Preface
Miller Goss and Antony Schinckel, 2022

Miller Goss met Arthur Higgs at the CSIRO Division of Radiophysics in August 1967 when he and his wife Libby moved to Australia to begin a three year postdoctoral fellowship after receiving his PhD at the University of California, Berkeley. His postdoctoral supervisor was John Bolton, the Director of the Parkes telescope.

On arrival they were welcomed by Sally Atkinson; she was Divisional Secretary for the Radiophysics Chief E. G. "Taffy" Bowen and for Arthur Higgs, who was Assistant to the Chief and earlier the Technical Secretary of the Division from 1945 to 1963. Higgs was known to be a staff member who gave special recognition to young staff members. For the next year and a half, he supported Goss with frequent introductions to senior staff and assistance with administrative issues (e.g. Goss' salary was paid in Paris/Brussels by NATO; several time the foreign process failed.)[1] In contrast to Higgs, Goss was not introduced to the Chief (Bowen) until sometime in mid-1968. Bowen did not know his name until about 1976. Goss did get to know him a few years later and talked to him frequently during visits to Australia about the history of RPL.[2]

In January 1968, the RPL moved from the University of Sydney building that had been its home since April 1940 to a new site in Marsfield (near Epping) and close to Macquarie University. Arthur Higgs retired in January 1969 after being at CSIR (now the CSIRO) for 28 years, since he was seconded from the Mt Stromlo Solar Observatory in September 1941. In the following years (up to 1972), Higgs was involved on an ad-hoc basis as a consultant to CSIRO as he represented Australia on issues concerning international deliberations on frequency allocations with meetings in Melbourne and Geneva.

Arthur J. Higgs was born on 6 January 1904 in Cheltenham, New South Wales, Australia. He graduated from Sydney University in 1926 with First Class Honours in physics. He then joined the staff of the Commonwealth Solar Observatory until September 1941. From 1930 to 1937, he was in charge of the Radio Research Board's (of CSIR) cathode ray direction finding station at Mt Stromlo. From 1937 to 1941, he was engaged in ionospheric research. In 1941 he was seconded to the CSIR Division of Radiophysics, working on WWII radar. In July 1945 he became the Technical Secretary of Radiophysics until he retired from CSIRO on 3 January 1969, still as a permanent officer of the Commonwealth Public Service, seconded from the Department of Interior. He worked closely with Taffy Bowen at Radiophysics starting in 1944. From March 1952 to May 1953, he was in charge of the Scientific Liaison Office at the Australian Embassy in Washington DC. Higgs died on 20 August 1991.[3] His wife, Jean Millicent Higgs (20 Jan 1912- 27 April 2006), was a prominent Australian potter, her interest in ceramics having begun in Washington in 1952-53.[4]

Five decades after his post-doc in Australia (circa 2015-2016), Goss was working on the Pawsey book (*Joe Pawsey and the Founding of Australian Radio Astronomy, Early Discoveries from the Sun to the*

[1] An example of Higgs' assistance occurred in late 1967 when he found an unused computer card punch that was mainly for the preparation of FORTRAN punched cards for computer input; the location was an unused closet!
[2] Taffy Bowen's son, Edward, has been a major contributor to Goss' historical projects since 2011; Goss and his wife have visited Edward's home at Port Stephens (north of Newcastle, New South Wales, Australia).
[3] For Higgs' CV, see the Supplementary Material following the text of *Radio Astronomy*.
[4] For more information on Jean Higgs, see the Supplementary Material following the text of *Radio Astronomy*.

Cosmos by W.M. Goss, Claire Hooker and Ron Ekers, Springer 2023, Open Access) at the National Archives of Australia (NAA) in Chester Hill (western suburbs of Sydney). He had been at the NAA earlier, working on the two books about Ruby Payne Scott. He was familiar with the CSIRO Division of Radiophysics series in the NAA – item C3930. This consists of 1200 entities collated by Sally Atkinson covering the years 1940 to 1992. The series C3830 D consists of publicity reports and patents and programs for publications. Item D5/4.1240 caught his attention as the description read:

> Publications, Reports, Patent - Radiophysics Papers for Publication - Book on Radio Astronomy in Nelson's Series by AJ Higgs - Tentative Title "Radio Astronomy."

A few days after his discovery at Chester Hill, he visited the CSIRO radio astronomy group at the Marsfield headquarters of the CASS (CSIRO Astronomy and Space Science). He met a colleague, Antony Schinckel, whom he had known earlier (circa 1990s) when Schinckel had been the Technical Director of the Caltech Submillimetre Observatory on Manna Kea on the Big Island of Hawaii. By chance Goss told the story of the Higgs book. Schinckel reminded Goss that at a 2012 meeting in Manchester he had told Goss about the Schinckel family's close friendship with Arthur Higgs and his wife, Jean, a prominent potter! This was originally through a CSIRO link – Schinckel's father was also a research scientist working for CSIRO, primarily on sheep physiology. Our collaboration on the Higgs project began immediately (see "Memories of Jean and Arthur Higgs" by Ant and his sister Sally with the Supplemental Material following the text of *Radio Astronomy*).

Schinckel took charge of getting the book manuscript digitised. Goss had never heard of this book, but later found some background material from Sally Atkinson from 1980 (see below) describing the book project, begun in 1968 but never completed. In October 2022, we discovered that three pages of Chapter 8 ("The Hydrogen Line and Galactic Structure") were missing. On 10 November 2022, Harry Wendt went to the National Archives of Australia in Chester Hill (Sydney); he located the three missing pages, misfiled in Chapter 10, and had the NAA staff add the following text to the D5/4/1240 descriptive text: "[Pages 2, 3 and 4 of Chapter 8 misfiled after Page 4 of Chapter 10] NAA text about C3830, D5/4/1240."

Other relevant documents from the National Archives of Australia include:

> Sally Atkinson 1 July 1980 - letter to the file re "Book on Radio Astronomy for publication by Thomas Nelson (Australia) LTD in their NAP series (Nelson Australia Paperbacks). ref no. 1240."

A letter to Nelson publishers from Higgs on 16 October 1968, in which the draft of the book is referenced, though the exact date of the first draft of the book is uncertain. We assume the writing occurred in 1968 to about 1970.

Atkinson wrote as background information in 1980:

> Following discussions between Arthur Higgs and José Turner (Field Editor, Thomas Nelson (Australia) Ltd., Sydney) in September 1968, Nelsons [sic] wrote to Chief of Division [Bowen] on 19 September 1968 inviting RP to write a book on Radio Astronomy for publication in their NAP series. The Chief agreed that Arthur Higgs would do this. [5]

[5] In a letter to Miss Turner from Bowen on 23 September 1968, Bowen wrote: "I find that Mr Arthur Higgs, my Assistant Chief [an exaggerated title since Higgs was the Assistant to the Chief] would be quite interested in writing a text on Radio Astronomy, provided he were not under pressure to meet an early date line. He would do this as principal author, drawing on the work of the laboratory [RPL] and of course on other sources for his material."

> Sometime after Mr Higgs left the Division (probably in 1971), I understand that Nelsons [sic] decided not to proceed with publication. There is not correspondence about this decision on file, but it is possible Arthur Higgs may have it. [There is no record of any correspondence that might have been located. Likely Higgs was discouraged and cancelled the project. We have no evidence. Copies of the 1 July 1980 document were given to the Chief of RP Harry Minnett and Marie Vickery, head of RP Publications.]

The material prepared by Arthur Higgs consists of an "Outline of Contents" and typed drafts of Chapters 1 to 12 and 14. The following extract from a letter to Nelsons [sic] from Arthur Higgs (dated 16 October 1968) indicated the type of book he envisaged:

> [Higgs] My overall objective, however, would be to produce an interesting but authoritative account of Radio Astronomy at a semi-popular level which would be thoroughly up-to-date and different from other texts on this subject, in that it would draw largely on Australian material for illustrative purposes and record the significant contributions which Australia has made toward the development of this new and exciting field. This has not yet been adequately done.

In addition to preparing the manuscript of Radio Astronomy, Higgs gathered images of both instruments and astronomical sources to use with the text; both are included with the Supplementary Material following his manuscript. There was little information with the manuscript about where Higgs intended to place the images, but we have placed bracketed notes within the manuscript referring to relevant instrumental images. David Malin and Antony Schinckel reviewed the astronomical images and suggested the captions we have used.

We are grateful to Harry Wendt, who wrote a Foreword and also visited the NAA to search for and scan the misplaced pages from Chapter 8. We thank David Malin for help with astronomical images, both Rita Nash and John Freeland for comments on Jean's pottery, and Jasper Wall, who prepared text about the flawed chapter 11 on quasars[6]. Ann Maltsberger, daughter of Higgs' first marriage, gave us permission to post the manuscript. We thank the National Archives of Australia in Chester Hill, Sydney, and CSIRO CASS for permission to use portions of Higgs' personnel file. National Radio Astronomy Observatory and the NRAO/AUI Archives have supported the Web publication of the manuscript and related materials.

[6] For Wall's comments, see the Supplementary Material following the text of *Radio Astronomy*.