D., F.R.S. & L.S.,

GOVERNMENT BOTANIST, MELBOURNE VICTORIA.

VOL. I.

RANUNCULACEÆ TO ANACARDIACEÆ.

PUBLISHED UNDER THE AUTHORITY OF THE SEVERAL GOVERNMENTS
OF THE AUSTRALIAN COLONIES.

LONDON:
LOVELL REEVE AND CO., 5, HENRIETTA STREET, COVENT GARDEN.
1863.

TITLE-PAGE OF FLORA AUSTRALIENSIS, Vol. I, 1863.
(From a copy in the possession of Prof. N.C.W. Beadle,
University of New England.)

FRAGMENTA PHYTOGRAPHIÆ AUSTRALIÆ,

CONTULIT

LIBER BARO FERDINANDUS DE MUELLER,

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"OMNIA AUTEM PROBATE ET QUOD BONUM EST TENETE."

Epistol. Pauli ad Thessalon. I., Cap. V., 21.

VOL. X.

Melbourne:
AUCTORITATE GUBERNI COLONIÆ VICTORIÆ. EX OFFICINA JOANNIS FERRES.
1876—1877.

TITLE-PAGE OF VOLUME X OF MUELLER'S FRAGMENTA, 1876-1877, showing his full degrees, styles and titles. (From a copy in the Dixson Library, University of New England.)

Before February 1863, when Bentham gave the printer the first of thousands of pages of manuscript from his faithful gold-nibbed pen,[750] there had been delicate negotiations between the colonies whose flora was to be systematised whether or not the need for such a step was widely appreciated at the political level. Being delicate, the negotiations were protracted, and Bentham, already nearly sixty when first offered the commission, passed his 61st birthday with some alarm[751] before the necessary co-operation from Mueller and from the colonies was finally obtained. The inter-colonial negotiations apparently went on at the gubernatorial level, with expert advice from such leading amateur scientists as William Sharp Macleay. Sir Henry Barkly, Governor of Victoria, where Mueller worked as a Government servant, found the situation particularly delicate. Writing to Sir John Young, Governor of N.S.W. in August 1861, he conceded that

> Mr Macleay is quite right about the Aust^{n} Flora. No good work can be produced without the cooperation of Dr Mueller with Mr Bentham, and that I hope is at length secured. However, I thought so three years ago, but where professional jealousies are concerned it never does to be certain.[752]

Barkly revealed that he had managed to have "a thousand Pounds put on the Estimates of this Colony" after he thought he "had persuaded Mueller to send home his sheets for review and publication under Bentham's auspices in London." Bentham disagreed to amend and publish Mueller's work, "and the project fell through." Mueller then "offered to send home his plants fascicles by fascicles as wanted by Bentham" and "to leave him to describe and publish them." This was the course ultimately adopted, but then Barkly was in the ticklish position of having to seek a grant from Parliament to subsidise work being published

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750 Bentham bought the pen in Nov. 1856. It served him for "more than 28 years of constant and exclusive use" until it broke whilst he was writing his autobiography. Jackson: Bentham, p.172; S.T. Blake in Proc. Roy. Soc. Qld., 1954, p.9; Aust. Dict. Biog., 3, p.146.

751 Bentham to Mueller, 22 May 1861: "...years are now coming on, and either I must at once commence it or give it up entirely." Vic. Nat., Aug. 1927, p.94.

752 Sir H. Barkly to Sir J. Young, 3 Aug. 1861, Macarthur Papers, ML. A4304, p.428.

FLORA AUSTRALIENSIS

(Opposite)

One of the zinc-lined iron boxes (27 1/2" x 20" x 20") used by Baron Ferdinand von Mueller in shipping the whole of the Australian collections to London, for use by George Bentham in the preparation of Flora Australiensis, 1863-1878.
The specimens displayed within the box are some of the thousands which were shipped to England and returned during this remarkable operation. There was only negligible loss of specimens through damage. Other specimens used by Bentham are depicted in this Chapter.
Note the fine seven-volume set of Flora Australiensis in which the plants shipped in these boxes were described and systematised.

Photo: Central Photographic Laboratory, Dept. of Crown Lands & Survey, Melbourne, through the good offices of Mr James H. Willis, Assistant Government Botanist of Victoria, Feb. 1971.

in England from material being provided by the Government Botanist of Victoria at a time when independent action was the prevailing motivation. As Barkly said,

> I feel with Dr Mueller that they might at once say, "Oh you are not competent for your post, for you see Botanists at home want to take the work out of your hands and to entrust it to an abler man."[753]

The matter was rather ingeniously settled by having £100 of Mueller's annual grant of £320 "for publishing his own works" to be sent to Bentham as Victoria's share.[754] For the time being Mueller's reputation was protected, and trouble over seeking a grant from "the Legislature" was avoided.

Sir John Young sent a copy of this letter to Sir George Bowen, first Governor of Queensland, and obtained a promise of "£50 per vol.", the same amount as promised by N.S.W. and South Australia. These guarantees enabled the work to proceed at last.[755] Western Australia and Tasmania declined to participate.

George Bentham spent sixteen years on Flora Australiensis, in which he described 8168 species in 1400 genera. He received £700 from Victoria (i.e. £100 per volume from Mueller's publication grants), £350 each from South Australia and Queensland (i.e. £50 per volume as promised) and £400 from N.S.W.[756] -- a total of £1800, "out of which paid the publisher £720, leaving clear £1080." On the Queen's Birthday following the appearance of Volume VII, Bentham was awarded the C.M.G.,[757] an honour Mueller had received nearly ten years before.[758]

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753 op. cit., p.430.

754 ibid.

755 Sir J. Young to W.S. Macleay, 23 Aug. 1861, Macarthur Papers, ML. A4304, p.425. The sum of £250 had to be guaranteed. For each £50 contributed, a Colony would receive 15 copies.

756 Jackson: Bentham, p.242. See also, for example, V. & P. Leg. Assembly NSW, 1870-1871, II, p.745; 1875-1876, II, p.445; 1876-1877, II, p.192. Reference to "the Ninth Volume" may account for the larger contribution from N.S.W., unless it was decided that more copies were required to issue to Government institutions.

757 Jackson: loc. cit.

758 In 1879, Mueller was made K.C.M.G.

HISTORIC SPECIMENS OF COACHWOOD AND CEDAR

COACHWOOD, Ceratopetalum apetalum. Left: specimens from "Timbarra" and "New England" probably collected by Charles Stuart. Right: specimen from Illawarra collected by Thomas William Shepherd, Proprietor of the Darling Nursery and Agricultural Editor of the Town and Country Journal.

RED CEDAR, Toona australis. Left: collected by William Woolls "in a gully about nine miles from Camden". Right: collected by James Fowler Wilcox in the Clarence River rainforests, and used by Bentham when compiling Flora Australiensis.

Photos: L.G., Melbourne Herbarium, Jan. 1967.

Although the work was not hailed over-enthusiastically in European botanical journals,[759] Woolls and others ensured that this fulfilment of a long-felt need was appropriately noted in the Australian press.[760] Woolls considered that although

> the subject is by no means exhausted, that great work will be regarded as the basis of all future treatises on the Flora of Australia...[761]

The Rev. B. Scortechini, while regretting that

> the only department of Australian Botany, which has received as yet anything like a fair share of study from scientific men, is the taxological department,

considered Flora Australiensis an "imperishable monument raised by the genius and labour of Bentham and Mueller...."[762]

Despite the title-page and Bentham's laudatory remarks in his preface, Mueller felt that "sneers" and "unsatisfactory allusions" were being made in his direction, and he remained rather unhappy while faithfully fulfilling his agreed role. Even after the appearance of the first volume, Mueller considered "that very many of Mr Bentham's newly established species will not stand the field test."[763] Mueller and Bentham never did agree on the degree of variability acceptable within the concept of a species. One's appreciation of this fundamental concept depended largely upon the width of field and herbarium experience and upon one's views on the fixity of species. Bentham tended to be the world botanist who for the time being was concentrating upon the Australian flora, while Mueller was considered to be an Australian botanist who was chiefly concerned with the Victorian flora, and neither fully appreciated the experience or the problems of the other. This was especially so when Bentham came to "the terrible genus Eucalyptus"[764] for Volume III. Mueller had had wide field experience and a special interest in the genus, while Bentham had to soften by soaking the dried specimens if he wished to carry out dissections some 12,000 miles from where the specimens were collected.

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759 Taxon (Utrecht) Dec. 1967, pp.541-542.

760 The point was made, however, that "a cheap edition of Dr Mueller's plates would be an invaluable accompaniment to the Flora Australiensis", which was true enough. SMH, 21 Jan. 1867.

761 Proc. Linn. Soc. NSW, 1881-1882, p.569.

762 op. cit., p.157.

763 Mueller to Daniel Oliver, Christmas, 1863, Vic.Nat., Sept. 1927, p.133.

764 Bentham to Mueller, 16 Nov. 1861, Vic.Nat., Aug. 1927, p.98.

HISTORIC SPECIMENS OF EREMOPHILA.

SPECIMENS of Turpentine Bush, Eremophila sturtii. Left to right: 1. Collected 12 Oct. 1860 in "sandy soil, Darling River", Burke & Wills Expedition (used by Bentham); 2. Collected by J. Burkitt "Between the Darling & Lachlan" 1862 (used by Bentham); 3. Collected by Rev. Wm. H.H. Yarrington at Balranald.

SPECIMENS of Budda Bush, Eremophila mitchelli, collected by Thomas Mitchell. Left: Mueller's pencil sketch of E.mitchelli for his Descriptions and Illustrations of the Myoporinous Plants of Australia, Melb., 1886. The specimen was used by Bentham.

Photos: L.G., Melbourne Herbarium, Jan.1967.

There were other niggling points, for example in 1869 when Mueller was created a hereditary baron by the King of Württemburg Bentham wrote testily, "I hope you are not particular about the von" for in England, "vons are not the custom and not recognised.:[765] Nevertheless, the title-pages of Volumes VI and VII (1873 and 1878)[766] bore the full title of Baron Ferdinand von Mueller, C.M.G., F.R.S. Bentham also implored Mueller not to name species after him, when clearly it was only an attempt on Mueller's part to bestow a compliment, however botanically undesirable the practice may be.

By 1877, Bentham was nearly eighty, and very tired. In December he wrote the "concluding preface" to Volume VII, in which he paid tribute to "Baron von Mueller" for having "fulfilled his promise of... every assistance" by sending

> the vast stores of Australian specimens collected by his own exertions, as well as by the able collectors he has employed...and...correspondents whom he had inspired with a love for science.[767]

This remarkable man did not leave his gold pen idle for long. He resumed Genera Plantarum completing it in his 83rd year. On 19 April 1883, Bentham addressed the Linnean Society of London on the authorship of this great work, "the only joint work" in which he had ever been engaged. The title-page of Flora Australiensis was not to be misinterpreted. Baron von Mueller had shown "extreme liberality" by lending specimens "unreservedly" and had sent notes and such works as his Fragmenta, but Flora Australiensis, said the veteran botanist,

> is entirely and exclusively mine, with the assistance indeed, but not the 'cooperation', of Baron v. Mueller.[768]

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765 Bentham to Mueller, 30 Sept. 1869, Vic.Nat., Oct. 1927, p.163.

766 It is of interest to note the title-page dates and actual publication dates of the work, as quoted by F.A. Stafleu from H.S. Marshall : I : 1863 (30 May 1863); II : 1864 (5 Oct. 1864); III : 1866 (5 Jan. 1867); IV : 1869 (16 Dec. 1868); V : 1870 (Aug.-Oct. 1870); VI : 1873 (23 Sept. 1873); VII : 1878 (20-30 Mar. 1878). Taxon, Dec. 1967, p.541.

767 Benth.: Fl. Aust., VII, p.viii.

768 G. Bentham: "On the Joint and Separate Work of the Authors of ..'Genera Plantarum'", Jour. Linn. Soc. Lond., Vol. XX, 1883-1884, p.304.

HISTORIC SPECIMENS OF PINK SWAMP HEATH.

SPECIMENS of Pink Swamp Heath, Sprengelia incarnata. Left to right : Sheet 1: Collected by James Anderson (see Chapter V); Sheet 2: Collected by Herman Beckler, Hastings River; Sheet 3: Collected by William Woolls, Parramatta.

Photo: L.G., Melbourne Herbarium, Jan.1967.

SPECIMENS of Pink Swamp Heath, Sprengelia incarnata. Left to right : Sheet 1: Collected by Louisa Atkinson at "Bundanoon Creek under drips of water"; Sheet 2: by Carl Wilhelmi at Manly Beach, Nov.1863; Sheet 3: var. longifolia from Leichhardt's collection. All used by Bentham.

Photo: L.G., Melbourne Herbarium, Jan.1967.

Despite the uneasiness of the partnership, the work it produced synthesized for the first--and only--time, the isolated efforts of explorers, collectors and amateur enthusiasts all over the continent. Colonial boundaries were (often erroneously) observed when indicating the localities in which species had been found, but Flora Australiensis was true to its name. It represented an Australia-wide botanical survey through the eyes and hands of scores of individual workers, from Banks to Mueller himself.[769] It was in fact a national work produced before there was a nation, and over seventy years of federation have not changed the situation. Its like has not been attempted since, and taxonomists still gladly turn to it, despite its geographical inaccuracies and the botanical deficiencies revealed by revisions and discoveries made since 1878.[770] Bentham indeed went close to Hooker's ideal of a work that "should last, and...be a standard for all time." The most outstanding compliment, however, was made 104 years after the appearance of Volume I--the whole work was reprinted in facsimile, deficiencies and all, for nothing had been produced to supersede it.[771]

Bentham and Mueller never met. Once Flora Australiensis was completed, their correspondence tended to lapse. Mueller continued to send Bentham copies of his botanical works, including in 1882, his Systematic Census of Australian Plants which he dedicated to George Bentham, Joseph Hooker and Alphonse de Candolle, Bentham's old mentor and collaborator. These were "leaders in phytography" destined to be "pre-eminent in bimorphic science through all ages." Bentham's acknowledgement was the ultimate disaster in the rather uneasy association :

> I have to thank you for your Systematic Census of Australian Plants...The work is beautifully printed, and shows a great deal of laborious philological

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769 See Appendix I for the N.S.W. collectors acknowledged by Bentham.

770 e.g. Woolls in 1881 listed 10 spp. omitted from N.S.W. distribution in Flora Australiensis. Proc. Linn. Soc. NSW, 1881-1882, p.570.

771 Reprint 1967 by A. Asher & Co., Amsterdam, Holland in conjunction with the original publishers, Lovell Reeve & Co., England.

> research into the dates of plant names...which will be duly appreciated by those who occupy themselves with that subject...but all that is not botany.
>
> With regard to that science, it grieves me to think that you should have devoted so much of your valuable time to a work which, botanically speaking, is not only absolutely useless, but worse than useless...

The rearrangement of families, "the wholesale amalgamation of genera" all without any explanation would have "no other effect than the unnecessary addition of many hundred names to the already over-loaded synonymy." If Mueller wished

> to maintain the high position in which your name stands, let me entreat you to give up the vain endeavour to attach the initials 'F.v.M.' to so many specific names, good or bad, as possible, and to devote your energies, your great abilities, and the splendid materials at your disposal, to the completion of such classical works as your Eucalyptus and similar monographs...to the supplemental volume or volumes of the Flora Australiensis, or above all, to a methodical digest of the copious and valuable data you have collected on the geographical distribution and relations of Australian plants.

Bentham concluded his admonition by hoping that Mueller might be enabled, like himself, "to devote nearly sixty years...exclusively to botany."[772]

Bentham thus clearly sounded the death-knell of the older encyclopaedic approach to botany, essential though it was in establishing the basic facts for subsequent sophisticated studies. Strangely this did not terminate the correspondence, Bentham wrote his "last letter" to Mueller in November 1883, outlining some of the main academic pursuits of his life--logic, law and botany. He concluded on a conciliatory note :

> I have now only, in taking leave of you, to thank you for all the pleasure I have had in my correspondence with you.[773]

Mueller relayed this last sad letter to the Linnean Society of N.S.W. with the suggestion that the "illustrious man" who wrote it should be

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772 Bentham to Mueller, 25 Apr. 1883. Jackson: Bentham, pp.253-254.

773 Bentham to Mueller, Nov. 1883, Proc. Linn. Soc. NSW, 1883-1884, p.553.

made an Honorary Member. The rather strained partnership was thus happily concluded. Bentham died ten months later, and so did not see the recalcitrant Mueller again demonstrate his Teutonic love for statistics and well-ordered lists of facts by publishing in 1889 his Second Systematic Census of Australian Plants, a catalogue of 8839 species of vascular plants--671 species more than Bentham had described. This work was also dedicated to Joseph Hooker and Alphonse de Candolle, but no mention was made of the memory of George Bentham.[774]

Alarm

References have already been made to various steps taken to conserve bush resources, chiefly timber trees. Governor King's order of 2 April 1802 was designed to control the cutting of Hawkesbury cedar,[775] that of 21 June 1803 was to protect likely sources of naval timber,[776] and the further order of 4 October 1803 provided for "two rods of timber" to be left on either bank of the Hawkesbury for the mitigation of floods and the maintenance of the waterway.[777] Macquarie sought not only to protect the plants of his "Governor's Demesne",[778] but also the cedar trees of Illawarra[779] and the Hunter.[780] In 1843, steps were taken to ensure that "timber on all Crown Lands within seven miles of the city of Sydney" was to be "reserved for public use."[781] During the 1850s and 1860s at least one

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774 Among other things, Bentham had objected to Mueller's placement of the "Passifloreae and Cucurbitaceae between Rubiaceae and Compositae" in the first Census. Mueller did not change his arrangement for the Second Census.

775 See Chapter IV, p.336.

776 See Chapter IV, pp.334, 336.

777 Those who occupied riverside farms which were already "cleared of timber" were enjoined "to re-plant the banks with such binding plants and trees as they can procure." HRA, IV, pp.67-68.

778 See Chapter V, pp.446, 448-449.

779 See Chapter IV, p.367.

780 HRNSW, VII, p.426.

781 See Chapter IV, pp.395-396, and this Chapter, p. E.W. Rudder urged "that the nature and value of...natural productions should be investigated without delay, and made known before greater extermination takes place." V. & P. Leg. Assembly NSW, 1865, II, p.1089.

settler and a group of timber consumers petitioned Governor and Parliament beseeching that bush resources, both real and potential, should be reserved. At last, in the mid-sicties, provision was made to reserve a two-mile strip of river forest along the Murray.[782] In the early 1870s William Carron issued his strong warnings about the deleterious effects of the indiscriminate barking of trees;[783] Commander A.A.W. Onslow asked questions in parliament about the reservation of timber;[784] and Carron reported on likely areas for forest reserves in northern N.S.W.[785] By 1881, nearly 3 1/2 million acres of the Colony had been gazetted as timber reserves.[786]

These actions were prompted almost entirely by the need to conserve timber resources in the face of rapidly expanding land occupation,[787] and not by any desire to conserve the vegetation of a particular area because of its scientific interest or aesthetic appeal. There were, however, some early signs of a change in attitude, even if there were no organized conservation movement. Despite the widespread destruction of trees to promote pasture growth, one settler who left N.S.W. in 1846 after four years, advocated that "pastoral land ought not be cleared" for "where the country is plain and the grass short", the trees protected the natural pasture from sun and frost.[788]

One of the earliest instances of a tree being preserved for its own sake, and not for its timber content, was recorded by Lieut. W.H. Breton in the early thirties. Near Maitland was "one of the thickest vine brushes in New South Wales" where grew

> a most enormous tree...known by the title of the great fig...The form of the trunk is triangular, the side facing the south-east being eighteen feet...that to the north nineteen feet and a half; and that to the west, twenty-two feet and a half...
> ...Will it be credited that the former owner of the farm had actually commenced felling this 'giant of

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782 See Chapter IV, p.406.
783 See Chapter III, p.298.
784 See Chapter IV, pp.422-423.
785 See Chapter IV, p.424.
786 See Chapter IV, p.428, also Town & Country Journal, 4 May 1872, p.564.
787 For the situation by 1880, see Chapter III, pp.316-317.
788 Townsend : Rambles, p.192.

> the forest'? This was positively the case, and he was only prevented from fulfilling his intention by the remonstrance of the settlers around. This noble specimen of vegetation still bears the mark of the axe, a memento of the Vandalic taste of him who could contemplate the destruction of such an interesting object.[789]

Such indignation was rare, but Henry Oakes, Crown Lands Commissioner on the Macleay, had "two enormous" fig-trees, probably also Ficus macrophylla , which he proposed "to spare from the woodman's axe". One measured "48 feet in circumference in the trunk, not including its singularly upraised roots", and it was then thought, in the 1840s, that visitors would consider these "among the most remarkable vegetable productions of this interesting land."[790]

As already indicated,[791] some observers, including settlers themselves, did appreciate something of the ecological implications of the changes wrought by pastoral, agricultural and urban expansion. As early as the 1830s, it was appreciated that

> even those natural beauties which may have influenced the settler in his selection of a site, are converted into deformity. The forest must be hewn down; and, in its immediate effects, nothing can be more desolating than this operation.[792]

About this time, Thomas Shepherd urged colonists not to make this desolation absolute,[793] and he commended a few, who, like Alexander McLeay, had "preserved his native trees and shrubs"[794] for no reason other than their aesthetic appeal and botanical interest.

After his "residence of eight years in the interior", chiefly during the 1840s, H.W. Haygarth pointed to "the change that follows hard upon discovery" of new land

> untrodden by the foot of the white man, and...covered with grass so luxuriant that it brushes the horseman in his saddle...

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789 Breton: Excursions, p.123. The tree was probably Ficus macrophylla. Breton claimed he was "not botanist enough to determine" the species. It may well have been the same tree as that mentioned by Dorothy Paty. See this Chapter, p.615.
790 Mossman: Australia Visited, p.294.
791 Chapter III, pp.319-321.
792 Edwards: New South Wales, (1837), p. (186).
793 See this Chapter, p.578.
794 See this Chapter, p.579.

Once the invasion has begun,

> Nature, as if offended, withdraws half her beauty from the land; the pasture gradually loses its freshness; some of the rivers and lakes run low, others become wholly dry...and the explorer, who has gazed on the district in its first luxuriance, has seen it as it never can be seen again.[795]

Robert Meston, a settler of Rocky River, New England, painted a similar picture in his paper "On the Deterioration and Necessary Renovation of Colonial Pastures" read before the Australian Horticultural and Agricultural Society in October 1857 :

> On all the earliest settled districts or occupied runs, over-stocking, like extra population, usually bring along the penalties pertaining. The primitive grasses become extirpated, or are eaten out...
> ...That country, in its virgin state, had produced abundantly so long, that it was blindly expected its endurance and vigour would last forever. Each settler squeezed out all he could get, and looked sharp for more, without expending one half penny worth, if possibly the outlay could be avoided, as a charity return for benefits rendered.[796]

The Rev. John Dunmore Lang agreed:

> The country in its natural state...was enveloped...in a mantle of indigenous green...generally tall enough to reach the saddle-girths of the explorer...But only imagine the wonderful change that must necessarily have taken place on the surface of such a country, after turning loose upon it year after year thirty millions of sheep, seventeen hundred thousand horned cattle, and thirty-two thousand horses!
>
> ....production...has deteriorated that country in many localities in a very sensible degree; and unless some great effort, or rather series of efforts, is made to prevent it, this process of deterioration will go on increasing for a very long time to come.[797]

In the late 1870s both the Rev. W.B. Clarke and the Rev. William Woolls soundly attacked the wholesale clearing of land by ring-barking.[798] In relating the destruction to possible ultimate results, Woolls revealed something of his skill as a teacher and his perspicacity as a naturalist :

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795 Haygarth: Recollections, pp.120-121.
796 Syd. Mag. Sci. and Art, I, 1858, p.107. The name appears as both 'Meston' and 'Weston'.
797 Lang: Historical Account, II, pp.44-46.
798 Chapter III, pp.246, 249, 252.

> And what has resulted from this prodigal waste of nature's resources?...You may depend upon it that nature requires a certain equilibrium. She must not be treated wantonly. If you kill all the little birds, insects will increase in your fields and damage your crops. If you cruelly shoot down blackfellows and poison all the native dogs, the kangaroos will assert their supremacy; and...if you destroy, without any reservation, the gum trees...you will add to the amount of low fever, dysentery, and ague ...in the economy of nature, they are absorbing that which is detrimental to animal life, and supplying... that which is necessary for health and purity.[799]

Woolls's concepts of "equilibrium in nature" and "economy in nature" come close to our concept of an ecosystem, in which Woolls saw the aborigines as an essential part, although he may not have guessed that they may have occupied the land for 20,000 years or so. While Woolls's views on the cause of certain diseases are long outdated, he foresaw the problems of "imbalance in nature" or, in modern parlance, "ecological disclimaxes" far more clearly than most of his contemporaries.

It was a concern for public health which finally brought the conservationists some measure of success. On 18 February 1879, John Lucas, Member for Canterbury, and former Secretary for Mines, moved that the Legislative Assembly should consider, among others, the following resolution :

> The health of the people should be one of the first objects of all good Governments, and to insure a healthy,and consequently vigorous and intelligent community, it is necessary that all cities, towns, villages, and such other centres of population, should possess parks and pleasure grounds as places of public recreation.[800]

The result was that Sir John Robertson, as acting head of a "good Government", had his Minister for Lands, James Hoskins, reserve from sale an area of 18,000 acres to the south of Port Hacking. This action

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799 Woolls: Vegetable Kingdom, pp.91-92, also pp.179-180. Woolls strongly believed in the "sanitary properties" of Eucalypts. See Woolls in Vic. Nat., 1885.

800 V. & P. Leg. Assembly NSW, 1878-1879, I, p.284.

was taken on 31 March 1879, and in the following year, the area was increased to "about 35,000 acres."[801] The people of N.S.W. owed their first National Park to governmental concern for their health. The step was "cordially endorsed by public opinion"[802] and the Government remained in office until January 1883.

Woolls maintained his campaign against the "great destruction of native plants", over-stocking of runs, and "the wholesale destruction of Eucalpyts" in the introductory "Remarks" to The Plants of New South Wales (1885). Before his death, he had the satisfaction of knowing that Alexander G. Hamilton had taken up the cause in a prize-winning paper "On the Effect which Settlement in Australia has produced upon Indigenous Vegetation", read before the Royal Society of N.S.W. in September 1892.[803] By now, the press had warmed to the subject of the conservation of forests;[804] Parkes's Director-General of Forests, John Ednie Brown was referred to as "the new conservator"[805] and there was talk of "Arbor Day"[806] and of the group of South Australians known as the "Wattle League".[807] Even some country newspapers were lamenting the diminution of "the natural floral wealth of the country"[808] by the time a Royal Commission was held in 1907-1908.[809]

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801 V. & P. Leg. Assembly NSW, 1879-1880, IV, p.637. The area was actually closer to 33,000 acres. See Official Guide to the National Park of New South Wales, Syd., 1915, p.15.

802 Official Guide: loc. cit.

803 Proc. Roy. Soc. NSW, V., 1892, pp.178-239. See also Chapter IV, p.429. For Frederick Turner's bitter protest concerning the success of this entry from "the schoolmaster at Mt Kembla", see Turner to Prof. Anderson Stuart, 7 Sept. 1892, Deane Papers, ANL. MS 610, Series 4.

804 e.g. SMH, 30 July, 16 Oct. and 28 Oct. 1890; Echo, 16 Oct. 1890; Australian Star, 16 Oct. 1890; Sunday Times, 16 Nov. 1890.

805 Australian Star, 29 Aug. and 17 Sept. 1890. For J. Ednie Brown, see Chapter IV, p.429.

806 e.g. SMH, 16 July 1890.

807 On 20 Sept. 1889, the Adelaide branch of the Australian Natives' Association initiated a Wattle League which was formally established 12 May 1890 with 61 members. In August 1909 J.H. Maiden revived the idea in Sydney and the first Wattle Day was observed in N.S.W. on 1 August 1910. Aust. Encyc., II, p.644 (1926 ed.).

808 Goulburn Herald, 20 June 1906.

809 See Chapter IV, pp.429, 431.

To-day's growing preoccupation with the related problems of overcrowding, conservation and pollution tend to bring the words and works of many of these pioneer investigators into sharper focus. The gloomy prophecies of some, we have seen come to pass; the problems others foresaw, are the problems we face. In some areas, their problems remain our problems, and in some fields of botanical investigation, work similar to theirs still continues, even if it should have been modified by developments in jargon and technology. Some botanical workers still collect plants for private and public gardens and herbaria; a few still try their hand at botanical art while others develop perfection of technique in botanical photography; some are still interested in the propagation of native plants as a means of aiding the cause of conservation; more and more writers are producing guides for the amateur botanist-cum-bushwalker; conservationists still do battle against the apathy of a multitude and the organised resistance of a few who seek lucrative returns from interests in minerals, timber or real estate in areas of botanical significance; with new techniques and criteria and with more stringent rules of nomenclature, taxonomists are still re-examining and revising old taxa and occasionally discovering new ones as they maintain the search for the perfect and comprehensive system of classification--and yet, they must still take care to consult Flora Australiensis and other botanical classics, thereby drawing into their considerations the labours and opinions of a host of enthusiasts who set about so deliberately and effectively to learn about the vegetative aspect of their native or adopted environment during the period here reviewed.