Chapter 6
To the Cavendish Laboratory of the University of Cambridge, 1931

From the 1851 Exhibition Scholarship Committee to Pawsey on 1 October 1931:

> [We] approve of your proposal to spend the period of your Scholarship at the University of Cambridge instead of at the University of London as formerly arranged, and after taking all the circumstances into consideration, [we believe] that you have made a wise choice. You, therefore, have the permission of the Commissioners to make whatever arrangements you consider necessary to proceed with your Radio Research at the Cavendish Laboratory in conjunction with Mr. Ratcliffe. (Sir Evelyn Shaw, 1882–1974, Secretary of the 1851 Scholarship Committee).

Pawsey started out in research in the midst of excitement over the possibilities of radio communications and the iteratively developing physical understanding of the ionosphere and of the equipment that might be used to investigate it. During 1926–28 he completed his BSc at the University of Melbourne, Victoria. In 1929 he began a Master's Degree, which was at that time a research-only degree, under the direction of Professor T.H. Laby. He was supported by receiving the M.J. Bartlett Research Scholarship. Presumably this, along with his work as a tutor in Physics at Queens College, provided him with a small, but independent, income. He embarked on a study of "atmospherics"—electrical disturbances in the atmosphere that Appleton, at King's College, London, and others had linked in part with thunderstorm activity—and their impact on radio broadcasting. From January 1930 to August 1931, he carried out observations using a cathode ray direction finder, working with George H. Munro and Lenard Huxley as part of the Australian Radio Research Board (RRB). Pawsey wrote in 1933: "We were able to give strong evidence that all atmospherics originate in lightning flashes, and made measurements of intensity enabling the distance of the thunderstorms to be roughly determined." (Ratcliffe & Pawsey, 1933)

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Pawsey was involved in one publication from this period: "Accurate Measurement of the Frequency of the Carrier Waves of Victorian Broadcast Stations", appearing in the 27 March 1930 *Australasian Electrical Times* by J.L Pawsey, W.J. Wark and R. Fallon, all from the Natural Philosophy Laboratory of the University of Melbourne. The purpose of this project was to check the frequency stability of the Victorian AM stations. The method was to take a standard frequency source (from an elinvar tuning fork) and multiply it by a factor of 40 or 41. This tone was then compared with the received carrier of the radio station. Similar to modern AM stations, the transmission band was from roughly 0.5 to 1.6 MHz, with the stations spaced by some tens of KHz. Thus the carrier frequencies of each station were required to have a stability of better than a few KHz. Pawsey and colleagues measured the stability of three Victorian stations. But as Pawsey et al. pointed out: "It should be emphasised, however, that in Australia, with its comparatively few stations, rigid frequency control is not so absolutely necessary as in Europe, where [the density of stations is quite high]." Evans comments that in no small measure as a result of this work, by 1933 understanding of atmospherics was adequate for planning a national broadcasting network (Evans, 1973, p. 88).

As a side note, it is amusing that the radio researchers encountered the same initial suspicion and disengagement from meteorological researchers in the 1930s as radio astronomers would later encounter from optical astronomers in the late 1940s and early 1950s. Investigation of atmospherics had shown that radio instruments could detect the source of an atmospheric from upwards of 1000 miles away. This made the value of radio instruments for weather prediction obvious to radio researchers, but not to meteorologists. The situation was made more difficult by the radio scientists making elementary errors in meteorological analysis (Evans, 1973, p. 102).

The MSc thesis was submitted in March 1931, apparently finished at the end of 1930.[1] In the 116-page thesis "Atmospherics", Pawsey began by defining the problem:

> An "atmospheric" may be defined as a *naturally occurring* variation of the electric and magnetic field of such a nature as to be capable of actuating a radio receiver; and so in the presence of signals, interfering with the reception of such signals. Such variations are propagated in the usual manner, so atmospherics are merely a class of [low frequency] electro-magnetic waves.

He provided a fascinating history of the discovery of atmospherics, starting with the famous Russian physicist Alexander S. Popov (1859–1905) (Smith-Rose, 2021), whose pioneering work occurred in May 1895 when he detected lightning strikes at a distance of 50 km. Pawsey described how early work on the cause of atmospherics (frequency from about 10 kHz to 30 MHz with typical frequencies near 300 kHz) was carried out by Appleton, Watson-Watt and Herd in the years 1922–1926 in the UK. Pawsey summarised the directional evidence of atmospherics which occurred

[1] Hastings Pawsey discovered in 2016 that no copy of the MSc thesis could be located at the University of Melbourne; fortunately the Royal Commission for the Exhibition of 1851 in London had a copy in their Pawsey file which was provided to the Pawsey family.

all over the world: "The major sources of atmospherics lie in the region of great thunderstorm activity for the time in question [often tropical afternoons)."

A noteworthy section of the thesis deals with the "treatment of interference [due to atmospherics] by means of Fourier analysis". Pawsey showed that the output of the radio receiver could be represented by a Fourier series or Fourier integral. Given the fundamental early contribution on the use of Fourier analysis for radio astronomy that McCready, Pawsey and Payne-Scott would make in 1946–7 (Chap. 13 and especially Chap. 36), we are intrigued at Pawsey's clear understanding of this property in about 1930, prior to his experiences at Cambridge. Evidently Laby was familiar with the use of Fourier analysis, which appears in a book on geoprospecting that he published with Broughton Edge in 1931 (Laby & Edge, 1931). Perhaps Pawsey had come across this application of Fourier analysis during his short period of research assistant work geoprospecting in Tasmania in 1929.[2] In any case, based on his understanding of Fourier's integral theorem, he gave a number of examples of Fourier pairs: an isolated sine wave, an exponentially damped sine wave and an "infinitely short pulse", later called a delta function.

The thesis was reviewed by David Martyn, presumably in early 1931 (undated):

> Since 1920 a rapidly increasing number of original contributions have been made, as the result of the intensive study of the subject carried out largely in Britain, France, America, and Germany. These investigations have been made with the object of discovering the precise electrical nature of atmospheric impulses, their origin, their connection with meteorological influences, and their effects on apparatus commonly used for the reception of wireless signals. The number of original contributions to this branch of science is now very large, but no connected account of the whole subject has hitherto been published, nor have the results of any attempts to analyse critically the data and methods of different observers been made available. Mr. Pawsey has attempted both of these tasks. Commencing with a brief historical survey which serves to present the subject as a whole in perspective, the author proceeds to describe exhaustively work on the intensity and waveform of atmospherics, and on their places of origin. There follows a section on the mode of origin of atmospherics in which all the known possible sources of electrical disturbance are considered, with special emphasis on the lightning flash. A strong case is made out, on several grounds, for the explanation of all individual atmospheric impulses as being due to separate lightning flashes occurring in some part of the terrestrial globe. Finally, there is a comprehensive account, chiefly mathematical in character, of the effect of atmospheric impulses on wireless receivers. The problem naturally possesses great practical importance, but unfortunately the investigations so far carried out have been brought to little practical issue. The author presents the lines of attack which have been employed in attempting a solution. There is a most extensive bibliography in which the author wisely gives weight to the papers which he considers to be of chief importance. This thesis could only be the result of a great amount of diligent and discriminating labour. The author has made a most painstaking survey of his subject in a competently critical manner. The data which he has brought together, and perhaps some of his conclusions, should prove of great use to all types of workers in that field. Mr. Pawsey's practical work is competent, and again he shows much diligence in the reduction and analysis of his data.

[2] H. Wendt commented to the authors that it seems that this technique dates back to the 1870s and was used on ship compasses, so it would not be surprising if surveyors were also familiar with it.

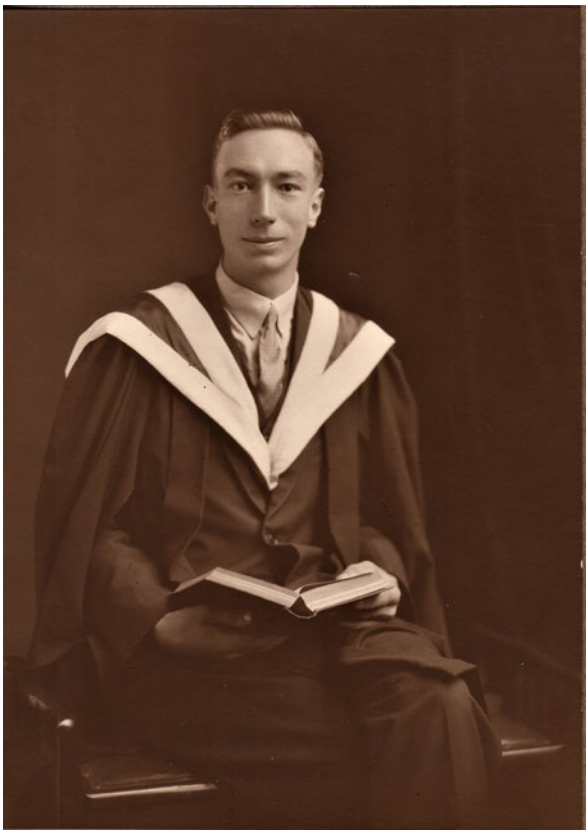

Fig. 6.1 J.L. Pawsey, April 1931, awarded MSc with First Class Honours. Credit: Joe and Lenore Pawsey Family Collection

We can perhaps see in this the emergence of a Pawsey "research style": focused, painstaking and meticulous, and attempting always to integrate existing knowledge, and pull all the elements together. There is no doubt that the contribution he had made to the nascent research program at the Radio Research Board was substantial and there was considerable discussion about whether he ought to be recognised as a lead author of the R.R.B. Report No. 5(1) "Atmospherics in Australia" (Evans, 1973, p. 77). The MSc was awarded in April of 1931 with First Class Honours (Fig. 6.1).

We should note that in the same year that Pawsey was awarded his thesis, 1931, Karl Jansky (1905–1950) (Sullivan, 2009), just three years older than Pawsey and an engineer with Bell Telephone, was building a turntable-mounted antenna in order to investigate atmospherics that might affect Bell's plans to wirelessly transmit trans-atlantic telephone calls by reflecting them from the ionosphere. It is a shame that Jansky could not know of or access Joe's useful compendium of information about atmospherics! While Pawsey contemplated his next career steps, Jansky was categorising a year's worth of static into three types: close thunderstorms, distant thunderstorms, and a mysterious additional hiss with a maximum intensity that rose and fell once a day, which turned out to come from the Milky Way. As is now well

known, the first observations in "radio astronomy" had been made, only to go largely unrecognised until after WWII (Sullivan, 2009, p. 34). Pawsey could not have seen the Milky Way as Jansky did, because the frequencies he used (around 100 kHz) were below the ionospheric cut off, and hence nothing from outside the ionosphere could be seen.

During his period at the University of Melbourne, Joe Pawsey was also involved in a number of sporting activities. At Queen's College in 1928 he qualified in Jiu-Jitsu and in rifle shooting. "He was awarded a Victoria Rifle Association medal in 1930 and was Vice-Captain of the Melbourne team which visited Adelaide in 1930 and was subsequently Captain." (Lovell, B., 1964) Also, he was the Vice-Captain of the Queen's College second football team.

1931: Award of an 1851 Exhibition Scholarship, Choice Between London and Cambridge[3]

In April 1931, Pawsey began to plan for his future. While we do not know what inner hopes or visions he held, clearly he could not see that future for himself in Australia. Opportunities for scientific work of any kind were very limited; the landscape for work as a physicist—let alone in research as such—was bleak indeed.

1931 was the height of the Great Depression, and Australia was a country with a small population strung out across vast geographical distances. It was a nation of agriculturalists and shopkeepers; it was an economy built on the export of primary materials, not on manufacturing; it was composed of immigrants who had left the centres of the Industrial Revolution. The development of organisational infrastructure for sectors intended in the end to be profitable often still rested with the government, which had to effectively get whole new industries started. State and Federal governments supported limited research in agriculture, geologists could hire their services to mining companies, and scientific medicine was drawing clinician researchers into the laboratories slowly growing in hospitals. And in one sense this activity added up to a quietly maturing Antipodean scientific milieu, with achievements all the more remarkable for being borne from a scarcity of resources.

But physicists? The numbers of positions around the country could be counted on fingers. With the Radio Research Board just beginning, there were no industries to demand them; the sole occasional employer was Amalgamated Wireless Australasia (AWA). The immensely talented Ruby Payne-Scott, who was to become such a key member of Pawsey's research group during and after WWII, found employment for a couple of years as a medical physicist as part of a cancer research project. When

[3] See ESM 6.1, Pawsey's letters, for a description of the collection of 189 letters from Joe to his parents from 1931 to the end of 1939 when the Pawsey family departed for Australia at the beginning of WWII.

that concluded, she had no choice but to look (rather anxiously) for work as a school teacher (Goss & McGee, 2009).

It is interesting that Pawsey, then still engaged in research on atmospherics in Laby's group at the University of Melbourne, appears to have explored several possible employment avenues. On 2 April 1931, he wrote a letter to a prominent US electronics company, General Radio Company (founded in 1915 in Cambridge, Massachusetts), hoping to find a position with this firm. J.W. Norton, Chief Engineer, replied on 14 May:

> . . . Apparently, you are interested in some temporary arrangement to permit you to become acquainted with American technique. The organisation of our Engineering Department is such that it would be difficult to find an opening of the nature you have in mind. Our engineers are required to acquaint themselves with all phases of our work and, consequently, commercial contacts and an intimate knowledge of the routines and practices of our customers are quite as much a part of their work as is the more fundamental scientific research. Because of this, it is not feasible for us to employ physicists or engineers for technical work alone . . .

This remains an issue at the contemporary science/industry interface.

He then sent a series of letters to Cambridge University, partly on the advice of Prof A.M. Wadham, professor of agriculture at the University of Melbourne and a former faculty member of the botany department at Cambridge. (This is a good example of the value of international links—Wadham did not even have to be in the same field to support Pawsey). As we have noted, going to study in the UK was in fact the most predictable path for the most promising young men of science in the interwar period. Most of the Australian professoriate—like Laby and Wadham—were British. They recommended their very best students to return "Home" for the exposure to new ideas and the collegiate company of fellow scientists that they remembered, and they used their carefully sustained networks to nurture these careers. Future Nobel prize winner Frank Macfarlane Burnet (1899–1985),[4] a fellow Melbournian, left for Cambridge just a year before Joe Pawsey.

The biggest barrier, of course, was money, but like many (perhaps the majority) Australian scientists, the crucial vehicle was a substantial scholarship program. By the end of May, Pawsey had submitted his application for an 1851 Exhibition Scholarship; he had been recommended by the University of Melbourne. He wrote, "I hope to continue with radio research, and would presumably be working under the direction of Mr J.A. Ratcliffe . . . I hope to arrive in England about the end of September." Ratcliffe had been a student of Sir Edward Appleton's, and remained at the Cavendish when Appleton moved to London.

In an accompanying letter, Pawsey applied to the Cavendish Laboratory with more details of his proposed study programme:

> I wish to carry out radio research at the Cavendish Lab. I understand that facilities for this work are available and that some students are carrying out such work under the direction of Mr. J.A. Ratcliffe, but that apparatus may not be readily available. For this reason Prof Laby

[4] See https://www.nobelprize.org/prizes/medicine/1960/summary/

> advises that it would be better not to specify a particular problem but to decide this question after consultation with Cambridge authorities . . . I am posting by this mail a letter from Prof Laby (FRS) to Lord Rutherford which deals with this matter.

Pawsey gave a short description of his MSc thesis work on atmospherics: "This work is that on which the Final Honour Exam results and the Dixson Scholarship . . . were awarded and was submitted for the 1851 Exhibition Scholarship." Within a day or so, the news arrived from London that Pawsey had been awarded this scholarship (£280 per annum).

In Cambridge, Priestley sent the papers along to Ratcliffe, asking if Rutherford "can accommodate him in the Cavendish Laboratory, and also if the authorities at Sidney Sussex will take him". At this point, the decisions regarding Pawsey became quite confused due to a misunderstanding of the 1851 Exhibition authorities.

The Royal Commission for the Exhibition of 1851 sent the application and reference letters to Prof Richard Tetley Glazebrook (1854–1935), a prominent physicist who had been the first Director of the National Physical Laboratory in Teddington, London. Glazebrook was the assessor for the 1851 research fellowship, writing a report on Pawsey's application, "on the work of J.L. Pawsey, age 22, [sic, actually 23]".[5]

> The thesis is an admirable piece of work. I endorse the high opinion of it expressed by Mr. Martyn of the Australian Research Board [sic, Radio Research Board]. Personally I know of no such account of Atmospheric Research . . . He clearly has a wide knowledge of what has been done to elucidate the cause of the phenomena and the laws to which they are subject. It is highly desirable that he should be brought into closer contact with the men who are working at the subject here and I recommend him strongly. **I think he would be better advised to work with Professor Appleton rather than at Cambridge** [our emphasis].

Shaw, secretary of the 1851 Scholarship Committee, informed Pawsey in early July 1931[6] that he had been awarded an 1851 Scholarship[7] to go to *London, King's College to work with Edward Appleton.* Lord Rutherford was not pleased to hear that the Cavendish had lost a promising PhD candidate. Pawsey, assuming that the decision was final, wrote Cambridge, withdrawing his application on 9 July 1931. On the same date, Rutherford had a telephone and written conversation with the 1851 Exhibition staff, and Ratcliffe wrote to Raymond Priestley (1886–1974), Secretary to the board of Research Studies, on 10 July 1931:

> I note from [Pawsey's] letter that he wishes to "carry out radio research at the Cavendish Lab", and he mentions my name and says he would like to work with our little band of radio research workers . . . I [just met] . . . Prof Appleton,[8] of King's College, London, and he then told me that Pawsey had been awarded an 1851 Exhibition, but that the authorities had

[5] Royal Commission for the Exhibition of 1851 archive, communicated to Hastings Pawsey May 2016.

[6] Cambridge University files for J.L. Pawsey, letter to R.E. Priestley, secretary of Board of Research Studies, 9 July 1931.

[7] Pawsey was in an illustrious group of Dominion (Australian, New Zealand and Indian) recipients: Rutherford, Oliphant, Massey, Laby, Leslie Martin and Bhaha, among others.

[8] Ironically, Appleton had been Ratcliffe's advisor at Cambridge in 1924–1927.

> decided that he should go to London and not Cambridge, because there had been so many 1851 Exhibitioners at Cambridge of recent years … In view of the fact that Pawsey very strongly wishes to come to Cambridge and to work with us, it seems very strange if he has been allocated to London … I have also seen Lord Rutherford and have ascertained that he would be willing to take Pawsey into the Lab as a research student.

After Priestley wrote Shaw on 14 July 1931, Shaw responded in a defensive manner two days later[9]:

> It is quite true that Mr. Pawsey … applied for permission to conduct his research work at Cambridge, but it is not true that the Commissioners decided that he should go to London "because there had been so many of their Scholars at Cambridge in recent years". The facts are these: Pawsey was awarded a Scholarship, but both the examiners of his papers felt that he would have better facilities for the particular research he proposed at King's College, London, than at Cambridge, and so after consulting with Professor Appleton, I was instructed to make the award to Pawsey conditional upon his going to King's College. I explained this in my telegram to the University. I hope that you will make it clear to everyone that there is not the slightest wish on our part to divert anyone from Cambridge. As you will readily understand, our only wish is to secure the best conditions for our Scholar's studies.

Ratcliffe reported that the committee had assumed that the "obvious place for [Pawsey] to work was with Appleton**.** They did not know any wireless work was done at Cambridge. They therefore asked Appleton if he would accept Pawsey and he accepted." Rutherford proposed a simple solution: after Pawsey reached England, he could visit both places and make his own decision. On 16 August 1931, two days before the ship (*Oronsay*) departed from Melbourne, Ratcliffe cabled Pawsey, explaining his options. Pawsey must have been relieved, as he told Ratcliffe that he would indeed visit Cambridge.[10] He sought advice from Laby, but Laby simply advised him to ask for more advice on arrival.

Pawsey arrived in the UK during the third week of September 1931 to face the decision of London or Cambridge. Pawsey met Shaw as Laby advised on Friday 25 September to discuss "the merits of my doing a course of research at Cambridge or London."

Pawsey visited Cambridge, being shown around by C.B.O. Mohr, a research student at the Cavendish and fellow graduate of the University of Melbourne physics department.[11]

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[9] This complex story has been pieced together using the Cambridge academic records of Pawsey and the 1851 Exhibition archive.

[10] A few days after leaving Melbourne, Pawsey received a telegram from Laby in Fremantle that did not provide decisive advice: "See Shaw, 1851 Commissioners, obtain advice English specialists, difficult me decide between London and Cambridge." [sic]

[11] Mohr (1906–1986) had graduated from Melbourne two years earlier than Pawsey. Mohr followed Massey to the Cavendish where they collaborated on nuclear physics problems (e.g. "Anomalous Scattering of Alpha Particles and Long Range Nuclear Forces", Massey and Mohr, 1938). Later in his life he was at the University of Cape Town and the University of Melbourne Physics Department. Massey had been a classmate of Pawsey's at the University of Melbourne.

> [Mohr] was able to give me an idea of Cambridge from the students' point of view. I saw Ratcliffe ... when he showed me the work they are doing there and on my return to London I visited Appleton at King's College and went with him to visit **[F.W.G. "Fred"] White**[12] (formerly with Ratcliffe [1930–31]) now demonstrating at King's. We also went to Slough to the Radio Research Station. [our emphasis].

On 30 September 1931, Pawsey outlined the pros and cons of both places to Shaw.[13] He was systematic. His letter laid out categories of consideration: "radio equipment, radio research workers, general research in physics, general conditions of life, duration of the degree and financial considerations". Pawsey liked the fact that the group in Cambridge was much smaller (at present one compared to four at London, leading to more attention from the supervisor). The duration at King's College was usually two years for a PhD compared to three at Cambridge. London would be considerably cheaper.

In the end though, the decision was not so much pragmatic but romantic. The overriding factors were:

> (1) Cambridge stands alone in respect to the famous physicists whom one meets (also mathematicians) and, (2) Cambridge alone has the "atmosphere" of university life ... there is not a great deal to choose between the two places, each having special advantages ...Taking these things into consideration I feel that it would be preferable for me to go to Cambridge to do radio research under Ratcliffe.

On 1 October 1931, Shaw wrote Pawsey with the message that the Chair of the Scholarships Committee:

> approves of your proposal to spend the period of your Scholarship at the University of Cambridge instead of at the University of London as formerly arranged, and after taking all the circumstances into consideration, he believes that you have made a wise choice. You, therefore, have the permission of the Commissioners to make whatever arrangements you consider necessary to proceed with your Radio Research at the Cavendish Laboratory in conjunction with Mr. Ratcliffe.

On 3 October, Pawsey wrote Shaw pointing out:

> I have been up to Cambridge [a second visit on 1 October] and the arrangements for my doing a research for a PhD are all in order, both as regards University and College (Sidney Sussex) authorities. The former is not official as the Board of Studies has not considered it, but I am assured by Priestley that this approval is practically certain. I shall therefore "go up" on [5 October] ... I am taking at Cambridge the proscribed courses leading to the PhD.

On 7 October 1931, Shaw wrote Appleton with an apology:

> We did know, when we made his Scholarship conditional upon working with you, that he had already made contact with Cambridge and that Lord Rutherford had agreed to his working with Mr. Ratcliffe. When the Commissioners heard this, they decided that the best thing to do was to let Mr. Pawsey acquaint himself with the conditions of each centre and then be guided by his own inclinations if he should arrive at a definite conclusion one way or the other. He told me that it was extremely difficult for him to choose between the two

[12] F.W.G. White (1905–1994) would later join Pawsey at Radiophysics during WWII.

[13] 1851 Exhibition archive, J.L. Pawsey. Pawsey to Shaw 30 September 1931. They had had a personal meeting earlier in the day.

> centres available for his research, but that the attractions of university life at Cambridge drew him strongly to Cambridge. On that, I could nothing but advise him to join Mr. Ratcliffe.[14]

Pawsey finally let his family know his status on 7 October 1931[15]:

> I am now more or less settled down. I "came up" on Monday [5 October]. Today I had a look round and Ratcliffe showed me the works in the problem I am starting on. I dined in Hall tonight for the first time. It was not a very unusual business. The only thing of note is the old custom of dining off the bare boards. After, Ratcliffe was to take me to see some of "the works" and asked me up to coffee in his rooms. I met Mrs. Ratcliffe, a charming woman I think . . . They make a nice pair.

On 16 October 1931, the Degree Committee informed the registrar of the University of Cambridge that J.L. Pawsey had been admitted to a course of research and that Professor Lord Rutherford was the supervisor. Pawsey was informed of this decision on 4 November 1931.

Friends and Student Life: J. L. Pawsey and Frederick H. "Ted" Nicoll from Canada, 1931–1933

In late 1931, Joe Pawsey met Ted Nicoll (1908–2000), a fellow 1851 Exhibition research student at the Cavendish. Nicoll had graduated from the University of Saskatchewan, Canada, and arrived about the same time at Cambridge.

A major source for the interaction of these two colleagues is the 400-page collection of letters from Nicoll to his family in Battleford, Saskatchewan.[16] On page 62 of the collection, Nicoll wrote his family on 15 November 1931 with the first reference to Pawsey:

> Yesterday, Pawsey—a friend of mine from Australia and also in Physics—arranged to get a bike for me from one of his friends. Pawsey had me over for lunch at his place earlier in the week when we decided we would go for the bike ride on Sunday. He got the bike from an Australian friend of his and Pawsey and I had dinner at my place and then left for Ely 16 miles at 1:30. We got there at 3:30 and spent a good deal of time looking over the famous [Norman cathedral from AD 672] there. It is very wonderful indeed . . . We left Ely at about 04:30 and arrived home at 06:30—well after dark but we had cycle lights with us . . . The day was misty all day and so damp the moisture was actually condensing but it wasn't at all disagreeable cycling and I thoroughly enjoyed it.

In these first few months that both Pawsey and Nicoll were in Cambridge, they both experienced the remarkable hospitality provided by Lady Frances Ryder (1888–1965, daughter of the fifth Earl of Harrowby), Organiser of the Dominion

[14] Appleton was so impressed with the [only] copy of Pawsey's MSc thesis that he borrowed it in July 1931 for "a few weeks". By October 1932, he had still not returned the thesis; after being prodded by the 1851 Exhibition Scholarship staff he returned the copy on 13 October.

[15] Pawsey Family Archive.

[16] Provided by Ted Nicoll's daughter, Patricia Agnew.

Services and Students Hospitality Scheme, which provided assistance to Dominion servicemen in WWI and again in WWII as well as to students in the interwar years. Lady Frances Ryder (CBE) and her friend Miss Celia Macdonald of the Isles provided these services in the 1930s, organising home visits in the UK for Canadian, Australian, New Zealand, South African and American students. At some point, Lady Frances reported that they had card indices of 1600 potentially lonely visitors. By the time of WWII, *The Australian Women's Weekly* of 13 April 1940 reported:

> Go along any afternoon you are in London to 21b Cadogan Gardens and ask for Lady Frances Ryder's rooms, and if you hail from any part of the Empire you are bound to meet someone you know there . . . Lady Frances [reported] that her mail amounted to something like 32,000 letters received and answered during the year. If you have a son or daughter who has left a hometown to seek more knowledge at [UK universities] a letter of introduction from the college will assure a welcome always at Lady Frances Ryder's . . . As time went on Lady Frances heard of young students who were coming to London, living in boarding houses, and in many cases utterly miserable with loneliness. The tea-parties became more frequent, one friend introduced another, and in the end Lady Frances decided to take the huge suite of rooms which by now are known to so many—including innumerable Australians . . .

A Canadian newspaper also had an article about Lady Frances[17]:

> Lady Frances Ryder is so well known among students, especially at Oxford and Cambridge, that the impudents [very rude], grateful though they certainly are, have taken to calling the system "Lady Rydering". It is really a good phrase, however, for pun that it is, it represents innumerable things easily expressed. And often while one is Lady-Rydering it is not unusual to find some other fellow student, who is an acquaintance, Lady-Rydering in another house in the same district. And you have picnics together, and there is great glee.

By early December 1931, Nicoll and Pawsey had numerous invitations for the December Christmas period organised by Lady Frances. For example, on Saturday 5 December, there was "Lady Frances at home" with games and dancing from 08:30 to 10:30 pm. Ted was enthusiastic about this party: ". . . [N]eedless to say I danced and had an excellent time and met two nice Australian girls (more of them later[18]). I hadn't accepted Lady Frances's invitation for the Sunday night but as I had nothing to do she very nicely asked me to go to it too." The two colleagues also went sightseeing in London during the weekend. The breakneck social schedule continued through Christmas and New Year's, with home visits organised by Lady Frances.

On 28 December, Pawsey moved to the home of two friends of Lady Frances: "My hostesses—the two Misses Bradshaw—are elderly, live in a comfortable house on the outskirts of the town of Retford and are rather nice."

The two friends returned to Cambridge on 8 January 1932 to continue their research studies. In early February, Pawsey and Nicoll decided to move farther outside Cambridge to "get cheaper rooms". (Pawsey was associated with Sidney

[17] A quote from an unnamed Canadian newspaper provided by Ted's mother, Mabel Nicoll.

[18] Pawsey and Nicoll took the two Australian girls (the Ainsworth sisters) to a ball organised by Lady Frances the following week. "We danced from 09:30 to 02:30 [am!]." Joe and Ted were to meet them again on 21 December 1931.

Sussex College and Nicoll with Trinity College.) They also would share a sitting room to save expenses. Nicoll wrote to his family on 7 February 1932:

> Pawsey is doing wireless research . . . and he and I are thinking of making some 5 metre sets [60 MHz] for amusement . . . I agree with you, Lenore [Ted Nicoll's sister] that I have probably seen more of some English life than many who live here. I can tell you we are in a marvellous position; being on a scholarship gives you the key to so many things like these and attending Cambridge puts you in such a position that you can meet anyone and consider yourself on their level if not above it. Altogether it gives you a great deal of self-confidence.

During the summer of 1932, William Beare (a fellow Canadian from Toronto, also at Cambridge), Pawsey and Nicoll went on a mountain climbing trip to North Wales, traveling the 700 miles on motorbike, and climbing Mount Snowden (elevation 3560 feet or 1085 metres). Soon afterwards, Nicoll's mother, Mabel, arrived in London (2 July 1932) and Nicoll took her to Cambridge, where she met Pawsey. Nicoll reported to his family: "Pawsey took us out to tea and she [Mabel] also liked him." Mabel returned to London that evening to continue her European tour on the continent.

Later that summer, Pawsey and Nicoll took a 3000-mile tour of Europe, travelling by motorcycles and camping along the way. For Pawsey, some of the route through France, Belgium, Germany, Austria, Switzerland and again France was a repeat of the YAL (Young Australia League) trip of 1925. They were gone for about five weeks. Ted summarised the tour in great detail in a letter from 1 October 1932.

The Flanders battlefields near Ypres were the first destination, a repeat visit for Joe. They visited Sanctuary Wood, a site where many Canadians were killed in April 1916. Ted wrote: "The weapons and instruments of destruction certainly set one thinking about war, why it happens and whether it will happen again and as a result Joe and I have had some excellent [discussions] on the subject though we have not, I fear, solved the world peace problem."

As they visited Germany they were initially impressed: "The Germans are very kind, good-natured and happy-go-lucky, with none of the German reserve . . . We found them easy to talk with and met some amusing people." Then they.

> met a real Hitlerite belonging to the Hitler [storm troops] and traveling also by motorbike. He could speak a bit of English and accompanied us for 50 miles till lunch and we ate together after which he left us. The chief information we got from him was the Nazi motto: "Bread and work for everyman" and their hearty dislike for [World War I] reparations—thinking that they are the source of all their troubles.

A high point of their visit was the Black Forest, where they did some long hikes, including one of 30 miles round trip (Figs. 6.2, 6.3 and 6.4). They visited Munich and the Deutsches Museum, a beer house near the headquarters of the Storm Troopers, and then they went to Innsbruck in Austria. From there, the pair travelled south through the Brenner Pass to Italy where they visited Cortina, Venice and Milan. Heading back north, they saw Geneva and Paris before boarding a cargo ship in Boulogne to sail to Folkstone (UK) and home.

Travelling through London in late September 1932, Pawsey and Nicoll visited the 1851 Exhibition office, meeting Canadian W.J. Henderson (previously from Queen's

Fig. 6.2 Pawsey on a climb in the Black Forest, summer 1932. Credit: Joe and Lenore Pawsey Family Collection

University in Canada), who was to later play a prominent role in the National Research Council of Canada. Henderson was on his way to the Cavendish Laboratory. He would later join Pawsey and Nicoll on numerous motorcycle trips.

For Pawsey, as for so many research students before and after him, this was a time of thoughtful exploration of his appraisal of the world in which he found himself, and of the roles he wanted to play within it. In Chap. 8, we briefly discuss some of his political and social reflections, formed partly from his critical observations of National Socialists in Germany. In a letter to his parents on 14 March 1932, he mused in particular about science. We quote these musings here, both because they capture something of how he approached *doing* science, but more for the values that were coming to define him:

> . . . In my last letter I touched on the spirit of science and the effect on the world. I wish to emphasise one point. I defined the scientific method of today as a willingness to question (& investigate systematically) any question which comes up. It may appear as an obvious thing stated thus. I should like to point out that the practical application is the reverse to many or I think most people. One of the most blatant applications is the questioning and re-examination of the old established ideas. These ideas have been upheld by men we look up to, men to whom we do not claim superior intellect. May we then question their

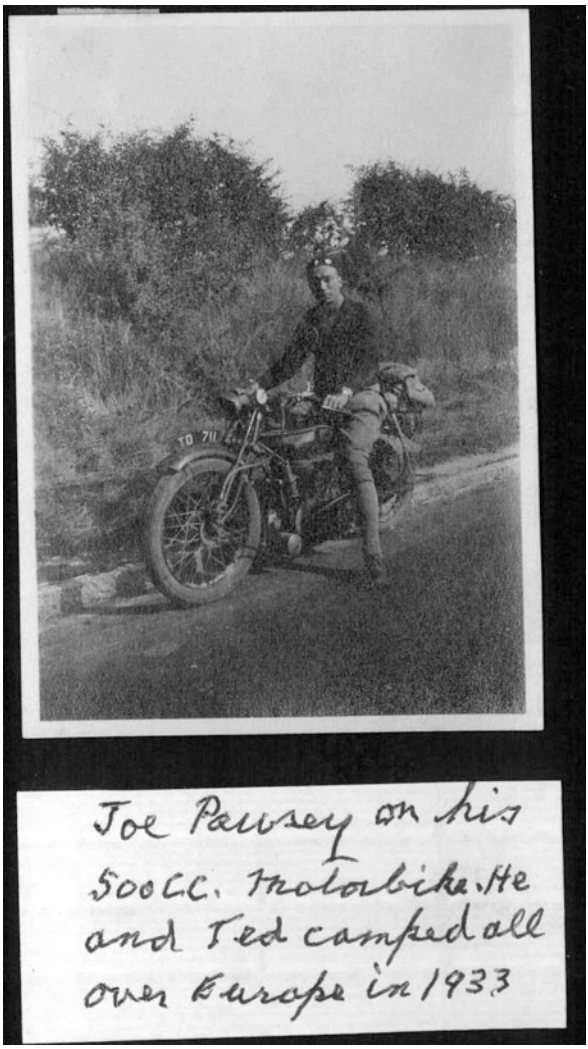

Fig. 6.3 Pawsey on his motorbike. Credit: Joe and Lenore Pawsey Family Collection

conclusions in any given line? The old school of thought held—I feel—that to question one tenent (sic) of the teaching of a great man was to despise him and to reject one tenent (sic) was to reject his whole philosophy. My idea is to accept no man as infallible & to base my conclusions, not in those of greater men than myself but in those cases where it is feasible on my own reasoning from the facts at my disposal.

These points of view are exemplified (a) in the doctrine of the verbal inspiration of the Bible & (b) in the attitude which gives Newton a place as probably the greatest scientist in an age which practically the whole of his conclusions are believed to be accurate. Most people hold views somewhere between the two.

As you will point out it is impossible to personally investigate every question & actually most things must still be accepted "from the accumulated wisdom of the ages" (or ignorance). The point of view however should have, & has, an important secondary

Fig. 6.4 Nazi Storm Troopers. Credit: Joe and Lenore Pawsey Family Collection

effect. It teaches tolerance. Most questions you conscientiously investigate have two sides to them which it is not easy to decide between. Those conclusions which you obtain second hand are almost always one sided. We are told unequivocally that such a thing is right, another wrong, not that a certain person or persons considered the first preferable to the second. This intellectually tolerant attitude possesses the characteristic that there is no great driving force. It does not play on the emotions without which life is flat. Thus one gets neither the saint nor the Inquisition & the "Thirty Years War" (of scenes from European History).

Religions seem to me to take their inspiration from a play on the emotions. Emotion and the satisfaction of instincts are the driving forces of religion—love— the fear of death—etc.

Science has had amazing successes in the conquest of the physical world through a reasoning questioning process. It fundamentally mistrusts emotional conclusions—the only argument for this is that different people agree on the former & usually disagree with the latter. The driving forces are comparatively weak—the curiosity—analogous to my mind to the artistic spirit, & a thirst for power. Curiosity the former, though less potent one would imagine, is more fruitful.

There is thus a clash between religion & science. Religion says unequivocally "Do this!" & gives no reasons. Science says, here are the reasons but does not say "Do this!" with any great power. They should to my mind urge the doing of the same thing.[19]

There are two possibilities. One is that you are bored stiff—the other is that you are very interested. If so state which. Of course this is just a collection of platitudes which have been said thousands of times before. But so have thousands of these things.

[19] Apparently, Joe was not "devout". On 4 January 1933, Joe reported to his parents that Mrs. Harford, a Lady Frances Ryder hostess for New Years, was "very devout which may be a strain on me".

In practical terms, the time had arrived when Pawsey wished to consider what kind of scientist he would be. In February 1933, Nicoll reported to his family that Pawsey was already looking for a job in the wireless industry. He wrote: "[Pawsey's] chances of getting the [position] are pretty good and that makes my chance for an extension [of my 1851 Exhibition] still better," since he and Pawsey were possibly competitors for this additional funding.

In the end both Nicoll and Pawsey received extensions for their 1851 Exhibition Scholarships.