

# A History of the Fish Collection at the Australian Museum (1860–1968), With a Summary of Current Australian Fish Collections

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## INTRODUCTION

Australia was discovered by Europeans in 1606 by the Dutch Captain Willem Jansz. Although other Dutch navigators mapped the northern and western half of Australia and southern Tasmania by 1644, the eastern half of Australia was uncharted until mapped by Captain James Cook in 1770. English settlement began in 1788 when the First Fleet arrived in Sydney. Eventually six separate colonies were established, which federated to become the Commonwealth of Australia in 1901. Today there are six states, each with a capital city (Figure 1): New South Wales (Sydney), Victoria (Melbourne), Tasmania (Hobart), South Australia (Adelaide), Western Australia (Perth), and Queensland (Brisbane). There is, in addition, the Northern Territory (Darwin), which, for the purposes of this paper, will be given statehood status. Each of these seven states has a state natural history museum in its capital city, some of which are associated with an art gallery and/or technology museum.

The vast majority of the ichthyological collections of Australia are housed in these seven state museums, there being no national museum as such with biological collections (the Australian Museum, sometimes thought of as a national institution, is the state natural history museum of New South Wales). The other significant Australian fish collections are found mostly in Tasmania, at the Queen Victoria Museum and Art Gallery in Launceston; the Commonwealth Scientific and Industrial Research Organization (C.S.I.R.O.) Division of Fisheries and the Tasmanian Inland Fisheries Commission in Hobart; and the Antarctic Division in Kingston. A fish collection is present at the Macleay Museum, University of Sydney, and smaller, less permanent collections are found at a number of other universities as well as the Australian Institute of Marine Science in Townsville, Queensland. The Queensland Museum also has a branch, with a small fish collection, in Townsville.

Whitley (1964) surveyed the history of Australian ichthyology. He pointed out that the earliest work on Australian fishes was done by European ichthyologists, and the earliest collections of Australian fishes, including numerous types, are currently housed in European museums. Australian fishes

were included in the comprehensive works of Lacepède (1798–1803), Bloch and Schneider (1801), Cuvier and Valenciennes (1828–1849), and Günther (1859–1870). As a result of numerous early European expeditions (compiled by Whitley, 1964), as well as the practice by early naturalists of sending specimens back to the mother country, the majority of expatriate Australian fish types are now in the Natural History Museum, London (BMNH); the Museum National d'Histoire Naturelle, Paris (MNHN); Staatliches Museum für Naturkunde, Stuttgart (SMNS); and the Naturhistorisches Museum, Vienna (NMW).

Although the Australian Museum, the first natural history museum on the continent, had its beginnings in 1827, it was not until the time of Gerard Krefft and Frederick McCoy (in Melbourne) in the 1860s and particularly Edward Ramsay, McCoy, and Alexander Macleay in the 1870s and 1880s that significant collections and types were enthusiastically deposited in Australia. Today the fish collections of Australia include more than a million juvenile and adult specimens and more than half as many larvae (Table 1). The strength of the country's ichthyological collections is their diversity of place and personnel, coupled with common standards and cooperation. Nine of the twelve major Australian fish collections have their data completely computerized or are in the process of computerization (Table 1). All of these utilize a common system of 470 families for collection storage and data retrieval. An initial workshop in 1985 was funded by the Australian Bureau of Flora and Fauna and attended by eighteen people representing nine of the major fish collections. The result was an agreement on the definition of data entered in each field, even though a number of different programs are utilized by the various institutions to manage data. Two later workshops were held, in conjunction with annual meetings of the Australian Society for Fish Biology, where common problems were discussed. Joint collecting trips, exchanges of paratypes and other specimens, and co-authored research papers are all evidence of the continuing cooperation among the managers and researchers of the country's fish collections.

Most of the state museums presently are suffering finan-



Figure 1. The states of Australia, their capital cities, and other major localities mentioned in the text.

cially, with budgets reduced from previous years and provisions for needed additional space limited or non-existent. Nonetheless, it is critical for the collections to continue to grow, as exploratory fishing continues in unsampled areas, as voucher specimens from other studies require archival placement, and as environmental changes necessitate collecting to provide baseline data (Paxton and McGrouther, 1991). Within the area of the Australian Fishing Zone defined by the 200-mile-law of the sea convention, the fish fauna of Australia numbers more than 3,600 species (Paxton *et al.*, 1989); this figure is now closer to 4,000 species. A number of large areas, including all waters below 2,000 m (more than half of the Australian Fishing Zone exceeds this depth), are virtually unsampled. If the estimate of Australia's total fish fauna of 4,500 species (Paxton *et al.*, 1989:5) is

ever reached, Australia's fish collections can expect significant future growth.

The purposes of the present paper are to describe the development of the fish collection at the Australian Museum up to 1968 (when the first author arrived), to present a brief history of the other fish collections of the country to 1968, and to summarize the current status of the twelve major fish collections of Australia. The following accounts are organized by state, in order of the chronological establishment of the state museums: New South Wales, Tasmania, Victoria, South Australia, Queensland, Western Australia, and Northern Territory (Table 2).

## MATERIALS AND METHODS

The primary sources for this paper include the published Annual Reports of each institution, and the various published histories, obituaries, and biographies listed under each section. Source material is also summarized by Marshall (1983) and Kohlstedt (1984). Collection registers, official Museum correspondence, Trustees' Minutes, Museum Archives, and Fish Section files were utilized for the Australian Museum (AMS). Visits to the Western Australian Museum (January 1991) and South Australian Museum (August 1992) allowed examination of their registers. The various individuals in charge of all of the different Australian fish collections kindly made available historical and especially current information (Table 1) about their fish collections (see Acknowledgments). The number of registered fish specimens at the Australian Museum (Figure 2) is based on a computer count of the total number of specimens at each of the years that a Museum ichthyologist began or finished his career. No new information has been added to the manuscript after May 1993.

## AUSTRALIAN MUSEUM, SYDNEY (AMS)

Forty years after the 1788 settlement of Sydney as a penal colony, a natural history museum was developing. Although

Table 1. Australian Fish Collections, Including Number of Registered Specimens and Lots (Excluding Larvae); Number of Larvae, Species (Nominal Species, Including Junior Synonyms), and Families (of 470 Recognized by the Australian Fish Collection Database Retrieval System); Number of Types; Amount of Floor space in Square Meters; Percent of Registered Specimens Computerized; Number of Curators; Backlog of Unregistered Specimens; and Date of Information. Symbolic Codes for Institutions Follow Those Provided by Leviton *et al.* (1985).

| Institution | Specimens | Lots    | Larvae  | Species | Families | Types: specimens | Types: lots | Types: species | Primary types | Floor space | Percent computerized | Curators | Backlog | Date  |
|-------------|-----------|---------|---------|---------|----------|------------------|-------------|----------------|---------------|-------------|----------------------|----------|---------|-------|
| ADH         | 7,000     | —       | —       | 170     | 20       | 0                | —           | —              | —             | 12          | 100                  | 1        | 0       | 11-92 |
| AMS         | 457,000   | 117,000 | 500,000 | 7,100   | 427      | 8,633            | 3,711       | 1,500          | 1,010         | 410         | 100                  | 3        | 20,000  | 1-93  |
| CSIRO       | 72,000    | 26,500  | 100,000 | 2,700   | 284      | —                | 230         | 123            | 35            | 130         | 100                  | 1        | 20,000  | 11-92 |
| MAMU        | 3,000     | 3,000   | —       | 2,000   | —        | 0                | at AMS      | —              | —             | 20          | 0                    | 0        | 0       | 5-93  |
| NMV         | 67,000    | 30,000  | —       | 2,100   | 323      | 392              | 174         | 69             | 25            | 145         | 100                  | 1        | 30,000  | 11-92 |
| NTM         | 89,000    | 17,300  | —       | 2,250   | 280      | 1,093            | 188         | 69             | 36            | 70          | 100                  | 2        | 10,000  | 11-92 |
| QM          | —         | 28,000  | —       | 4,241   | 283      | —                | 476         | 365            | 222           | 257         | 100                  | 1        | 4,000   | 11-92 |
| QVMT        | 10,000    | 2,500   | —       | 500     | —        | 68               | 68          | 35             | 20            | 40          | 20                   | 0        | 500     | 11-92 |
| SAMA        | 62,000    | 9,100   | —       | 1,076   | 259      | 249              | —           | 125            | —             | 100         | 30                   | 0        | 5,000   | 1-93  |
| TIFC        | 50,000    | 3,000   | 100     | 40      | 20       | 0                | —           | —              | —             | —           | 0                    | 0        | 5,000   | 12-92 |
| TMH         | 2,500     | 2,500   | —       | —       | —        | 63               | —           | 28             | 24            | 20          | 0                    | 1        | —       | 5-93  |
| WAM         | 120,000   | 45,000  | ?,000   | 3,700   | 270      | 6,559            | 1,545       | 432            | 247           | 225         | 100                  | 2        | 0       | 1-93  |

Table 2. Australian Fish Collection, with Dates of Origin, and Extent of Tenure of their Ichthyologists Indicated by Solid Lines. Dashed Lines Indicate Additional Tenure as Directors (Ramsay, Talbot, Hale), Volunteers or Honorary Workers (McCulloch, Whitley, E. Scott), Contract Workers (Ogilby), and Private Owners (Macleay).

| Institution | Ichthyologist | 1860 | 1880 | 1900 | 1920 | 1940 | 1960 | 1980 | 1996 |
|-------------|---------------|------|------|------|------|------|------|------|------|
| AMS 1827    | Kreffft       | —    |      |      |      |      |      |      |      |
|             | Ramsay        |      | —    |      |      |      |      |      |      |
|             | Ogilby        |      | —    |      |      |      |      |      |      |
|             | Waite         |      |      | —    |      |      |      |      |      |
|             | McCulloch     |      |      | —    |      |      |      |      |      |
|             | Whitley       |      |      |      | —    |      |      |      |      |
|             | Talbot        |      |      |      |      |      | —    |      |      |
|             | Paxton        |      |      |      |      |      |      | —    |      |
|             | Hoese         |      |      |      |      |      |      | —    |      |
|             | Leis          |      |      |      |      |      |      | —    |      |
| ADH 1948    | Williams      |      |      |      |      |      |      | —    |      |
| CSIRO 1935  | Munro         |      |      |      |      |      |      | —    |      |
|             | Last          |      |      |      |      |      |      | —    |      |
| MAMU 1888   | Macleay       |      | —    |      |      |      |      |      |      |
| NMV 1854    | McCoy         | —    |      |      |      |      |      |      |      |
|             | Gomon         |      |      |      |      |      |      | —    |      |
| NTM 1969    | Larson        |      |      |      |      |      |      | —    |      |
|             | Russell       |      |      |      |      |      |      | —    |      |
| QM 1871     | de Vis        |      | —    |      |      |      |      |      |      |
|             | Ogilby        |      | —    |      |      |      |      |      |      |
|             | Marshall      |      |      |      | —    |      |      |      |      |
|             | Hoare         |      |      |      |      |      |      | —    |      |
|             | McKay         |      |      |      |      |      |      | —    |      |
| QVMT 1887   | E. Scott      |      |      |      |      | —    |      |      |      |
| SAMA 1856   | Haacke        |      | —    |      |      |      |      |      |      |
|             | Zeitz         |      | —    |      |      |      |      |      |      |
|             | Waite         |      |      | —    |      |      |      |      |      |
|             | Hale          |      |      |      | —    |      |      |      |      |
|             | T. Scott      |      |      |      |      | —    |      |      |      |
|             | Glover        |      |      |      |      |      |      | —    |      |
| TIFC 1959   | Fulton        |      |      |      |      |      |      | —    |      |
| TM 1830(43) | Lord          |      |      |      | —    |      |      |      |      |
|             | Andrews       |      |      |      |      |      |      | —    |      |
| WAM 1891    | Glauert       |      |      |      | —    |      |      |      |      |
|             | Mees          |      |      |      |      |      | —    |      |      |
|             | McKay         |      |      |      |      |      |      | —    |      |
|             | Hutchins      |      |      |      |      |      |      | —    |      |
|             | Allen         |      |      |      |      |      |      | —    |      |

the official birth year has been considered 1827, there is some debate as to which year between 1827–1831 parturition occurred. This and other matters are considered in some detail by Strahan (1979) and his co-authors in the 150-year history of the Australian Museum. Earlier histories include the reports of Etheridge (1916, 1919) and Rainbow (1922) and the extensive unpublished manuscript of Whitley completed in 1963.<sup>1</sup> The following account draws heavily from these works, as well as the biographies, obituaries, and bibliographies listed for each ichthyologist.

Strahan (1979) detailed the early years of the Australian

Museum (also referred to as the Colonial Museum, Publick Museum, Sydney Museum) and the various keepers, zoologists, curators, and directors-in-charge of the early collections, beginning with William Holmes in 1829. Much credit for government founding of the Museum is given to Alexander Macleay, Colonial Secretary (head of the public service) at the time and the first of a family of eminent Australian zoologists (see below under Macleay Museum). Development of substantial collections in the early days of the Museum was hindered by the practice of sending to Europe the newly found specimens, where the scientists of that day

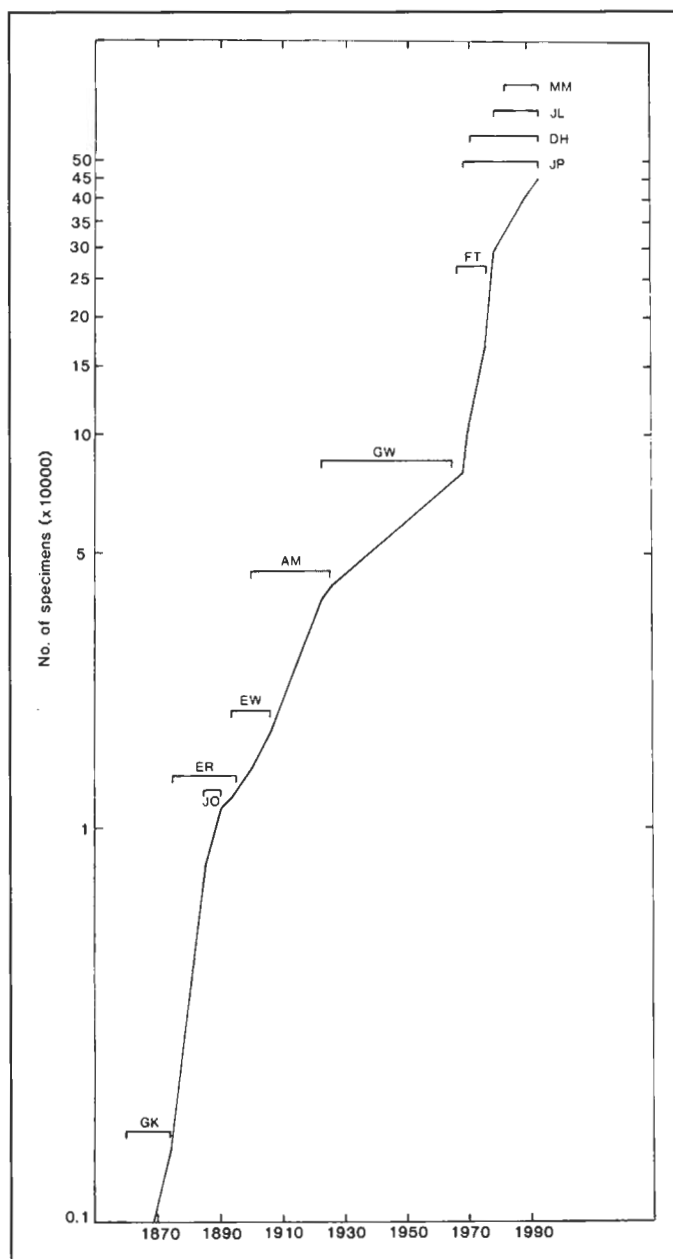


Figure 2. Growth of the Australian Museum fish collection (note log scale) in relation to the careers of major curators: GK = Gerard Krefft, ER = Edward Ramsay, JO = James Ogilby, EW = Edgar Waite, AM = Allan McCulloch, GW = Gilbert Whitley, FT = Frank Talbot, JP = John Paxton, DH = Douglass Hoese, JL = Jeffrey Leis, MM = Mark McGrouther.

had both the literature and comparative collections necessary for study (Cogger, 1979). Another hindrance was surely the lack of a permanent home; the early collections moved numerous times between 1829 and 1852. Although the first wing of the new Museum building (which forms the core of the present-day Museum) was begun in 1846 and "completed" in 1852, it was not opened to the public until 1857. Once this permanent home was established (Figure 3), the job of building collections could commence in earnest.

The first ichthyologist at the Australian Museum was Ge-



Figure 3. The Australian Museum seen from the northwest in 1973. The first two floors at the far left incorporate the original 1852 building. Photograph by John Paxton.

rard Krefft in 1860, followed in sequence by Edward Ramsay, James Ogilby, Edgar Waite, Allan McCulloch, Gilbert Whitley, and Frank Talbot, through to the three ichthyologists working at the Museum today, John Paxton, Douglass Hoese, and Jeffrey Leis (Table 2). As with all early zoologists, Krefft and Ramsay studied many animal groups and in both cases, fishes were not their major specialty. Krefft's publications primarily were on reptiles, mammals, and fossils, while Ramsay's specialty was birds. Even Waite, who became one of Australia's most productive ichthyologists, was a specialist on birds when he came to AMS. Nevertheless, all made significant contributions to Australian ichthyology.

### Collection Documentation

With the first Museum registers beginning in 1877 (see below), the earliest Annual Reports provide important documentation of the early collections (Anonymous, 1854–1900). The first Annual Report was published in 1854, while the Annual Report of 1858 is the first to give an account of the specimens obtained by the Museum. Until 1900, each Annual Report listed all of the specimens (and books and periodicals) donated with the names of donors, detailed exchange specimens, both inward and outward, and gave numbers of specimens purchased and collected by major group. According to Strahan (1979:50–51), cessation of this detail, and the entire "Curator's Report" portion of the Annual Report, was due to the power struggle between the then Secretary Sinclair and the Curator Etheridge.

It is not clear what kind of early registration catalogs, if any, were kept. All that survives are such publications as Bennett's (1837) *A Catalogue of the Specimens of Natural History and Miscellaneous Curiosities Deposited in the Australian Museum* and Krefft's (1862) *List of Australian Reptiles and Fresh Water Fishes in the Collection of the Australian Museum, Sydney*. This latter list of 21 fish species includes localities for most (including five New Zealand species), but no registration numbers.

The first formal Museum registration catalog was begun

in 1877 with the Palmer register, named after the man who was hired to do the cataloging (Strahan, 1979:49). Palmer began registering the backlog and worked from 1877 to 1880; the entries cover specimens collected from about 1866 to 1871. Almost all entries in this register have been reregistered in later catalogs, exchanged, or destroyed; few fishes are involved. Concurrently with the Palmer register, new specimens were being registered in the Museum's A. and B. registers. Three catalogs, with entries from 1877 to 1886 and registration numbers beginning with A or B, include all material registered in the Museum during this period. By 1886, the difficulties of the entire Museum registering in one catalog must have been considerable, and at this time each major animal group was given its own catalog. The first all fish catalog began in 1886 and all registration numbers were preceded with the letter I. In the seventeen years to 1903, when the catalog was filled, 9,175 fish specimens had been registered. In 1920, when the second I. register was filled with 8,677 more entries, the decision was made, presumably by McCulloch, to start the next register at number 1, this time with IA. as the prefix. Earlier in 1909, another multi-group register was started for all of the marine animals, including fishes, collected by the Commonwealth Fisheries Steamer ENDEAVOUR, with the prefix E. A second multi-group register included skeletons from 1889 to 1963 and began with the letter S; all fish skeletons from this collection have since been reregistered. When the IA. register was completed in 1939 with 8,104 entries, an IB. register also beginning with number 1 was commenced. This register was filled in 1968 with 8,394 entries. All of these registration catalogs have one line across two pages for each registration number.

By 1969 there were seven sets of registration numbers for fish specimens, beginning with the prefixes A., B., E., S., I., IA., and IB., found in twelve different registers. In most instances each specimen received a different registration number, which was either punched into a metal tag or punched and inked on a wooden tag, and tied on the fish. Only rarely were a number of specimens of the same species with the same data given the same number. In 1969, a station and lot registration system commenced, with each collection locality given a basic number like I.15321 (starting with the next available number with an I. prefix) and each species taken at that station given a secondary lot number: I.15321-001, I.15321-002, etc. Two further catalogs were filled by 1977, when registrations began on computer data sheets. Finally, in 1989, computer registration of the entire collection was complete. The most dramatic increase in rate of collection growth (Figure 2) coincides, among other things, with the changed registration system (see below).

### Johann Ludwig Gerard Krefft (1830–1881)

Shortly after the opening of the Museum's new permanent building, Gerard Krefft (Figures 4, 5) was appointed Sub-Curator in 1860 and Curator (= Director) in 1864 (acting Curator from 1861). In Strahan's (1979:28) words, "After thirty years of hesitation, the Museum was on the move." Krefft was the first productive scientist to work over a number of years in the Museum, and gave the institution an



Figure 4. Gerard Krefft, circa 1857. Australian Museum Archives, AN 90/95.

international reputation. Whitley (1961) listed more than 150 papers, newspaper articles, and letters written by Krefft between 1858 and 1882. The previous Curators had been primarily collectors or taxidermists or worked in the Museum for a short period. Even George Bennett, the first Curator to publish, was considered to have had only minor scientific activities (Strahan, 1979:17).

As with almost all zoologists of that period, Krefft wrote on many animal groups, although reptiles, mammals, and fossils predominate. Nevertheless, his description of the Queensland lungfish (*Neoceratodus forsteri*) in 1870, and a number of other new freshwater fish species in 1863, 1864, and 1868, unquestionably qualify him as the Australian Museum's first ichthyologist. At least twenty of the 150 works listed by Whitley (1961) included fishes, with five separate articles about the Queensland lungfish in 1870–1871 (Whitley, 1969). Krefft's influence in ichthyology continued until recently, as his great nephew, Gerhard Krefft (1912–1993), was for many years director of the ichthyology laboratory of the Institut für Seefischerei in Hamburg, where he worked on deep sea fishes (see Stehmann, 1997).

The senior Krefft was born in Germany and attended universities there. He emigrated to New York at the age of 20,



Figure 5. Gerard Krefft, Curator/Director of the Australian Museum, 1860–1874. Australian Museum Archives, Series 160/29.

and then to Australia where he worked in the gold fields for seven years. Krefft began his zoological career in Melbourne, working for the National Museum of Victoria. His stormy fifteen-year tenure at the Australian Museum (1860–1874) has been chronicled by Whitley (ms), and Strahan (1979:27–36).

Krefft undertook extensive fieldwork during his early years in Australia, starting with his first position at the Melbourne Museum, when he joined Blandowski (see below under Museum of Victoria) in a field trip to the Murray and Darling Rivers in 1857 (Iredale and Whitley, 1932). In 1860, Krefft sent a large consignment of insects, fishes, reptiles, mollusks, and mammals to the German Museum Commission to repay one of his fares to Australia (Whitley, 1961). Presumably, these were specimens he had collected.

With the first registers of collections not beginning until 1877 (see above), it is difficult to ascertain how much field work Krefft actually did himself. The Annual Reports of the Museum give some clues. In 1860, his first year of appointment, Krefft donated numerous reptiles and insects to the museum collections (but no fishes). In the following year, when he became Director, Krefft donated a few mammals, birds, and snakes (but again no fishes). The only other Krefft

donations listed in the Annual Reports include a collection of reptiles from a presumably extensive field trip to New South Wales, Victoria, South Australia, and Western Australia in 1864, and some freshwater fishes from the Macquarie River, New South Wales in 1871. Krefft also collected fossils from the Wellington caves in central New South Wales in 1869.

Krefft's Australian contemporaries during the period of his Museum directorship (Table 2) included Professor Frederick McCoy, Director of the National Museum of Victoria in Melbourne from 1858 to 1899 (see below), and Frederick George Waterhouse, first director of the South Australian Museum in Adelaide from 1860 to 1882. McCoy apparently recommended Krefft for the Australian Museum position, and the two remained correspondents for the rest of Krefft's life (Pescott, 1954:40). McCoy and Krefft corresponded about exchanges (Pescott, 1954:40), but no such exchanges are mentioned in the Annual Reports of the Australian Museum for that period. The amount of material exchanged cannot be determined due to the lack of formal registers at the Australian Museum during that time. There is no indication of any major specimen exchange between the three developing institutions. The only listing is a Queensland lungfish sent in 1872 to Waterhouse in South Australia.

Krefft developed an active exchange program with many European museums and collectors. These exchanges are first noted and then listed in the Annual Reports beginning in 1858. Krefft not only published in overseas journals, but corresponded with the leading scientists of the time, such as Darwin, Owen, Agassiz, Günther, and a number of Germans (Whitley and Rutledge, 1985). He was the first to establish an international reputation for the Museum.

In 1864, the position of Assistant Curator was again filled, by George Masters (1837–1912) whose tenure lasted until 1874; field work was one of his main duties. From 1864 to 1870 he made virtually annual field trips, visiting Queensland (twice), Western Australia (twice), Tasmania, and Lord Howe Island. The lists of specimens resulting from these trips, published in each Annual Report, indicate that fishes were not a high priority during this period. Of the thousands of specimens collected by Masters between 1864 and 1869, only eight fishes are listed.

The discovery of the Queensland lungfish and its description by Krefft in 1870 seems to have raised the priority of fishes in the Museum collections. Master's 1870 trip to southern Queensland resulted in 381 fishes, including nineteen lungfish specimens. In 1871, Krefft himself collected freshwater fishes from the Macquarie River in New South Wales. The Annual Report for 1871 also lists 133 fishes sent from the British Museum on exchange, whereas the exchanges listed from the previous eight years included few, if any, fishes.

The oldest surviving specimen in the fish collection is a surgeonfish (*Acanthurus olivaceus*, I.26948–001) collected by John MacGillivray in the New Hebrides on 17 December 1858 (Whitley, 1973:4). In the absence of formal registers, the Annual Reports give the major information about the state of the fish collection and its growth before and during Krefft's tenure. In 1858, the first annual list of donated spec-

imens includes forty-four fishes. The Annual Report for 1859 states that 470 fish specimens are on public display (the Museum attempted to display all specimens in its collections, apparently until the late 1890s when mention is made in the Annual Reports of duplicates being stored in non-public areas). Between 1859 and 1873, a total of 525 fish specimens are listed in the donations (an average of thirty-seven per year), plus twenty-six separate collections of unstated numbers. In addition to the 410 specimens collected by Masters during this period, an additional 194 specimens and three collections were received on exchange. The Museum fish collection at the beginning of 1874 may have numbered more than 1670 specimens, although at least 198 fishes (including nine lungfish) were sent out on exchange during this period; thus an average of slightly more than 100 fish specimens per year were added to the collections during Krefft's tenure.

The development of the fish collection was slowed for a number of years by Krefft's 1874 dismissal from the Museum, coinciding with Master's resignation and employment by Macleay (Table 2).

Another noteworthy item in the Annual Reports is the active part played by the trustees of the day. Quite apart from the acrimonious feud with Krefft near the end of his career, many trustees clearly were involved actively in the development of the Museum collections. Of the thirty elective trustees of the Museum between 1858 and 1873 (Strahan, 1979:161–162), eleven are listed as donors of fish specimens in the Annual Reports of those years. A few, like James Cox (1834–1912) and the two William Macleays, donated specimens over many years. At the same time that W. J. Macleay (see below) was donating specimens to the Australian Museum, he was building on the very large personal collection of the Macleay family that eventually resulted in the Macleay Museum at the University of Sydney (Fletcher, 1929). Krefft's dismissal was involved in this conflict of interests (Strahan, 1979:29). At the age of forty-four, Krefft was fired as Curator of the Museum and died in poverty only seven years later. By then he had set the foundation for continued growth of the Museum, both with its collections and its scientific endeavors.

The specimen donation analysis above is limited to fishes. It is noteworthy that the Annual Report for 1860 lists Edward P. Ramsay for the first time, donating a gecko, three collections of shells and fossils, and in 1863 a bird. Although he donated only a few fishes during his 20-year tenure as Curator (= Director), Ramsay was the second Australian Museum ichthyologist and one of the most significant of the fish collection builders.

### Edward Pierson Ramsay (1842–1916)

Edward Ramsay (Figure 6) was born in Sydney on 3 December 1842, the third son of a medical doctor.<sup>2</sup> He was educated in Sydney and studied medicine for two years at the University of Sydney. His interests were in natural history, primarily ornithology, with his first publication appearing in 1863. Ramsay had published thirty papers on birds by 1874 (Whittell, 1954), when he was appointed Cu-



Figure 6. Edward Ramsay, Curator/Director of the Australian Museum, 1874–1894. Australian Museum Archives, Series 160/58.

rator (= Director) of the Australian Museum replacing Krefft.

Strahan (1979:38) showed that Ramsay obtained this position by the patronage of the powerful W. J. Macleay, then a Museum trustee and prime mover in the dismissal of Krefft. Notwithstanding this beginning, Ramsay stands out as one of the most effective directors of the Museum in its first 120 years. He was Director for twenty years, until ill health in 1894 forced his replacement by Etheridge. He remained as Consulting Ornithologist to the Museum for an additional fifteen years. Backed by a supportive board of trustees, Ramsay significantly increased the collections of the Museum, built a scientific staff that near the end of his tenure in 1893 (before the depression resulted in staff reductions) numbered eight scientists in addition to himself, obtained enough government money to add new space in the form of a new hall for ethnology and later a third floor on one of the wings, and initiated publication of the *Records of the Australian Museum*, in addition to the irregular publication of catalogs that had commenced with Krefft.

Ramsay was obviously a man of great energy, for during this twenty-year period he also wrote more than fifty papers on birds, thirty on fishes (many with Ogilby as co-author),

and others on reptiles and mammals. He was one of the Commissioners of the International Exhibition of Industry and Arts in Sydney in 1879, Commissioner of a similar exhibition in Melbourne two years later, Commissioner of New South Wales Fisheries from 1882 to 1895, and Secretary in charge of the Australian exhibits at the International Fisheries Exhibition in London in 1883. In all of these exhibitions he organized Museum displays that included numerous fish specimens, winning medals and commendations (Etheridge, 1917:207–210; Strahan, 1979:38–39). He was also foundation treasurer of the Entomological Society of New South Wales in 1862 and foundation council member of the Linnean Society of New South Wales in 1874, continuing until 1892.

Ramsay's reputation as a collection builder is impressive. In his specialty of ornithology, Ramsay added some 18,000 specimens to the Museum collections (Etheridge, 1917:212). Krefft had begun the practice of exchanging specimens with overseas museums, and McCoy, director of the National Museum of Victoria during this period, built extensive collections with purchases, and later exchanges, of foreign specimens (Pescott, 1954:61–62). Ramsay's collection building, as detailed in the Annual Reports of the period, included specimens from donation, collection by Museum staff, purchase, and exchange. A breakdown of the fish specimens by category for these years (Table 3) indicates the importance of Ramsay's overseas trip to Europe in 1883. During this trip, Ramsay negotiated the purchase of Francis Day's collection of Indian fishes, which make up the bulk of the purchases in 1884–1885. This important collection was built by Day over twenty years in India and included a large number of his type specimens. The collection was available because of the dislike Day had of Günther, then curator of fishes at the British Museum (Natural History). Günther had strongly criticized Day's work a number of times and Day refused to lodge his collection in the British Museum. Günther (1975:409–415) and Whitehead and Talwar (1976:59–85) detailed the feud between the two. Ramsay's coup, despite serious competition from European museums, resulted in some 2,000 specimens being sent to Sydney, including types of Day species and a collection of Bleeker specimens (see Type Collection below).

During the twenty-year directorship of Ramsay, an average of 527 specimens per year were added to the fish collections (Table 3). It is clear that purchases were the most important method of addition, equaling the numbers from donation and staff collection combined. James Cox, Museum trustee and Commissioner of New South Wales Fisheries, is the single most important fish donor during this period, with at least one collection donated virtually every year.

Although exchanges did not result in a net gain for the period, they greatly broadened the scope of the collections. Fishes were obtained from the major museums in Calcutta, Florence, Brussels, Paris, Vienna, London, and Dublin, while fish exchanges were developed with the Commissions in Canada, Chile, and Norway. Later exchanges were with the United States National Museum and Museum of Comparative Zoology in the United States and, on a smaller scale, with other Australian museums in Brisbane, Hobart, Ade-

**Table 3. Donations, Purchases, Collections, and Exchanges (Incoming and Out-going) of Fishes at the Australian Museum, 1874–1894, as Noted in the Annual Reports for Each Year. Numbers within Parentheses Indicate Collections with Unstated Numbers of Specimens. The Total Number of Incoming Specimens for These Years Combined is 9,525 (10).**

| Year              | Number from donations | Number from purchases | Number of collections | Exchanges |           |
|-------------------|-----------------------|-----------------------|-----------------------|-----------|-----------|
|                   |                       |                       |                       | In-coming | Out-going |
| 1874              | 4                     | 0                     | 0                     | 0         | 0         |
| 1875              | 119                   | 0                     | 0                     | 0         | 0         |
| 1876              | 179                   | 85                    | 0                     | 91        | 87        |
| 1877              | 111                   | 48                    | 0                     | 0         | 0         |
| 1878              | 55                    | 90                    | 0                     | 0         | 0         |
| 1879              | 169                   | 22 (1)                | 181                   | 0         | 0         |
| 1880              | 135 (2)               | 375                   | 117                   | 148       | 111       |
| 1881              | 70                    | 173 (1)               | 203                   | 18        | 395       |
| 1882              | 155                   | 645                   | 156 (1)               | 0         | 257       |
| 1883              | 226 (2)               | 263                   | 602                   | 10        | 210       |
| 1884              | 125                   | 1,699                 | 4                     | 1,076     | 694       |
| 1885              | 83                    | 1,074                 | 76                    | 504 (2)   | 150       |
| 1886              | 355                   | 0                     | 210                   | 312       | 170 (1)   |
| 1887              | 149                   | 152                   | 138                   | 53        | 15        |
| 1888 <sup>1</sup> | 139                   | 140                   | 301                   | 0         | 251       |
| 1889              | 94 (1)                | 149                   | 18                    | 0 (1)     | 0         |
| 1890              | 61                    | 41                    | 201                   | 103       | 120       |
| 1891              | 61                    | 67                    | 0                     | 106       | 2         |
| 1892              | 63                    | 40                    | 7                     | 0         | 166       |
| 1893              | 43                    | 53                    | 10                    | 2         | 6         |
| Totals            | 2,396 (5)             | 5,116 (2)             | 2,224 (1)             | 2,423 (3) | 2,634 (1) |

<sup>1</sup> There are notable discrepancies in the numbers given in the Annual Report for 1888. The figures in the table were obtained from the various appendixes to the Report and from the Curator's (Ramsay) report; however, in the departmental report, Ogilby gives the following figures: donation 130, purchase 238, collection 39, exchange 10. Specimens entered in the fish register for 1888 are: donation 136, purchase 247, collection 122, exchange 41, and old collection or unknown 105.

laide, and Melbourne. Contemporaneous with Ramsay, and also building fish collections in their own museums, were De Vis in Brisbane, Zeitz in Adelaide, and McCoy in Melbourne, as well as Macleay in Sydney.

Actively describing fishes during this period was Castelnau, the French Consul in Melbourne (see under Museum of Victoria, below). Some of Castelnau's specimens were sent to Sydney (see below under types).

McCoy and Ramsay were two of the most successful early Australian collection builders, relying extensively on both purchases and exchanges. Yet the two apparently did not develop any special relationship; with exchanges in 1880, 1881, and 1885, the National Museum of Victoria did not exchange more material or more often than the other Australian museums at that time. McCoy, during his forty-year term as director of the National Museum of Victoria (see below), is recognized as probably the greatest collection builder Australia has seen (Moyal, 1976). However, Ramsay's collection building was paralleled by his initiatives in establishing new scientific positions in the Museum, initiatives that were not matched by McCoy in Melbourne. These new positions eventually totaled eight and included the ich-



Figure 7. James Ogilby, Assistant in Zoology (Vertebrates), Australian Museum, 1884–1890. Australian Museum staff photograph, February, 1885. Australian Museum Archives, Series 159/7.



Figure 8. James Ogilby, from his obituary (Whitley, 1926b).

thyologist James Ogilby, appointed in 1884 (and dismissed in 1890), and his replacement, Edgar Waite, appointed in 1892.

### James Douglas Ogilby (1853–1925)

James Ogilby (Figures 7, 8) was born and educated in Ireland, son of the zoologist W. I. Ogilby.<sup>3</sup> The junior Ogilby published a few papers in Ireland, mostly on fishes, before immigrating to Australia. He was hired as Assistant in Zoology (= Vertebrates) in 1884 and started work at the Museum early in 1885 (Walsh, 1988). In the Annual Reports of 1887–1889, he is at first noted as head of the Department of Ichthyology and later of both ichthyology and herpetology; Ramsay presumably was in charge of ornithology and mammalogy at the time.

Ogilby immediately began research on Australian fishes, publishing six papers in 1885 and fifteen papers in 1886. Whitley (1926b) listed 181 publications resulting from Ogilby's forty-year Australian career, the vast majority of these on fishes. More than twenty of these papers were co-authored with Ramsay between 1885 and 1890; all were descriptions of new species, both fishes and reptiles, in the

*Proceedings of the Linnean Society of New South Wales*. Descriptions of new species in the *Proceedings of the Zoological Society of London* or other papers like catalogs were published by Ogilby alone. When Ogilby lost his position at the Australian Museum in 1890, for "extreme and indiscriminating affinity for alcohol" (Strahan, 1979:42, as John Douglas Ogilby throughout), the co-authorship ceased.<sup>4</sup>

Regardless of this affinity, Ogilby was certainly productive. In addition to the eighty papers of this six-year period, Ogilby registered more than 5,200 entries of fishes in his neat, distinctive handwriting. His six years of formal association with the Museum included a very active collection-building period for ichthyology (Table 3). Ramsay's numerous overseas exchanges, including the important Day collection, were arriving. Also many Australian fishes were being added by collectors and purchases, resulting in the many new species descriptions of this period.

After his dismissal, the Annual Report for 1890 stated that Ogilby had then been contracted to write and complete catalogs. This arrangement must have been relatively successful, as he published a series of papers in Museum publications from 1891 through 1893, including a 142-page "Catalogue of Australian Mammals" (Ogilby, 1892). Most of

Ogilby's later papers were published in the *Proceedings of the Linnean Society of New South Wales*.

Later, Ogilby was working on a "Catalogue of Australian Fishes" that was to include all known information on food, reproduction, and migrations. The work was sponsored by the State government, with the Museum as overseer. It must have been a difficult period; official Museum correspondence for that period includes a folder titled "Ogilby Papers" that contains more than fifty letters and internal memos concerning Ogilby from 1896 to 1900.<sup>5</sup> There were continued questions of salary, money for stores, progress of the manuscript, and even access to the Museum. Among the more acrimonious developments was Ogilby's request to take part in the trawling operations of the fisheries trawler THETIS to examine specimens for his national catalog, and the Museum sending Waite instead. This debate reached the public, with a series of letters to the editor in the Sydney *Daily Telegraph* from 22–25 February 1898. Although Ogilby was promised access to all public documents relating to the expedition, more ill feeling was doubtless generated.

The Annual Report for 1900 stated that supervision of Ogilby's work on the "Fishes of Australia" had been transferred to the Chief Secretary of New South Wales. Ogilby submitted the first part of the manuscript to the Museum in July 1900, a few weeks after the deadline of 30 June; it had been reduced in scope to the "Fishes of New South Wales" in the hopes of a more rapid publication. It was clear from Ogilby's cover letter<sup>6</sup> that he was far from happy with either the deadline or the reduction in scope, stating he did not want it to be published in that state. In fact, except for the lamprey revision (Ogilby, 1896), no part of the grand work was ever published, although promises to do so kept Ogilby on the payroll (£160 per year for five years).

The Fish Registers show that between 1891 and 1901 Ogilby donated or sold (rarely) fourteen different lots of fishes to the Museum. Although Ogilby was associated with the Museum for nine years while Waite was in charge of the Ichthyology Department, there is little to show that the two ichthyologists worked together. They co-authored no papers, although Ogilby had one new species description in Waite's Australian Museum memoir on the results of the THETIS Expedition (Waite, 1899). While Ogilby's name appears frequently enough in the Fish Registers, his distinct handwriting never reappeared after 1890, only that of Waite beginning in 1892. Presumably before he moved to Brisbane in 1901, Ogilby met the young Allan McCulloch, who started work at the Museum at the age of thirteen in 1898 as an unpaid volunteer with Waite. Whitley (ms, xii:9) described Ogilby as "Another ichthyologist, McCulloch's old friend James Douglas Ogilby. . . ."

Ogilby does not appear to have been involved much in field work. He did collect in Moreton Bay, Queensland, in 1886. Later fish registrations indicate trips, after the death of his wife in 1894 (Whitley, 1926b), to Mt. Kosciusko, New South Wales, in 1895, and presumably Tasmania in 1896. The Western Australian fishes he donated in 1899 were given to him by a Mr. Lea (Ogilby, 1899), who was also working in Tasmania. Most of the fishes Ogilby added to the

collection were from the Sydney area, with many from the markets.

Ogilby moved to Queensland in 1901, but continued his association with the Australian Museum. He co-authored three papers with McCulloch (1908, 1916, and 1919), even though some ill feeling presumably developed between the two over Ogilby's attempted 1910 publication on new species collected by the Fisheries vessel ENDEAVOUR in Queensland. Allan McCulloch had been appointed official ichthyologist for all the ENDEAVOUR surveys, and managed to have the volume of the *Proceedings of the Royal Society of Queensland* that contained Ogilby's paper suppressed. Later, Ogilby's new species descriptions were recognized as valid due to the private transmission of reprints, but the identity of his type specimens continues to cause problems (see Paxton *et al.*, 1989:14).

After a few months at the Queensland Museum in 1901 (see below), where he again had alcohol problems, and a five-year period of limited publications, Ogilby resumed his productive career in 1906. He was first with the Amateur Fishermen's Association of Queensland and then with the Queensland Museum as part time ichthyologist from 1912 to 1920. He died in 1925 at the age of 72.

### Edgar Ravenswood Waite (1866–1928)

Edgar Waite (Figure 9) was born in England and studied biology at Victoria (now Manchester) University.<sup>7</sup> He worked as a subcurator and curator at the Leeds Museum before his appointment at the Australian Museum as Assistant in Zoology in charge of vertebrates in 1892. Although Waite was originally interested in birds, this was Ramsay's area of specialization, as well as that of another staff member, Alfred North. The Annual Reports between 1892 and 1900 indicate Waite's duties covered mammals, reptiles, and fishes, and he was much involved in the display of all three groups.

While Waite's first Australian papers were on snakes, he soon turned his attention to fishes. Waite eventually published some 140 papers, more than half of which dealt with fishes. His major reports on the fishes of Funafuti (1897), the THETIS Expedition (1899), and Lord Howe Island (1904), as well as a series of smaller papers in that period, established him as one of Australia's leading ichthyologists; he was the first to use detailed illustrations in his papers. In 1906, Waite left Australia to become Curator of the Canterbury Museum in Christchurch, New Zealand. After a productive eight years there, he returned to take up the directorship of the South Australian Museum, where he remained until his death in 1928 (see below).

Waite worked at the Australian Museum during a period of extreme financial stringency. The depression of 1893 resulted in a reduction of running funds by more than half and a one third reduction in staff that took ten to fifteen years for recovery (Strahan, 1979:50). The result was a great curtailment in museum field work and even the purchase and exchange of collections.

Waite's first major field trip on the THETIS in 1898 resulted in more than 300 fishes being registered. Two trips to Lord

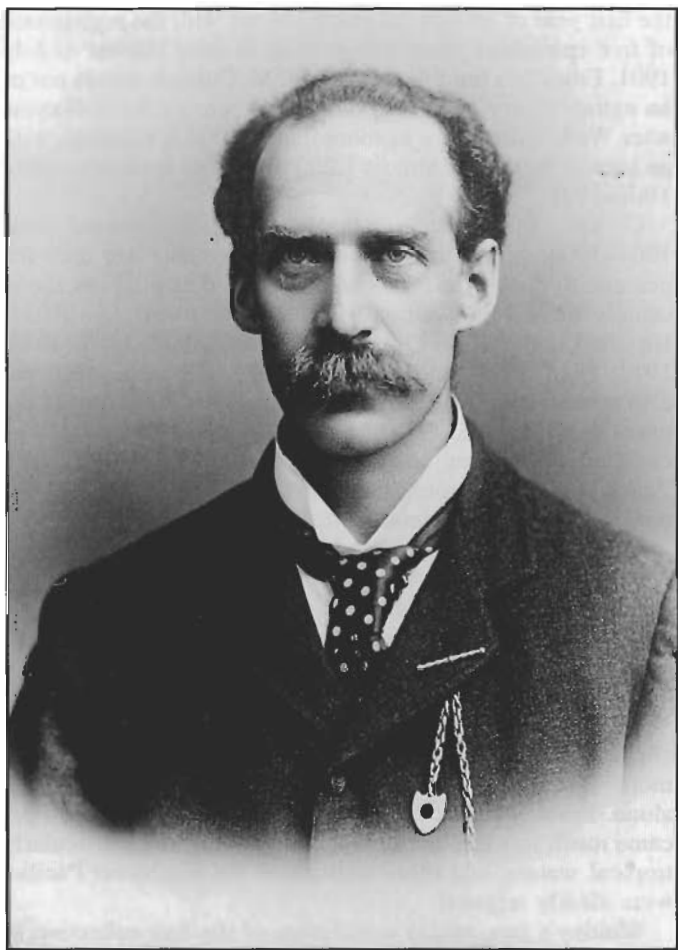


Figure 9. Edgar Waite, Assistant in Zoology (Vertebrates), Australian Museum, 1892–1906, Australian Museum Archives, Series 159/12.

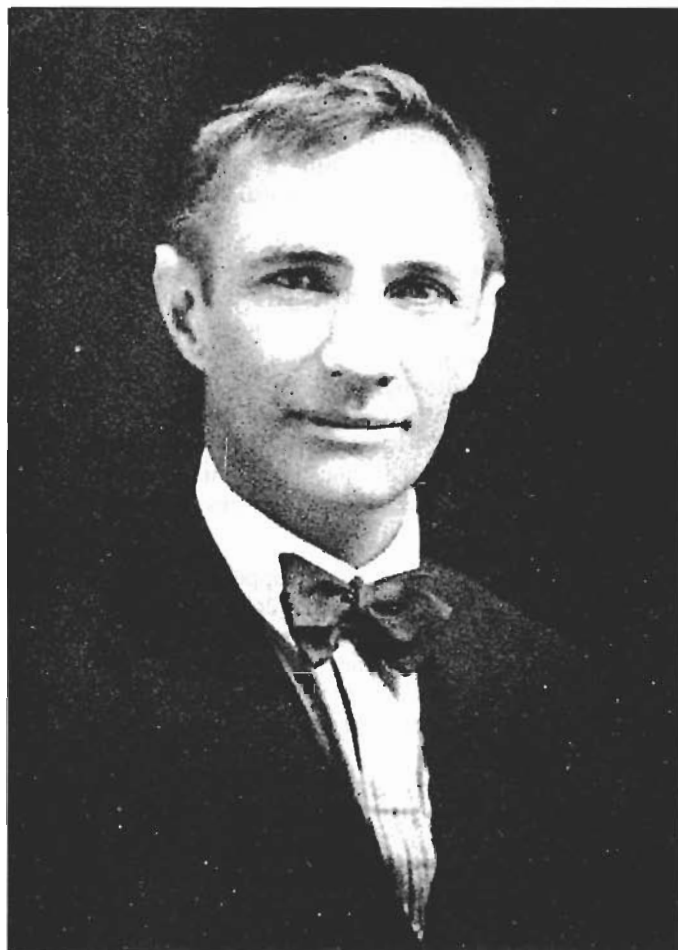


Figure 10. Allan McCulloch, Vertebrate Zoologist, Australian Museum, 1906–1925, from his obituary (Anderson, 1926).

Howe Island in 1898 and 1903 (the second with McCulloch) brought back more than 500 fishes. The lack of funds presumably curtailed this aspect of Waite's activities at the Australian Museum, for he later collected extensively for the South Australian Museum (see below). Nevertheless, Waite was able to increase the fish collection during his tenure to more than 18,000 specimens, exceeding Ramsay's annual average with more than 550 specimens registered per year (Figure 2).

Waite began a card file of specimens in the collection, first for mammals (Annual Report, 1898) and later for fishes. These duplicated the book registers, but were arranged in systematic order by family. Another set of cards was maintained for literature references. The first was begun by Ogilby, with a later set maintained by McCulloch, and a third by Whitley. Waite's primary legacy to Australian Museum ichthyology was a solid body of fish publications during his fourteen years, as well as the training of his successor, Allan McCulloch.

#### Allan Riverstone McCulloch (1885–1925)

McCulloch (Figure 10), son of a barrister, was born in Concord, Sydney, New South Wales, and began his career at the

Australian Museum as an unpaid volunteer at the age of thirteen.<sup>8</sup> In 1901, he was appointed Mechanical Assistant to Waite, whom he succeeded as Vertebrate Zoologist in 1906 when Waite moved to New Zealand. He held this position for nineteen years, until his untimely death in 1925, at the age of forty.

McCulloch was an excellent illustrator, and studied art under Julian Ashton, Sydney's leading art teacher at that time (Strahan, 1979:51; misspelled "McCullough" throughout). His scientific illustrations even included butterflies (Walsh, 1986:244). According to Whitley (ms, xii:8–9), McCulloch was:

a devoted Museum Officer with great administrative ability and scientific enthusiasm. He had personally trained most of the younger men in museum techniques and encouraged them to write papers and articles. His own special field was ichthyology, of which he was a master, but he also specialized on crustaceans and was a field collector with the broadest interests. . . . His card catalogue of ichthyological literature relating to Australasia has been kept up to date and is of invaluable assistance to this day.

McCulloch's research resulted in some 100 papers and

books (Whitley, 1926a), the most important of which included five reports on fishes collected by the Fisheries Research Steamer ENDEAVOUR (McCulloch, 1911–1926) and his *Check-list of the Fish and Fish-like Animals of New South Wales* (McCulloch, 1922); both works included many of his own illustrations. While a thorough analysis of McCulloch's ichthyological work must await future research, Strahan (1979:68) concluded:

The verdict of history has been somewhat less enthusiastic [than a glowing tribute by T. C. Roughley]. While recognising McCulloch's [sic] energy, enthusiasm and scholarship, one must admit that some of it was misdirected and that although he clarified many problems, he muddled others. Like most self-taught naturalists, he was a "species-splitter" with an inordinate respect for the written word and, rather than let sleeping dogs lie, would upset accepted nomenclature by resurrecting obscure names.

Strahan's criticisms were not supported by David Starr Jordan (as quoted by Anderson, 1926:142), who considered "that he was unquestionably the greatest authority on fish in the southern hemisphere, and one of the eight men in the world who really knew about fish"—"one of the most accurate workers in systematic ichthyology now living." A species by species analysis is beyond the scope of the present work, but the current recognition of at least four of the five species described by McCulloch in the family Platycephalidae (Paxton *et al.*, 1989:465–472) suggests that Strahan's description of McCulloch as a "species-splitter" is ill-founded.

While McCulloch worked with Waite for eight years (1898–1906) and co-authored six papers with him (from 1915–1918), they had a major disagreement in 1923. Waite (1923) included ninety-three of McCulloch's illustrations in his *Fishes of South Australia* and failed to acknowledge their source, apparently repeating a similar omission from a previous publication. The injustice resulted in correspondence between McCulloch, Waite, the Director of the Australian Museum, and the publishers of the handbook.<sup>9</sup> McCulloch, not in the best of health at that time (see below), was clearly distressed:

My dear Mr. Waite, you have done more to shatter my enthusiasm as a student of ichthyological research than you will guess, even though you owe more than a little to my drawings which have served you so well. I have just that very natural desire for the recognition of my labour, which you could have satisfied without detracting one iota from the value of your own.<sup>10</sup>

Waite acknowledged McCulloch's letter by saying "... I may write to you more fully later"<sup>11</sup>—but, if ever written, additional correspondence on the subject by Waite has not been found. The episode ended with the insertion of a general acknowledgment of the sources of all illustrations in Waite's handbook, which included McCulloch among many others. Considering the size of McCulloch's contribution, the insertion is unlikely to have healed the breach.

McCulloch's field work and collection building began in

the first year of his official employment, with the registration of five specimens from Balmoral in Sydney Harbor in July 1901. From this humble beginning, McCulloch stands out as an extraordinary collection builder, increasing the collection after Waite's departure to more than 40,000 specimens, with an annual average of almost 1,200 registered specimens from 1906–1925.

Of the approximately 5,000 specimens registered from 1904–1908, McCulloch personally collected more than ten percent. Sydney area fishes were collected at least once, and usually more often, virtually every year from 1904–1918. He often collected in Queensland (1905, 1907, 1909, 1911, 1912, 1914, 1918) and his trips to Lord Howe Island were also numerous. A collecting trip to the New Hebrides on the naval vessel H.M.S. PEGASUS (1922) resulted in a very large collection. However, an extensive trip to New Guinea with Frank Hurley for more than four months in 1922–1923 did not result in fish specimens. McCulloch's duties on that trip were to purchase artifacts and birds of paradise for the museum collections, and to operate the wireless radio (Specht and Fields, 1984). McCulloch's expertise with the radio was matched by his abilities as a still photographer, cinematographer, artist/illustrator, lecturer, and even a musician and hard-hat diver.

Exchange specimens were a significant portion of the incoming material during Waite's (and Ramsay's) tenure, with more than 2,200 registered exchange specimens in 1905 alone. From McCulloch's time on, exchange specimens became much less important; fishes from Australia, particularly tropical waters, and other regions of the southwest Pacific, were clearly targeted.

Whitley's (ms, xi:21) description of the fish collection in 1920 as "fifteen thousand specimens of fishes were arranged in the Spirit House . . ." does not coincide at all with the calculation of the size of the collection at that time of more than 35,000 specimens, based on a computer count of registrations. The discrepancy may be a combination of the accuracy of computers, the fact that the majority of the 10,000 exchanged and destroyed specimens were of pre-1920 registrations (but an analysis of when they were destroyed or exchanged has not been done), and that the ENDEAVOUR fishes, which by then totaled some 5,000 specimens, were kept as a separate collection at that time.

Whitley (ms, xi:21–22) continued:

arranged in the Spirit House according to a system of letters (such as DEF, DEG, DEH, etc.) similar to the Dewey classification of library books. This, with the catalogue cards, enabled any specimen to be found in a couple of minutes. A huge collection of fishes was acquired from the State Fisheries Department, thanks to Mr. D. G. Stead, naturalist to that Department. It was some years before all these were incorporated into the main collection.<sup>12</sup>

McCulloch worked strenuously on the rapidly growing collection. According to Anderson (1926), Director of the Australian Museum at that time, "He was a great worker, and by his unremitting toil, often far into the night, he had seriously undermined his constitution." In his last year he was on leave, in the hopes that his health would recover. He

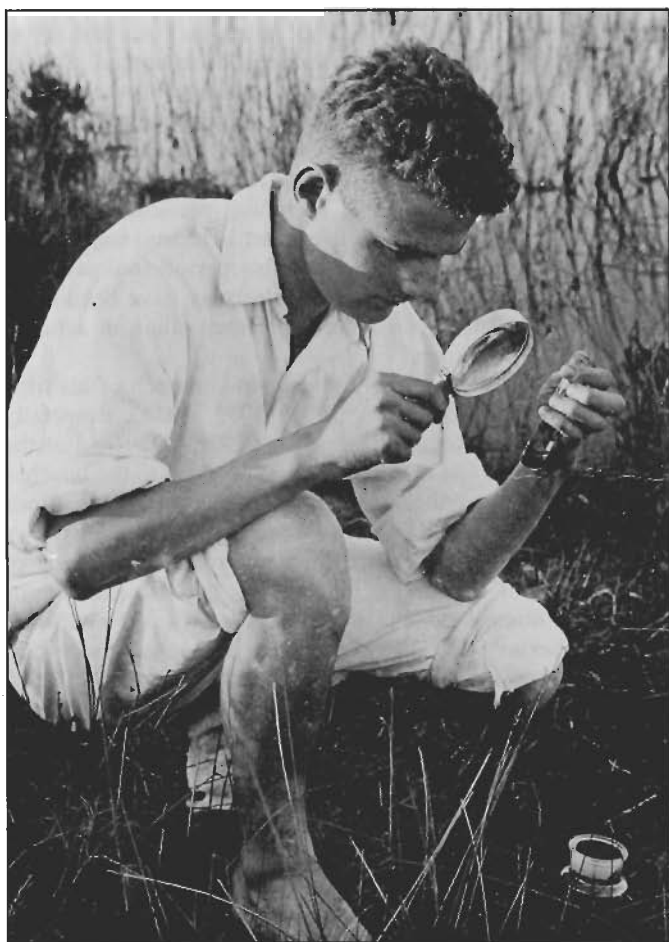


Figure 11. Gilbert Whitley, Ichthyologist/Curator of Fishes, Australian Museum, 1925–1964, Maroubra, Sydney, 1925. Australian Museum Fish Section slide collection.

went to Hawaii for a Pan-Pacific Fisheries meeting, with D. S. Jordan and B. W. Evermann among others, and

It is obvious that although McCulloch was in a poor state of health during his stay in Hawaii, he devoted himself with his accustomed ardour to the work . . . until he broke under the strain. He paid the penalty of enthusiasm in his chosen field of research, in which he had become an acknowledged master, and we must regard him as a martyr in the cause of science (Anderson, 1926:142).

A monument to McCulloch overlooks the lagoon at Lord Howe Island and contains his ashes.

### Gilbert Percy Whitley (1903–1975)

Gilbert Whitley (Figures 11–14) was born at Swathling near Southampton, England, on 9 June 1903 and emigrated to Australia at the age of eighteen with his parents and two sisters.<sup>13</sup> A year later in 1922 he joined the staff of the Australian Museum as an assistant to Allan McCulloch. With McCulloch's death in 1925, Whitley became Ichthyologist until his retirement in 1964. For three years during the Second World War he was seconded to C.S.I.R. Fisheries, where



Figure 12. Gilbert Whitley, 1941, using an Australian Museum microscope of the period. Australian Museum Archives, Series 163/V15796.

he worked on sharks and pelagic fisheries. In the ten years after his retirement, he was a regular visitor to the Ichthyology Department, often coming in once or even twice a week. He spent most of this time on the history of Australian biology, but his amazing photographic memory often aided the new curator from California, unfamiliar with Australian species. At that time, the lack of general books on fish identification resulted in a constant stream of public inquirers requesting identification and information on "unusual" fishes. Whitley was active until his death, writing and traveling. In 1973, he joined the first author and a number of other ichthyologists in a month's collecting at Lord Howe Island (Allen *et al.*, 1976), returning to the site of previous collecting trips, the first of which was forty-nine years before.



Figure 13. Gilbert Whitley "walking the dogfish," Australian Museum Swains Reef Expedition, 1962. Photograph by Anthony Healy.

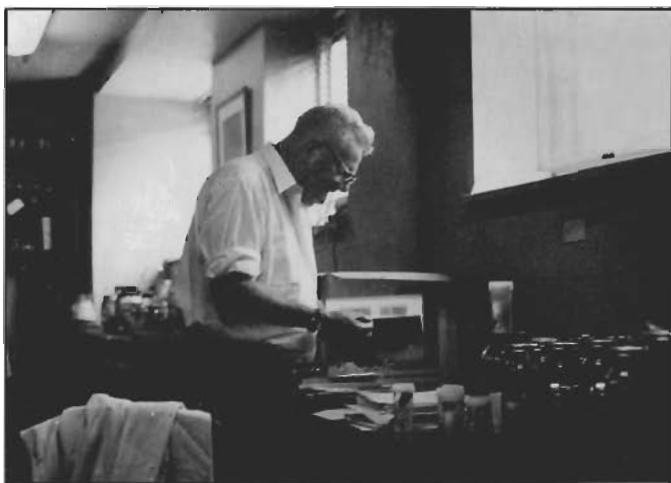


Figure 14. Gilbert Whitley, Ichthyology Department, March 1973. Photograph by John Paxton.

Whitley was an extensive traveler to many areas of the world, both on his own and on Museum time, making more than eighty trips (Anonymous, 1971).

Ichthyologists will remember Whitley for his prodigious output, some 550 papers, of which more than 300 dealt with fishes. The remainder are mostly historical and biographical, covering Australian biology and biologists. He was a prolific describer of new species; in his checklist of Australian fishes (1964), Whitley is author of more than 320 of the 2,447 species listed (Valance, 1977:257). He was also responsible for the previous checklist of Australian fishes (McCulloch, 1929–1930), for Whitley (ms, xii:13) himself wrote: "McCulloch's manuscript checklist of the fishes recorded from Australia was also taken in hand, expanded by the inclusion of references to all the genera and species and their synonyms, and prepared for publication as a Memoir."

This is not the place, nor is there time, to review Whitley's extensive ichthyological contributions. One aspect will be mentioned briefly. Whitley has been criticized severely (Trewavas, 1957) for his formulation of new genera to replace those he considered homonyms by being based on the same root as earlier names, but differing in one or more letters. Trewavas wrote on the back of the reprint sent to Whitley, "I'm sorry, but WHY do you do it?!" Whitley's only apparent response was to stop sending his reprints to the British Museum (Natural History) (P. H. Greenwood, personal communication, c. 1975). Early in his ichthyological career (1927), he corresponded with David Starr Jordan at Stanford University on the matter, taking the position of the early French Regles. Later (1930), he corresponded with Carl L. Hubbs at the University of Michigan on whether families should bear the name of their oldest described genus or whether to use priority, taking the former position. He did not change his mind about either matter. Much later (1968–1975) he confided to the first author that he did not see the reason for so many changes to the International Code of Zoological Nomenclature, and that he followed (mostly) the 1931 edition.

As a collection builder, Whitley's accomplishments were

considerable. From 1925 until his retirement in 1964, Whitley registered some 37,000 specimens, at an annual average of almost 950 specimens, virtually doubling the size of the collection (Figure 2). Considering he personally identified, registered, and tagged all the specimens (and concurrently wrote more than 500 papers, as well as being associated with numerous scientific societies, including presidencies and a long term as journal editor), the effort is indeed impressive. Analysis of the Fish Registers for this period indicates that Whitley's value as a collection builder may have been more in encouraging others to donate specimens than in actually collecting fishes himself.

He did collect hundreds of specimens on each of his trips to Queensland (1926, 1928, 1931, 1935, 1936), especially the Great Barrier Reef Expedition of 1928–1929 and at the Cook Islands in 1931. He regularly made trips to the beaches and rockpools around Sydney, resulting in small collections of usually less than ten fishes being registered (the first in February 1924), which over the years totaled hundreds of specimens. But the major portions of the fish collections were from donations. The names D. Stead (of New South Wales Fisheries), M. Ward (who had immense private collections), D. Serventy (of Western Australia), and R. Catala (of the New Caledonia Aquarium) appear regularly in the Fish Registers over many years, along with New South Wales Fisheries, Commonwealth Fisheries, Taronga Aquarium, and the University of Sydney. Officers in the Royal Australian Navy were regular donors, and in the latter fifteen years of Whitley's tenure, so were those associated with fisheries in New Guinea.

It takes considerable effort, as well as appropriate supplies (formalin, containers, etc.) to preserve a significant collection of fishes. Whitley must have impressed his donors enough that they repeated their efforts on numerous occasions. A number were certainly rewarded by having new species named after them. Whitley must have helped insure the continual donation of important collections by the virtual guarantee that noteworthy specimens would be the subjects of a publication. Whitley's command of ichthyology, and his gregarious nature (as recalled by the first author) also must have encouraged donors. While there were minor exchanges with Stanford University, the Queensland Museum, the British Museum (Natural History), the Dana Collections (Copenhagen), the South African Museum, the California Academy of Sciences, and the Western Australian Museum, among others, they do not account for a significant amount of the incoming collections. The purchase of fish collections, particularly important during Ramsay's tenure, had virtually ceased. However collection by other Australian Museum staff resulted in repeated registrations, with the herpetologist H. G. Cogger and the malacologist D. F. McMichael providing large collections.

This brief account does not do justice to such a complex ichthyologist, naturalist, and historian as Gilbert Whitley, but the sheer volume of the bibliographic source material, like all that he produced, is overwhelming. Hopefully a professional historian can do a more thorough job (there is surely more than one thesis in his material). As Strahan (1975) wrote: "Much more will be written in learned journals, at

greater length and with greater scholarship, on the life and work of Gilbert Whitley. . . ."

One cannot end a biography of Whitley without at least a mention of his humor, which is noted by Strahan (1975). Whitley typed a brief biography for a New South Wales Public Service Board Survey in 1963; under "Qualifications," he entered "Genius and diligence." His occasional irritation with authority is indicated by the sentence that follows: "Studies at the University of Sydney were terminated by order of the Australian Museum Trustees, March 1925." A fitting remembrance is a photo (Figure 13) from the 1962 Swains Reef Expedition, showing Whitley walking in knee deep water with a rope tied around a small shark's tail. Those on the trip recalled this (H. G. Cogger, personal communication, 1993) as "Gilbert walking the dogfish."

### Frank Hamilton Talbot (1930- )

Frank Talbot came from the South African Museum in Cape-town, where he was Deputy Director, to take the Curator of Fishes position in 1965 after Whitley's retirement. The following year he was appointed Director of the Museum, where he stayed until 1975. After a period as Foundation Professor and Head of Environmental Studies at Macquarie University in Sydney, he moved to the directorship of the California Academy of Sciences. From there he became Director of the National Museum of Natural History at the Smithsonian Institution. The development of the fish collection after Talbot's arrival is closely associated with the early years of the tenure of the first author. Although Talbot became Director in 1966, he continued his researches on and involvement with fishes until his departure in 1975, establishing Museum research stations, first at One Tree Island and later Lizard Island on the Great Barrier Reef. Detailed analyses of this next phase of the Australian Museum fish collection is left for future workers.

### Current Collection Status

John Richard Paxton (1938- ) arrived in Sydney in 1968 as Curator of Fishes, and was joined by Douglass Fielding Hoese (1942- ) in 1971 and Jeffrey Martin Leis (1949- ) in 1979; Leis spent eight years on fellowships and grant funds before his permanent appointment in 1987. All three are now Senior Research Scientists. Mark Andrew McGrouther (1958- ) joined the Fish Section staff in 1984 and is now Collection Manager. Sally Elizabeth Reader, Thomas Trnski, and Diane Brown are permanent Technical Officers in the Fish Section.

Today, the fish collection numbers more than 450,000 juvenile and adult registered specimens (although over the years some 10,000 registered specimens have been destroyed, exchanged, or lost); there are also more than 500,000 larval specimens (Table 1). Data for all of the registered specimens are fully retrievable using TITAN computer databases; however, data editing is far from complete. The backlog of unregistered specimens has been reduced by more than half in recent years by identifying major portions only to family or genus to make the material available.

The striking increase in collection size in the last twenty-

five years (Figure 2) is the result of a combination of factors: a dramatic increase in personnel, new and more intensive collecting techniques using scuba and rotenone (or rarely explosives), increased exploratory fishing by fisheries vessels (e.g., more than 35,000 specimens have come from the New South Wales FRV KAPALA), and a more efficient registration system by lots rather than individual specimens, allowing more specimens to be processed each year. Computer data entry was initiated in 1977 and the backlog completely entered by 1989, providing a further improvement in efficiency. The increase in collection size has paralleled the increase in the known number of species in the Australian ichthyofauna (Paxton *et al.*, 1989, figure 2).

Strengths of the collection include fishes from New South Wales, the Great Barrier Reef (more than 30,000 specimens are from the Lizard Island area), temperate rocky reefs, temperate mesopelagic, and upper slope to 1,000 meters, as well as larval, gobioid, and myctophid fishes. Otoliths, radiographs, dried skeletons, and cleared and stained specimens are available; an archival collection of frozen tissue was started in 1989 and currently includes more than 1,200 specimens.

### AMS Type Collection

A list of type specimens was compiled by Whitley in 1957, but never published.<sup>14</sup> Our current estimate of types is more than 8,500 specimens of some 1,500 species (Table 1). A type catalog is planned. A number of type specimens are currently registered and held in trust for eventual deposition in the Papua New Guinea National Museum.

During research for this essay, a few questions regarding the type status of some collections were uncovered. As the proposed AMS type catalog is some years away from completion, they are briefly described here.

There is still considerable debate about the status of Francis Day's type specimens (Whitehead and Talwar, 1976:144-146), and particularly about the supposed "cotypes" of Bleeker species (see under Ramsay, above). The list of species in the Museum Annual Report of 1884 (p. 42) notes the following:

Specimens of fish from India and the Indian Ocean purchased from Deputy Surgeon-General Francis Day, F.L.S., F.Z.S., including duplicates of his type species and co-types from Dr. Bleeker's collection. "Co-type" signifies that the specimens were admitted by Dr. Bleeker as identical with his types. "Type," that these are certified to by Dr. Day being part of his original collection, and named by him.

Whitley<sup>15</sup> took all of these type designations at face value. In Australian Museum terminology, at least at the time of McCulloch, cotype had the meaning of paratype. The above description of Bleeker's cotypes, however, would indicate that none of them have type status (a conclusion reached by Whitehead and Talwar, 1976:141). However, in the list as published in the Annual Report are some specimens (in this example, of *Eleotris aporos*) with the description "One of the types from Bleeker's Coll." At least ten species are so described and this complex problem is currently under study.

At the least, all these Bleeker "types" retain the unquestioned value of his identifications.

The status of Day's specimens will have to be solved for each individual species, with comparisons of the original descriptions, other available specimens, etc. The above quotation would indicate that each Day specimen with type indication has potential authenticity. Whitehead and Talwar (1976:154–162) listed 102 possible Day type specimens in the Australian Museum. Seven potential Blyth types are also in the Day collection. Edward Blyth (1810–1873) wrote a few papers on Indian and Ceylonese fishes (see Dean, 1916: 140).

A few of Castelnau's types may be in the collection. In the AMS register for the year 1917, McCulloch entered the following under I.14216, *Neogunnelus sulcatus* (= *Ophiclinus antarcticus*): "Name and locality copied from parchment labels attached to the specimen, the writing on which is identical with that on other specimens in Australian Museum known to have been exchanged from Castelnau, and which was probably written by Castelnau himself. The specimen may therefore be considered a co-type." However, the number of Castelnau specimens is not large, and the authenticity of this and the other five putative types of Castelnau species at AMS has not been determined. The only other known Castelnau types are at the Museum National d'Histoire Naturelle in Paris, but the collections in both Adelaide and Brisbane may possibly contain Castelnau types as well (D. Hoese, personal communication, June 1993).

## MACLEAY MUSEUM, UNIVERSITY OF SYDNEY (MAMU)

When Alexander Macleay (1767–1848) arrived in Sydney from Great Britain in 1826, he brought with him one of the finest private collections of insects in Europe (Strahan, 1979: 3). Upon his death in 1848, this collection passed to his eldest son, William Sharp Macleay (1792–1865). W. S. Macleay was a trained biologist and publishing entomologist (Strahan, 1979:22), who increased the insect collection and influenced the scientific training of his cousin William John Macleay (Fletcher, 1929). With the death of W. S. Macleay in 1865, the collection passed to W. J. Macleay.

William J. Macleay (1820–1899) was an extraordinary individual, a member of the New South Wales parliament (1856–1874), trustee of the Australian Museum (1861–1877), founder of the Entomological Society of New South Wales and the Linnean Society of New South Wales, and holder of numerous other positions in science, many associated with fisheries (Fletcher, 1929). For many years he was intent on increasing the Macleay insect collection and describing Australian insects. In 1873–1874, at about the time he agreed to bequeath the collection to the University of Sydney, he broadened his acquisition activities to include all zoology, especially fishes (Fletcher, 1929:187, 220–221). Macleay became a vigorous fish collector in the Sydney area, but later, in 1875, financed and headed a five-month collecting expedition to New Guinea aboard the CHEVERT. He became a publishing ichthyologist, co-authoring the results

of the CHEVERT Expedition (Alleyne and Macleay, 1877) and later publishing a catalog of Australian fishes (Macleay, 1881–1884) that included accounts of 1,291 species. His fish collection was increased by collection, purchase, and exchange, and included overseas as well as Australian species (Fletcher, 1929). Eventually the natural history collections became so large that Macleay presented them to the University of Sydney; the Macleay Museum opened to the public in 1890 (Stanbury and Holland, 1988:55). Few fish specimens were added to the collection after 1890.

Stanbury (1969:204) estimated the fish collection to contain 9,000 specimens, but Stuart Norrington (personal communication, June 1993), presently in charge of the vertebrate collections at the Macleay Museum, indicates that only 3,000 remain today. Most specimens are from eastern Australia and Papua New Guinea. The type specimens were listed by Stanbury (1969), then transferred on permanent loan to the Australian Museum. Detailed study of the collection should result in the discovery of more types of the numerous species described by Macleay.

## TASMANIAN MUSEUM, HOBART (TMH)

Tasmania (Van Diemen's Land until 1855) was first settled by Europeans in 1803 and became a separate colony in 1825. The Van Diemen's Land Scientific Society started a museum in Hobart in 1829 and the Alathena Museum began outside of Hobart in 1841.<sup>16</sup> The Royal Society of Tasmania was founded in 1843 and took over the responsibility of running a museum. The Tasmanian Museum was opened to the public in 1853 and the original building on the present site was opened in 1863. The state government took over the museum in 1885 (Bryden, 1963).

R. M. Johnston(e) (1843–1918), Tasmanian government statistician for more than thirty years, worked on Tasmanian fishes, eventually producing his synopsis of Tasmanian fishes and fisheries (Johnston, 1902), but he was never on the staff of the Tasmanian Museum. Clive Errol Lord (1889–1933) was first appointed Assistant Curator of the Museum in 1917, and eventually became director, from 1923–1933. Although he was Tasmania's leading ornithologist at the time (Thwaites, 1986), his work on Tasmanian fishes resulted in a checklist of Tasmanian fishes (Lord, 1927). He also prepared a synopsis of Tasmanian vertebrates with H. H. Scott of the Queen Victoria Museum (see below) (Lord and Scott, 1924).

A. Phillip Andrews (1941– ) joined the Tasmanian Museum in 1965 and as Curator of Vertebrates has written a number of papers on Tasmanian fishes. Today the fish collection of the Tasmanian Museum numbers some 2,500 specimens (Table 1), although the freshwater fish collection of the Tasmanian Inland Fisheries Commission (see below) has just been transferred to the Tasmanian Museum. The bulk of the fish collection is made up of Tasmanian freshwater and marine fishes. Andrews (1992) published a catalog of chor-date type material.

## QUEEN VICTORIA MUSEUM AND ART GALLERY, LAUNCESTON (QVMT)

The Queen Victoria Museum was established in Launceston, Tasmania, in 1887 and opened to the public in 1891 (Anonymous, 1899).<sup>17</sup> It has been administered by the city council of Launceston since its origin and currently receives a government subsidy.

Herbert Hedley Scott (1866–1939) was the first Curator (= Director) of the Queen Victoria Museum, from 1898 to 1939. His only published work on fishes was as co-author with Lord of the Tasmanian Museum (see above) on the vertebrates of Tasmania (Lord and Scott, 1924). Eric Oswald G. Scott (1899–1986) became Director after his father's (H. H. Scott) death in 1939, having been Assistant Curator since 1930. E. O. G. Scott resigned from the museum in 1943, and for some time during the Second World War was incarcerated as a pacifist (R. H. Green, personal communication, 1976). Later he became a school teacher in mathematics, and was well known as a poet. E. O. G. Scott published his first paper on Tasmanian fishes in 1934 and eventually published more than fifty ichthyological papers, many as virtual annual papers entitled "Observations on some Tasmanian fishes," with more than thirty parts. In later years, Scott worked closely with Robert H. Green (1925– ), who was first Assistant Curator and eventually Curator of Zoology for more than twenty-five years and specialized in mammals; together they were responsible for building most of the fish collection as it is today. Scott was appointed an Honorary Associate in Ichthyology in the mid 1960s and an Honorary Research Associate in 1981. He was actively continuing his research on Tasmanian fishes when he was killed by a car at the age of 86.

Today, the fish collection numbers some 10,000 specimens (Table 1), of which the vast majority are Tasmanian. Green (1974) included fishes in his list of Queen Victoria Museum types. Timothy J. Kingston (1949– ) replaced Green as Curator of Zoology in 1990, and has just begun to computerize the fish collection data.

## CSIRO, HOBART (CSIRO)

The Commonwealth Scientific and Industrial Research Organization (CSIRO) had its origins in 1916 with the establishment of an Advisory Council of Science and Industry. In 1926, the Council for Scientific and Industrial Research was formed, which became CSIRO in 1949 (Mawson *et al.*, 1988). A fisheries section was formed in 1935 and was functional by 1937 (Tranter, 1988). The Fisheries Division had its headquarters in Cronulla, New South Wales (in the southern suburbs of Sydney), until 1985, when it moved to Hobart, Tasmania.<sup>18</sup>

Ian S. R. Munro (1919–1994) was the fish taxonomist at CSIRO Division of Fisheries from 1943 to his retirement in 1984. He was involved in other areas as well, such as project leader for the Gulf of Carpentaria prawn surveys in the mid-1960s. Munro (1988) described the FAIRWIND survey that collected much of the nucleus of the CSIRO fish collection. It was appropriate that in the year of his retirement the re-

search collection was renamed the CSIRO I. S. R. Munro Ichthyological Collection. He personally collected many of the specimens on a number of expeditions and cruises. As the primary curator, identifier, and label writer, the collection formed the basis of his most important works on New Guinea and Australian fishes (Munro, 1956–1961; 1967).

Munro and Gilbert Whitley of the Australian Museum were taxonomic ichthyologists working within forty kilometers of each other for more than twenty-five years. However, there is little indication that there was much communication between the two. They were workers of opposite styles—Munro the great synthesizer who produced three impressive works on the fish faunas of Ceylon, New Guinea, and Australia; and the prolific Whitley, publisher of more than 500 papers who rarely synthesized even at the familial or generic level. Both, however, built and maintained two of Australia's most important fish collections.

Today the CSIRO Munro fish collection numbers more than 70,000 specimens (Table 1). Strengths of the collection include fishes from Papua New Guinea, Gulf of Carpentaria, Tasmania, tropical pelagic and Australian deep-sea fishes, as well as a very large collection of sharks and rays. Peter R. Last (1952– ) was appointed curator in 1985; Alastair Graham (1964– ) is the Collection Manager.

## ANTARCTIC DIVISION, HOBART (ADH)

The Antarctic Division was established in 1948 in Melbourne as part of the Commonwealth Department of Science. The Division moved to its present location outside of Hobart, Tasmania, in 1981, and is currently a part of the Department of the Arts, Sport, the Environment, Tourism, and Territories (Anonymous, 1991). The systematic collection and registration of Antarctic fishes was begun in 1985, with Richard Williams (1947– ) in charge. Williams began his work with the Division in 1973. This specialized collection of some 7,000 specimens (Table 1) consists of benthic and midwater fishes primarily from the Australian sector of the Antarctic and the Australian subantarctic including Macquarie and Heard Islands.

## TASMANIAN INLAND FISHERIES COMMISSION, HOBART (TIFC)

The Tasmanian Inland Fisheries Commission began in 1959, although it had its origins with those working with introduced trout in the late 1800s. Commissioners have included D. F. Hobbs (1960–1963), R. A. Terry (1963–1964), D. D. Lynch (1964–1984), R. D. Sloane (1984–1990), and W. Fulton (1990–present). Wayne Fulton (1950– ) began with the Commission in 1972 and for many years as a Commission biologist collected freshwater fishes throughout Tasmania. Today the collection numbers some 50,000 specimens (Table 1), but it is currently packed in cardboard boxes and has just been formally transferred to the Tasmanian Museum. The Commission considers that the primary descriptive work of the freshwater fishes of Tasmania has been completed and the collection would not be utilized by staff on taxonomic

problems (Fulton, personal communication, December 1992).

## MUSEUM OF VICTORIA, MELBOURNE (NMV)

Melbourne was first settled by Europeans in 1836 and the Colony of Victoria was separated from that of New South Wales in 1850. The Museum of Victoria was founded in 1854 as the Museum of Natural History, also known as the Colonial Museum and later as the National Museum of Victoria. The present Museum of Victoria was formed in 1983 by an amalgamation of the National Museum of Victoria and the Science Museum of Victoria.<sup>19</sup>

William Blandowski (1822-?) was born in Germany and was one of the founders of the Geological Society of Victoria in 1852 (Paszowski, 1969). He was the first zoologist appointed to the new Museum in 1854. Blandowski was an active collector of both zoological and ethnological specimens, including fishes from the Murray River. A report on the latter collection included descriptions of nineteen species, some of which were new species named after Museum council members with such unflattering descriptions ("slimy, slippery fish . . . dirty olivish-green colour") that they were considered insulting and deleted from his published report (Blandowski, 1858). He eventually left the Museum and Australia (Iredale and Whitley, 1932; Pescott, 1954:13-20). Nevertheless, the former authors pointed out that the large number of species collected, including two species until then (1932) not recorded from Victoria, testified to Blandowski's ability as a collector.

Frederick McCoy (1817-1899) arrived from Ireland to become the first Professor of Natural Science at the new University of Melbourne in 1854. In 1858 he became Director of the National Museum of Victoria. For more than forty years until his death in 1899 he was the Director and only scientific officer of the Museum. McCoy was the broadest of scientists, publishing in geology, paleontology, and zoology. His major zoological work, the *Prodromus of the Zoology of Victoria* (McCoy, 1878-1890), included sixty-four colored figures of fifty-eight fish species found in Victorian waters. Four species were described as new by McCoy in the 200 color plates and descriptions that made up the work.

McCoy was a prodigious collection builder, obtaining many overseas collections by purchase and exchange. These include a Bleeker collection of 870 specimens (Dixon and Huxley, 1982), a Museum Godeffroy collection of more than 800 specimens, a Smithsonian Institution collection of 294 lots, a Mediterranean collection of 146 specimens, and various other foreign collections of about 300 specimens.<sup>20</sup> McCoy exchanged material with both Krefft and Ramsay (see above), although not an extraordinary amount.

The most prolific early Victorian ichthyologist was Count François L. de Laporte de Castelnau (1812-1880), French Consul in Melbourne in the 1870s. Apparently only one of his collections was purchased by the Museum,<sup>21</sup> while the vast majority of his types still extant have been found in the Museum National d'Histoire Naturelle, Paris (Paxton *et al.*,

1989:14). Some of his material is also in the Australian Museum (see above).

Although McCoy had built an impressive fish collection, the first Curator of Fishes was not appointed to the National Museum of Victoria until 1978. Previous to this, the Directors and Curators Joseph Kershaw, George Mack, and Joan Dixon had each published a few papers on Victorian fishes. That none was a specialist on fishes presumably resulted in the relatively small number of Victorian fishes (some 700 specimens of the c. 2,600 total of registered specimens) in the collections at the time of the Munro report in 1967.<sup>22</sup> Munro concluded, however, that the total number of specimens at that time (1967) was 15,000-20,000, with the vast majority unregistered. He stated that the fish collections, dating back to 1860, may be second in quantity [in Australia] to those of the Australian Museum.

Martin F. Gomon (1946- ) was appointed Curator of Fishes in 1978. The fish collection today numbers about 70,000 registered specimens (Table 1). Its strengths are in its demersal shelf and slope specimens, midwater fishes of south-eastern Australia, and the freshwater fishes of Victoria.

## SOUTH AUSTRALIAN MUSEUM, ADELAIDE (SAMA)

Adelaide was first settled by Europeans in 1836 when the Colony of South Australia was established. In 1856, the South Australian Institute, comprising a public library and museum, was founded by government act.<sup>23</sup> Frederick George Waterhouse (1815-1898), the first Curator (= Director), of twenty-three years (1856-1879), was followed for a brief period (1883-1884) by Johann Wilhelm Haacke (1855-?) who wrote a few papers on Australian fishes and eventually became Director of the Zoological Gardens in Frankfurt. Amandus Heinrich Christian Zietz (c. 1840-1921) started as preparator under Haacke and became Assistant Director (c. 1898-1910) under the anthropologist Stirling. Zietz collected and published on marine and freshwater fishes over a twenty-five year period in the museum, concluding with a three-part synopsis of South Australian fishes (Zietz, 1908-1909).

Edgar Waite, previously with the Australian Museum (see above) and Canterbury Museum in New Zealand, was Director of the South Australian Museum from 1914 until his death in 1928. Waite was primarily an ichthyologist, with more than half of his 143 papers on fishes, including his handbook on the fishes of South Australia (Waite, 1923), although he published on all vertebrate groups. He was a member of many expeditions, to Macquarie Island (twice), New Guinea (where he contracted incurable malaria in 1916), New Britain, and New Ireland, as well as on those in Australia and New Zealand. In addition to collecting numerous specimens for both the Australian and South Australian Museums, Waite was instrumental in training two young zoologists, McCulloch, who succeeded him as ichthyologist in Sydney, and Herbert Mathew Hale (1895-1963), who succeeded him as Director in Adelaide.

Hale was Director for thirty years (1931-1960), during

which time he published mostly on Crustacea, but also a few papers on South Australian fishes. Trevor Dennison Scott (1929- ) joined the Museum in 1951 as Assistant in Marine Zoology and in 1962, when he was Curator of Fishes, published a revised edition of Waite's (1923) *Fishes of South Australia*. Scott actively increased the fish collection, as evidenced by the statement in the 1962–1963 Annual Report: "The large volume of material entering the collection in recent years has established it as the second largest reference collection of Australian fishes." The same report stated that much of this was in plastic bins waiting identification (Crowcroft, 1964:6–7). In 1956, the fish collection comprised some 10,000 specimens (Hale, 1956:208). Scott transferred to the South Australian Department of Education in 1963. C. John M. Glover (1935–1992) replaced Scott as Curator of Fishes in 1964 and retired in 1991. Glover worked extensively on desert fishes and oversaw large increases in the fish collection.

Today, the fish collection numbers some 62,000 specimens. Many of these are available on family shelves but not formally registered. Computerization of data has recently begun. Strengths of the collection include broad coverage of South Australian fishes including recently collected slope fishes and desert fishes. Types were reported by Glover (1976). The collection is maintained by the Collection Manager, Terry Sim (1952- ).

## QUEENSLAND MUSEUM, BRISBANE (QM)

Brisbane was first settled by Europeans in 1824 and the Colony of Queensland was formally separated from New South Wales in 1859. In 1862, the Queensland Philosophical Society began to display collections, and in 1871 the government assumed the primary responsibility for the Queensland Museum (Robinson, 1986).<sup>24</sup>

The fish collection probably began with the appointment of Charles Walter De Vis (1829–1915, born Devis) as Curator (= Director) in 1882 (until 1905). De Vis was a prolific worker, publishing 136 papers that included descriptions of 173 new species of fishes. However he was not a field biologist, and most of the collections were made by the Museum collectors Broadbent and MacGregor (Ingram, 1986:157).<sup>25</sup>

James Douglas Ogilby (see under Australian Museum) was appointed Assistant in Zoology in 1901, but was dismissed after three months, again for alcohol problems (Robinson, 1986). Ogilby was reappointed in 1912 as part time Ichthyologist, remaining until 1920. Ogilby spent the intervening years as Honorary Curator of the Queensland Amateur Fishermen's Association, where a fish collection was developed and maintained.

Thomas C. Marshall (1896–1976) was appointed cadet in 1912, eventually becoming assistant, then artificer and modeller. In 1942, he was seconded to the Department of Harbours and Marine, where he spent twenty years as an ichthyologist and maintained a separate research collection of fishes. Marshall published on fishes over a long period from 1925 and is best known for his 1964 book on the fishes of

the Great Barrier Reef, which was illustrated by the color paintings of Townsville naturalist and fisherman George Coates (c. 1894–1980). George Mack (1899–1963), who had published on fishes in Victoria in the 1930s and was the ornithologist at the National Museum of Victoria, was director of the Queensland Museum from 1946 to 1963.

After Ogilby's death in 1925 and Marshall's departure from the Museum in 1942, little ichthyological work was done until Susan Hoare (1946- ) was appointed Curator of Fishes in 1968; she left in 1970. Roland J. McKay (1935- ) has been Curator of Fishes since 1972. At that time, the fish collection was changed to ethanol from formalin, in which it had been placed prior to Ogilby's reappointment. Jeffrey William Johnson (1959- ) is Collection Manager of the fish collection. The fish collection begun by Marshall at Queensland Fisheries has now been transferred to the Queensland Museum, as have all the types from the Queensland Amateur Fishermen's Association. This Association still maintains its fish collection in Brisbane. A northern branch of the Queensland Museum was established in Townsville in 1987; a small collection of fishes is developing there under the care of Peter Arnold (1949- ).

Computerization of the fish collection began in 1988 and was completed in 1990. The collection currently includes 28,000 lots (Table 1). Its strengths include broad coverage of Queensland freshwater fishes, inter-reef bottom fishes, and Queensland slope fishes from exploratory fishing. A list of types in the Queensland Museum fish collection has been compiled, but not published.

## WESTERN AUSTRALIAN MUSEUM, PERTH (WAM)

The European settlement of Perth and establishment of the Colony of Western Australia (as New Holland) occurred in 1829. The Western Australian Museum had its origins in the Swan River Mechanics Institute founded in 1851.<sup>26</sup> In 1891, the State Government took over responsibility for the collections; the Western Australian Museum and Art Gallery was named in 1895. Bernard H. Woodward (1846–1916) was the first Curator (= Director) from 1896–1912. As with the early development of a number of Australian state museums, one individual had a long and productive tenure in Perth: Ludwig Glauert (1879–1963) was appointed assistant in natural history and ethnology in 1910 and when he retired in 1957 he had spent forty-one years as Curator and Director. Glauert's early work was in geology and paleontology, with many later papers on herpetology. Among his more than 120 papers are four on Western Australian fishes, and he is the identifier of the fishes in the Museum register from 1920 to 1957. Glauert, whose bibliography is included in the Annual Report of the Western Australian Museum for 1962–1963 (Anonymous, 1963), was succeeded as director by David Ride in 1958 and John Bannister in 1972.

Gerlof Mees (1926- ) of Leiden, Holland, worked as Curator of Vertebrates for five years from 1958 to 1962. He wrote a number of papers on Western Australian fishes before returning to Holland; Mees is now retired and living in

Western Australia. Roland J. McKay worked as Senior Technical Assistant on fishes from 1964 to 1972 before moving to the Queensland Museum as Curator of Fishes. J. Barry Hutchins (1946- ) began work in the Department of Ichthyology in 1972, followed by Gerald R. Allen (1942- ) in 1974. Drs. Allen and Hutchins are assisted by Kevin Smith as Technical Officer.

The first fish was registered in the Museum in 1894 and the current registers were begun in 1912. Today the collection totals 120,000 specimens (Table 1). Computerization of the fish collection began in 1976 and was completed in 1982. The program was developed by staff of the Western Australian Museum, which included during that period A. John Bass of South Africa. The registration system, using station and station/lot databases, is similar to that of the Australian Museum. The strengths of the collection include Western Australian fishes, Papua New Guinea freshwater fishes, pomacentrids, and monacanthids. A catalog of type specimens was published by Hutchins and Smith (1991).

# NORTHERN TERRITORY MUSEUM OF ARTS AND SCIENCES, DARWIN (NTM)

Darwin (as Palmerston until 1911) was settled by Europeans in 1869, after a number of earlier failed settlements in different areas of the Northern Territory, beginning in 1824. The Museum had its origins in 1964 when a Museums Bill was introduced to government, but it was not until 1970 that the first director, Colin Jack-Hinton, took up appointment.<sup>27</sup> The first Museum building (the original Town Hall) was destroyed by a cyclone in 1974 and the new complex was finally opened in 1981.

Helen K. Larson (1949- ) was appointed the first Curator of Fishes in 1981, joined by Barry C. Russell (1948- ) in 1982. Today the fish collection numbers some 89,000 specimens (Table 1) and includes the collections made earlier by Northern Territory Fisheries and the Conservation Commission. The strengths of the collection include principally Northern Territory fishes and trawl fishes from the Arafura and Timor seas, as well as Indonesian, gobioid, and nemipterid fishes.

# CONCLUSIONS

Some generalities or trends in the above accounts can be discerned. Three of Australia's museums are noteworthy for the long leadership provided by one early director, McCoy in Melbourne, De Vis in Brisbane, and Glauert in Perth. Most of the significant collection builders described herein were concurrently establishing the foundations of systematic ichthyology in Australia, especially Macleay, McCoy, De Vis, Ogilby, Waite, McCulloch, Whitley, and Munro. It is on the broad shoulders of these industrious men that Australian ichthyologists stand today. In the last fifteen years, there have been significantly more researchers associated with Australian fish collections than at any time in the past (Table 2).

# ACKNOWLEDGMENTS

The following individuals kindly provided information, both current and historical, about their collections (the content and value of Table 1 is directly attributable to their unselfish provision of current information; almost all commented on drafts regarding their own collection): Dick Williams (ADH), Alastair Graham and Peter Last (CSIRO), Stuart Norrington (MAMU), Martin Gomon (NMV), Barry Russell (NTM), Jeff Johnson (QM), Tim Kingston (QVMT), Terry Sim (SAMA), Wayne Fulton (TIFC), Phil Andrews (TMH), Jerry Allen, Barry Hutchins, and Kevin Smith (WAM). Ian Crawford of WAM kindly provided a summary from his draft museum history. Jan Brazier of the AMS Archives was especially helpful with historical material, while Hal Cogger of AMS provided references and advice. The comments of Brazier, Cogger, Hoese, and Leis (AMS) considerably improved earlier drafts of the manuscript. Our appreciation goes to all.

# NOTES

<sup>1</sup> Gilbert Percy Whitley, "History of the Australian Museum," unpublished manuscript, Australian Museum, cited throughout as Whitley (ms). This two-volume typescript was apparently written between 1957 and 1963. It includes 13 (as Roman numerals) chapters, each beginning with page 1. The citations in the text refer to chapter and page number.

<sup>2</sup> For an obituary and bibliography of Ramsay, see Etheridge (1917) and Whittell (1954), respectively; for a chronicle of Ramsay's 35-year association with the Australian Museum, see Whitley (ms) and Strahan (1979).

<sup>3</sup> For an obituary and bibliography of Ogilby, see Whitley (1926b); a brief biography was also published by Walsh (1988).

<sup>4</sup> According to Trustees' Minutes of 3 June 1890, Australian Museum Archives, Ogilby's dismissal was for "repeated acts of intemperance." An Australian Museum urban myth has long held that David Starr Jordan, then at Indiana University, was involved in the dismissal of Ogilby, but there is no supporting evidence in the official Ogilby files.

<sup>5</sup> James Douglas Ogilby (JDO) Papers, Official Correspondence, Australian Museum Archives, Series 9, O:4, 1898.

<sup>6</sup> JDO Papers, letter of July 1900.

<sup>7</sup> For a brief obituary of Waite, see Anderson (1928); Hale (1928) included a full bibliography in his extensive obituary, and later (1956) gave more detail in his centenary history of the South Australian Museum.

<sup>8</sup> McCulloch is mentioned in the Annual Reports of both 1898 and 1899 as working for Waite as a volunteer. Obituaries of McCulloch appear in the *Australian Museum Records* (Anderson, 1926) and the *Australian Museum Magazine* (Anonymous, 1925; presumably authored by Anderson since the first four paragraphs are identical with those of Anderson, 1926). A bibliography was prepared by Whitley (1926a) and a biography by Walsh (1986) while Strahan (1979) and Whitley (ms) both included considerable details of McCulloch's time at the Australian Museum.

<sup>9</sup> This correspondence is bound into a volume of Waite's reprints (AMS library 21949/166) in the Fish Section of the Australian Museum.

<sup>10</sup> McCulloch to Waite, 28 May 1923 (see note 9, above).

<sup>11</sup> Waite to McCulloch, 7 June 1923 (see note 9, above).

<sup>12</sup> The registration of a large collection of Stead's freshwater and estuarine fishes from the Malay Peninsula was only completed in 1992.

<sup>13</sup> Brief obituaries of Whitley were published by Paxton and Hoese (1975), Strahan (1975), and Ponder (1976); the most extensive is that of Valance (1977). Chalmers (Anonymous, 1971) prepared a brief biography when Whitley received the Clarke Medal from the Royal Society of New South Wales. Whitley left many boxes of his notes, unpublished manuscripts (notably his "Fishes of Australia" and "Genera Piscium"), and figures of fishes that are now in the Archives of the Australian Museum Library. He was a compulsive cataloger, and left lists of his publications, annual trips, manuscripts completed, and other achievements. His personal effects dealing with historical items are now in the Mitchell Library of the State Library of New South Wales, and have not been consulted. While Whitley corresponded with broad range of individuals, and copies of a few of his letters have been found in different areas of the Fish Section, no formal correspondence file has been found. The most pertinent biographical material, including everything used

n preparing this account, has been placed in a separate "Whitley Biography" file amongst the Whitleyana in the Australian Museum Archives (AN 93/26).

The much abbreviated account of Whitley provided here is based on the above cited obituaries, personal lists, correspondence, and recollections of his seven years during which the first author enjoyed the association of this extraordinary ichthyologist. It deals primarily with the growth of the fish collection during Whitley's thirty-nine years as Ichthyologist (from 1948 as Curator of Fishes).

<sup>14</sup> Gilbert Percy Whitley, unpublished mimeo, "List of type-specimens of recent fishes in the Australian Museum," Australian Museum, Sydney, 1957, 40 pp.

<sup>15</sup> *Ibid.*

<sup>16</sup> There is no detailed published history of the Tasmanian Museum (Kohlsedt, 1984:79), but the works of Bryden (1963, 1966) are of value.

<sup>17</sup> There is no published history of the Queen Victoria Museum; this summary is compiled from Annual Reports, newspaper articles, information kindly provided by Tim Kingston, personal recollections of a visit by the first author in 1976, and considerable correspondence with E. O. G. Scott and R. H. Green.

<sup>18</sup> For an informal history of the marine science section of CSIRO, see Mawson *et al.* (1988).

<sup>19</sup> This account of the Museum of Victoria is based primarily on Pescott's (1954) history of the first hundred years of the Museum, and Ian S. R. Munro's unpublished "Report on the Ichthyological Collections in the National Museum, Melbourne," (in which Munro summarizes the case for the creation of a new position of Curator of Fishes), 1967, 17 pp.; copy in Fish Section files, Australian Museum, Sydney.

<sup>20</sup> Ian S. R. Munro, unpublished report, 1967 (see note 19, above).

<sup>21</sup> *Ibid.*

<sup>22</sup> *Ibid.*

<sup>23</sup> Much of this account is taken from Hale's (1956) history of the first hundred years of the South Australian Museum.

<sup>24</sup> This account is based largely on Mather's (1986) history of the Queensland Museum.

<sup>25</sup> Additional details of De Vis's career are provided by Johnston (1916).

<sup>26</sup> Ian Crawford of the Western Australian Museum, who is preparing a centenary history of the Museum, kindly provided information for this account. As an introduction to their type catalog, Hutchins and Smith (1991) recently published a brief history of the fish collection.

<sup>27</sup> A brief history of the Northern Territory Museum is included in the document printed for the official opening of the new Museum complex on Fannie Bay in 1981 (Anonymous, 1981).

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