



Royal Meteorological Society

OCCASIONAL PAPERS ON METEOROLOGICAL HISTORY No.12

**ALBERT WALTER, O.B.E (1877-1972)**  
**Meteorologist in the Colonial Service**  
**Part I: His early life and work in Mauritius**

*Joan M. Kenworthy*

Published by  
The Royal Meteorological Society's  
History of Meteorology and Physical Oceanography  
Special Interest Group

MAY 2013

ISBN: 978-0-948090-34-9

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# Albert Walter, O.B.E. (1877 – 1972) Meteorologist in the Colonial Service

## Part I: His early life and work in Mauritius

Joan M. Kenworthy

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## Abbreviations used

L. M. A.	London Metropolitan Archive
Oxford DNB	Oxford Dictionary of National Biography
R. G. O. (RGO)	Royal Greenwich Observatory
R. A. O.	Royal Alfred Observatory

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## Acknowledgements

Reference is made to the memoirs and papers of Albert Walter with the permission of the Librarian, Bodleian Library of Commonwealth and African Studies at Rhodes House, Oxford, as agreed by members of the family of Albert Walter. Details of permission to use images are shown below each map and plate.

The help and support of the following are gratefully acknowledged: M. Jacques Pougnet, Secretary of The Mauritius Meteorological Society; Mssrs. Lindsay and John Walter; Peter Marsh, for finding census data and ship records; David E. Pedgley for helpful comments on the draft; J. Malcolm Walker, Editor; the Bodleian Library of Commonwealth and African Studies at Rhodes House, Oxford; the British Library; the Manuscript Room, Cambridge University Library; Durham University Library; Durham University Department of Geography; Harris Manchester College, Oxford; the London Metropolitan Archive; the National Archives of Mauritius; the National Meteorological Library and Archive, Exeter; the Radcliffe Science Library, Oxford.

NOTE: The Meteorological Society of Mauritius was founded in 1851 and continued into the twentieth century, although Walter states in *The Mauritius Almanac* for 1926-7 that meetings were not held anymore. The Mauritius Meteorological Society was formed in 1999 by a group of amateur and professional meteorologists, with a different name to distinguish it from the earlier society founded by Charles Meldrum and others (information from J. Pougnet – see above acknowledgement).

## 1. Introduction

At the time of my departure for the colonies Stanley was making his third and last journey to Africa and the books on his previous journeys had been published. The Congo was being developed by the Belgians and the European powers had divided the other parts of Africa into spheres of influence. I certainly could not surmise what the future would hold for me and that I should be called upon to preside over the first pan-African conference which was convened in Lusaka in 1936 to deal with the organization of the meteorological services in Africa.<sup>1</sup>

**Walter, Albert, O.B.E.** (1935), F.R.A.S. – b.1877; ed. Roans Sch., Blackheath; war serv. 1943-47, G/capt.; appt., Royal Observatory, Greenwich, 1892; asst.dir., Royal Alfred Observatory, Maur., 1897; statistical advr. to Maur. Royal comsn. 1909; census comsr., Maur., 1911 and 1921; dir., Royal Alfred Observ., 1911; food, trade and export contr., 1920-22; mem. of coun. of govt., 1922; headed deputation to India for the re-opening of emigr. to Maur., 21<sup>st</sup> Dec., 1922; statistician, Ken., 1926; statistician to govs.' Confce., 1926; dir., Br. E. A. Meteor. Serv., 1928; pres. reg. comsn. (No. 1) Africa internat. meteor. organ., 1936; author of Sugar Industry of Mauritius, Insurance of crops against cyclones, and articles on climate in E.A.; editor, Mauritius almanac.<sup>2</sup>

A summary of Albert Walter's career is recorded in the Colonial Office List (above) and an obituary appeared in the *Quarterly Journal of the Royal Meteorological Society* in 1973.<sup>3</sup> A short account of his work as a meteorologist in East Africa has been published,<sup>4</sup> but his memoirs, papers and correspondence held in the Bodleian Library of Commonwealth and African Studies, Rhodes House, Oxford<sup>5</sup> provide such an extensive record of value to historians of colonial meteorology that this study (which cannot include all that is in the memoirs and papers) is written so that the resources

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<sup>1</sup> Walter, A., 1963. *Echoes of a vanishing Empire, being the memoirs of a meteorologist and civil servant in the colonial Empire 1897-1947*, Volume I, MSS. Brit. Emp. r. 9. Bodleian Library of Commonwealth and African Studies at Rhodes House, Oxford, 7.

<sup>2</sup> The Colonial Office List 1950, Colonial No. 251, 618. HMSO. Walter appeared in the Lists from 1913 to 1950.

<sup>3</sup> *Q. J. R. Meteorol. Soc.* **99**, 1973: 795.

<sup>4</sup> Kenworthy, J. M., 1997. Albert Walter, O.B.E., Meteorologist and Civil Servant in the Colonial Empire: some aspects of his contribution to meteorology in East Africa, contrib. to Kenworthy, J. M. and J. M. Walker. (eds.), *Colonial observatories and observations: meteorology and geophysics: proceedings of a conference held at St. Mary's College, University of Durham, 8-10 April 1994*, Department of Geography, University of Durham, in collaboration with the Royal Meteorological Society, 105-116.

<sup>5</sup> I am grateful to the Librarian of Rhodes House for permission to draw on the following materials: 1897-1960, Meteorological Papers, Kenya and Mauritius, MSS Brit. Emp. S, 391. (received by Rhodes House Library, July 1971); 1912-1960, Mauritius (papers), MSS. Brit. Emp. s. 441(1). (possibly received by Rhodes House Library in 1967-8); 1921-1960, Correspondence, tables, charts and statistics, 4 Boxes, MSS. Afr. S. 1864 (1-4). (possibly received by Rhodes House Library in 1967-8); 1963, *Echoes of a vanishing Empire, being the memoirs of a meteorologist and civil servant in the colonial Empire 1897-1947*, Volume I, MSS. Brit. Emp. r. 9. (received by Rhodes House Library, June 1969).

and the details of Walter's colonial service may be more widely known. Background information and references are given in footnotes.<sup>6</sup>

Part I covers the period to the end of 1925, when Walter was called to Kenya. Part II will describe his work as first Director of the British East African Meteorological Service and as first President of the International Meteorological Organization Regional Commission No. 1 (Africa), his activities in the Second World War and his involvement with the Groundnut Scheme. A third paper will describe how climate in the Kenya highlands was observed and understood from 1883 to the establishment of the British East African Meteorological Service in 1929.

Walter dated the first volume of his memoirs as 1963. He states that he first wrote memoirs as a record for family and friends.<sup>7</sup> It is clear that those deposited in Rhodes House Library are based on his private diaries and papers, together with reports, papers and publications that were later deposited in the Library at Rhodes House<sup>8</sup> or transferred to the Radcliffe Science Library. His plan for the memoirs refers to sections that he did not in the end include.<sup>9</sup>

As was common in the late 19<sup>th</sup> and early 20<sup>th</sup> century, Walter left school when he was 14-years old, but he received further tuition and continued to study in his spare time. He rose to positions of responsibility without the advantages of the university education experienced then by relatively few.

There were of course other scientists serving colonial governments and institutions, who, like Walter, were inspired by the demands of pioneering to take initiatives, sometimes in difficult circumstances. Walter's experience and service reflected his particular personality and drive in meeting the challenges that came his way.

He writes that his work brought him into contact with 'administrative officials of outstanding ability who played a decisive role in the Colonial services'.<sup>10</sup> He refers, however, to a trait in his character not to allow

... adverse government action to affect the success of any project which I had undertaken. It brought me into conflict with senior officials throughout my career, but at the same time earned me the sympathy and protection of others, equally senior, who appreciated what I had done.<sup>11</sup>

He was appointed OBE in 1935.

In writing his memoirs, Walter shared the same sense of purpose as the final generation of District Officers, described by Anthony Kirk-Greene as 'motivated by the realization that they were just that, the final generation' and that it was 'incumbent on them to record a job and a way of life – "how it really was" – which others would otherwise not know about save by hearsay and which nobody else will experience again'.<sup>12</sup> Walter describes his 'varied and colourful experiences associated with half a century of work in the twilight of our Colonial Empire', as 'experiences which can never be re-lived as the conditions which gave rise to them have passed into history'.<sup>13</sup>

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<sup>6</sup> Quotations and other references to Walter's memoirs are given in footnotes as *Echoes* with the page number. Other sources are also indicated in footnotes. Family details have been checked with Albert Walter's 6<sup>th</sup> son, Lindsay John Joseph Walter, and his son, John Walter, Walter's grandson, both of whom were met by this writer in November, 2010.

<sup>7</sup> Neither Walter's son, Lindsay, nor his grandson, John, has a copy of a family memoir, which may be in the keeping of a relative overseas.

<sup>8</sup> These include *The Mauritius Almanac*.

<sup>9</sup> *Echoes*, 146. Listed but not included are: The making of a Kenya home and social contacts; The European Catholic Association and St. Vincent de Paul; The Nairobi Scientific and Philosophical Society; Our vacation leaves in Europe; Retirement and the Ground-nuts affair.

<sup>10</sup> *Echoes*, 2.

<sup>11</sup> *Echoes*, 53.

<sup>12</sup> Kirk-Greene, A., 2006. *Symbols of Authority: The British District Officer in Africa*, London: I. B. Taurus, 232.

<sup>13</sup> *Echoes*, 1.

## 2. School and the Royal Greenwich Observatory (R. G. O.)

### 2.1. School

Walter gives a brief account of his early life and further details have been added here from the archives of the Roan School and the Royal Greenwich Observatory. He was born on 6 July 1877. His father, Joshua Walter, owned establishments on Blackheath Hill, where Albert was born, and later at Westcombe Park and Plumstead, having been set up in business as a stationer by his mother, Maria, Walter's grandmother, who was well off for the period and possessed property in Margate. Albert was one of ten siblings, the first boy after two girls (the eldest girl died at a young age). Following attendance at a preparatory school owned by a Mr Green, where he remembered being taught true calligraphy superbly, he was sent at the age of nine to The Roan School, Greenwich,<sup>14</sup> where at that time the fee for each term was £2. The school had opened in 1677 as a charitable establishment for the education of boys in the 'Three R's', but was re-opened in 1877 as a secondary school for boys (and in another such school for girls in 1878), the London School Board having taken over the education of the poor following the Education Act of 1870.<sup>15</sup>

Opportunities for achievement in the Empire must have been enticing. The school records show that, in 1887, Walter received a general proficiency prize, presented at the school ceremony by the Rev. R. Rhodes Bristow, M.A., M.L.S.B.,<sup>16</sup> whose middle name might have conjured up images of the exploits of Cecil Rhodes in Central Africa. In 1889, Walter earned a general proficiency prize, which was presented by Viscount General Wolseley, K.P.,<sup>17</sup> famous for his involvements in the Crimean War, the Indian rebellion, the Ashanti campaign, and the Nile Expedition attempt to save General Gordon. The catalogue of the Roan School library<sup>18</sup> includes books under headings (amongst others) of Biography and History, Historical Tales, Geography and Travels, whilst Ryder Haggard's *King Solomon's Mines* was in the fiction library.<sup>19</sup> Links with the nearby Royal Greenwich Observatory were considerable. Margaret Flamsteed, wife of the first Astronomer Royal, had been one of the first feoffees (trustees) of the school,<sup>20</sup> and Sir George Biddell Airy, Seventh Astronomer Royal, had been a feoffee and served as a governor to 1873.<sup>21</sup>

Walter left school in the summer of 1891.<sup>22</sup> He writes that he was 'taken in hand' by Mr. Stone, a member of the Plymouth Brethren and 'a prominent member' of the Peak Frean biscuit firm, and was given private tuition by his former master in the fourth form (Mr. Soppitt) and a tutor of the Royal Naval College (Mr. Waites) with a view to a medical career and medical missionary work. However, W. C. Nash,<sup>23</sup> a scientific assistant at the Royal Observatory and friend of the family, who also tutored Walter, informed Walter's father that vacancies had occurred for junior computing staff at the Observatory. It was agreed that Walter should sit the entrance examination, which he passed and was offered a post.

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<sup>14</sup> London Metropolitan Archive, LMA/4442/03/02/01/026, Application no. 1419; also LMA/4442/03/02/01/002, 142, gives the following information: Application 1419: parent: J.Walter, Stationer, 1 Eastcombe St., Blackheath, present school: Morden House.

<sup>15</sup> Kirby, J. W., 1929. *History of the Roan School (The Greycoat School) and its Founder*, London: Blackheath Press.

<sup>16</sup> Vicar of St. Stephen's Lewisham, 1868-1896, *Crockford's Clerical Dictionary*, 1887, London.

<sup>17</sup> LMA/4442/03/03/03/02, The Roan School Distribution of Prizes 1878-1910.

<sup>18</sup> LMA/4442/03/03/01/012, Catalogue of the Roan Library.

<sup>19</sup> Anthony Kirk Greene refers to the novelist Sir Compton Mackenzie's reflection that 'from the second half of the twentieth century Britain's youth would no longer be able to read stories about imperial service overseas and then, inspired by the vicarious taste of the larger life, on reaching the last page would decide that here was a career for them'. Kirk-Greene, A., 1999. *On Crown Service: a history of HM Colonial and Overseas Civil Services, 1837-1907*, London: B. Taurus, 122.

<sup>20</sup> op. cit. 15, 88.

<sup>21</sup> op. cit. 15, 88 and 117.

<sup>22</sup> LMA/4442/03/02/01/026.

<sup>23</sup> William Carpenter Nash was later to publish on rainfall at Greenwich.

## 2.2 The R. G. O.

The Observatory practice of using young boys as computers was introduced by Airy in the 1830s to deal with a backlog of astronomical data.<sup>24</sup> Computers were frequently recruited from the Roan School and also from the Bormann Foundation School attached to the Naval College. Papers of the Royal Greenwich Observatory held in the Cambridge University Library show that under W. H. M. Christie (1845-1922), Eighth Astronomer Royal, the entrance examination for computers involved writing from dictation to test hand-writing, spelling, punctuation, arithmetic, including extraction of square roots and the use of logarithms, and algebra to quadratic equations.<sup>25</sup> Candidates had to be between the ages of 14 and 18 years. The stipend in 1888 was 3/- a month, with increments at the discretion of the Astronomer Royal, who took the usefulness of the computer and his general conduct into account. Computers were required to live within a mile of the Observatory and working hours were from 9 a.m. to 4.30 p.m. on weekdays, with a lunch break of one hour, and from 9 a.m. to 2 p.m. on Saturdays, with no lunch break, whilst the 'strictest of punctuality' was to be enforced. Holidays of up to 24 days per year were granted at the discretion of the Astronomer Royal. On 5 February 1892, Walter wrote that he would commence work on Monday, 8 February.<sup>26</sup>

The Observatory regulations stipulated that computers would be discharged from duties at the age of 23, unless special circumstances made it desirable to retain their services, a stipulation that caused concern for the young men, as it was difficult to find employment if they left the Observatory at that age with no other experience.<sup>27</sup> Walter writes:

As the chances of transfer from the lower grade to the higher scientific branch in the Observatory at that time were slender, most of the computers studied in their spare time for various examinations in the Civil Service or the professions. I continued with the special tuition for the medical entrance examination and finally qualified, but I was not attracted to the prospects of missionary work and started studying for the Civil Service Excise Examination.<sup>28</sup>

Any idea that the young computers were working long hours with no fun is contradicted by Walter's description of his involvement as secretary of the Observatory sports club:

... the principal sport being hockey which was a game growing in popularity at that time in England. The whole staff from the Astronomer Royal downwards participated in the games.<sup>29</sup>

On 28 October 1892, after making satisfactory observations with appropriate instruments in the Meteorological and Magnetic Department under William Ellis,<sup>30</sup> Walter was recommended by Ellis and Nash for the certificate of competency to undertake the ordinary magnetical and meteorological observations. On 16 February 1893, he was similarly recommended for the certificate to undertake photographic work.<sup>31</sup> Certificates of competency were signed by the Astronomer Royal. From 1 October 1894, Walter's salary was increased to 5/- a month and was increased by a further 5/- a month from 1 October 1896.<sup>32</sup>

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<sup>24</sup> Grier, D. A., 2005. *When computers were human*, Princeton University Press, 50-51.

<sup>25</sup> RGO 7/134, Papers of William Christie: Papers on the engagement of computers: Notice from W.H. M. Christie, Astronomer Royal, Royal Observatory, Greenwich, 1888, November [Form 134]: Regulations for Supernumerary Computers.

<sup>26</sup> *ibid.* Correspondence on the engagement of computers.

<sup>27</sup> *op. cit.* 24, 113. Grievances held by the staff at the Observatory were looked at but dismissed as a possible cause in the investigation following the Greenwich bomb of 1894, immortalised in Joseph Conrad's *The Secret Agent* (1907).

<sup>28</sup> *Echoes*, 3.

<sup>29</sup> *Echoes*, 4.

<sup>30</sup> William Ellis (1828-1916) began work at the Observatory as a computer. He was appointed Superintendent of the Magnetical and Meteorological department following the retirement of James Glaisher in 1875 and retired from the Observatory in 1893. He served as President of the Royal Meteorological Society from 1866 to 1867. Field, M. 2010. Pen portraits of Presidents – William Ellis, *Weather* 65: 250-252.

<sup>31</sup> RGO 7/136, Papers of William Christie: Papers on computers' orders.

<sup>32</sup> RGO 7/137, Papers of William Christie: Computers' increases in salaries from 1893 to 1900 Dec.

In 1895, Dr Charles Meldrum,<sup>33</sup> Director of the Royal Alfred Observatory, Mauritius, applied to Kew and Greenwich Observatories for someone to replace his Assistant Director, H. J. Bell, who had died of malaria. Thomas Folkes Claxton, with whom Walter had worked on overtime at the Observatory, was appointed and resigned from his post as computer on 3rd December 1895, having been certified fit for service as First Assistant Director and Director Designate of the Royal Alfred Observatory.<sup>34</sup> Claxton had been appointed a computer at Greenwich in 1890, after education to the age of 16 at the Upper Nautical School, where he had gained prizes or certificates in Mathematics, Geometrical Drawing, Navigation, Astronomy and French.<sup>35</sup>

A possibility arose for Walter to work at the Cape Observatory in South Africa, but, as he wrote to the Astronomer Royal on 11 December 1895, his medical adviser, Dr. Roper, declined to certify that he would be equal to the duties involved as he (Roper) was not acquainted with the nature of the work. The certificate from Roper stated that 'Mr Albert Walter is in a low & depressed state of health (but without actual disease) and would, I think, benefit from a holiday and a change'.<sup>36</sup> Walter explained that Roper believed that the voyage and climate would be beneficial, but had not said that Walter's health demanded such a radical change. Nevertheless, a note written by hand on Walter's letter after its receipt<sup>37</sup> indicates that Walter was advised that the certificate was hardly a good recommendation, as Dr Gill,<sup>38</sup> Her Majesty's Astronomer at the Cape, would be unlikely to look on a computer's work as a holiday and would naturally be afraid that Mr. Walter would not be equal to the duties.

Fifteen months later, on 18 March 1897, however, Walter tendered his resignation from the Magnetical and Meteorological Department to take effect 'on about the 8<sup>th</sup> proximo', when he was to leave for Mauritius. He enclosed a handwritten copy of a letter of appointment as First Assistant Director of the Royal Alfred Observatory, Mauritius. He also enclosed a letter informing him that he had been passed physically fit for service, that the Crown Agents for the Colonies had been instructed to arrange a passage by steamer, that he should communicate with the Crown Agents in Downing Street as to the agreement he was required to sign with regard to the cost of his passage, and that he would receive a letter of appointment from the Governor when he arrived in the Colony.<sup>39</sup> A legacy of £65 from his grandmother, intended to be drawn at the age of 21, was released to help with the purchase of his outfit and, to show why such a sum and the apparently small salaries paid were perfectly adequate given the value of money at that time, Walter lists in his memoirs the cost of the items purchased.

Walter explains the circumstances of his appointment. When Meldrum retired from the Royal Alfred Observatory in 1896, after 22 years service, Claxton became Director and the vacant post of Assistant Director was offered to others at Kew and Greenwich, who were unable to take up the opportunity. When he heard this, Walter applied for the post with a recommendation from the Chief Assistant, Frank Dyson.<sup>40</sup> On 17 March 1897, he was appointed Assistant Director (sometimes referred to as Chief Assistant) of the Royal Alfred Observatory. On 5 April, he left Charing Cross on the Continental Express and later boarded the Messageries Maritime Steamer, SS Ava. He arrived in Mauritius on 11 May and assumed duties on 12 May 1897.<sup>41</sup> Thus began a demanding yet stimulating career in the Colonial Service. Albert Walter was not yet 20-years old.

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<sup>33</sup> Hinks, A. R., 2004. 'Meldrum, Charles (1821-1901)', *Oxford DNB*, Oxford: OUP.

<sup>34</sup> RGO 7/138, Papers of William Christie: Papers on computers' resignations.

<sup>35</sup> *op. cit.* 25.

<sup>36</sup> *op. cit.* 34.

<sup>37</sup> *ibid.*

<sup>38</sup> David Gill, LL.D., F.R.S. (1843-1914).

<sup>39</sup> *op. cit.* 34.

<sup>40</sup> [Sir] Frank Dyson (1868-1939), Astronomer Royal 1910-1933.

<sup>41</sup> Annual Report of the Director of the Royal Alfred Observatory for the year 1896, Colony of Mauritius, 1897, 5 (footnote).





**Map 1: Mauritius and nearby islands (with inset to show their relationship with the African mainland), provided by the Cartographic Unit, Department of Geography, Durham University.**

### **3. Mauritius and the Royal Alfred Observatory (R. A. O.)**

#### **3.1. Mauritius**

Walter's contributions to the work of the Royal Alfred Observatory were to be innovative and productive and he became involved in many aspects of the life of the island, including its colonial government. When he was called by the Colonial Office to take up service in East Africa in 1926, he left what he had grown to believe would be his life's work.

He recalls that, although his first reactions to Mauritius were not entirely favourable, he soon learned to love the island and its people deeply. He was impressed by the beauty of Port Louis on its approach by sea and marvelled at the attractive scenery when he explored on foot with a friend called Taylor. He quotes descriptions from letters home, for example:

Last week I visited Le Souffleur on the extreme south of the Island. The shore here is lined with huge masses of lava rock and as there is no reef the sea breaks on to the shore itself. The swell on this side of the Island is always more or less heavy as it is formed by the rollers coming in from the Southern Ocean so that the breakers present a magnificent sight. Standing on the extreme point and looking right and left a splendid view of the shore line is seen. Some miles to the right there is a most curious phenomenon. A rock at the bottom of the cliff appears to be arched and perforated at the top and every wave that rolls up forces its way under the arch and shoots up a column of water and spray some seventy feet into the air. The effect is very similar to the pictures one sees of geysers. The rock that we are looking at is only a miniature of the one we are standing on. This has a large cave underneath it, about fifty feet high, and at the top of the cave a hole large enough for a man to climb down. Through this hole in very rough weather the waves shoot up exactly the same as in the smaller one I have just mentioned and it is said to cause a whistling noise, hence its name Le Souffleur, which can be heard ten miles inland.<sup>42</sup>

Mauritius was visited by the Portuguese and occupied for a time by the Dutch before coming under French control from 1715 until 1810, when it was surrendered to the British by Napoleonic France.<sup>43</sup> French settlers were allowed to retain their language, land and property rights and the civil and criminal laws of France. The importance of meteorology in the south-west Indian Ocean was long recognised by the French. Cyclones were recorded throughout the mid-eighteenth century and thermometer and barometer observations were made by the Director of the Pamplemousses Botanical Garden from 1774.<sup>44</sup> Under the British, a government observatory was established at Port Louis in 1832, for observations of magnetism, meteorology and the determination of time. Unfortunately, the observations were not published. In accordance with instructions to the Army throughout the British Empire, the Royal Engineers set up an observatory near to the Government one in 1853 and from 1859 the army observations were continued at the old Government observatory.<sup>45</sup> Also in 1851, the Meteorological Society of Mauritius was founded under the auspices of the Governor, Sir James Macaulay Higginson, for the purposes of promoting meteorological science in general and especially cyclonology, and to provide for meteorological, magnetical and tidal observations in Mauritius and its dependencies. A grant of £200 p.a. covered the cost of an assistant and the rent of a room at Port Louis. In 1855, it was determined that the whole building in which the room was rented should be an observatory and an additional sum of £50 was voted by the Admiralty to assist with the cost of printing reports.<sup>46</sup>

In 1862, Meldrum, Professor of Mathematics at the Royal College of Mauritius from 1848, was appointed Government Meteorological Observer and took charge of the observatory at Port Louis.<sup>47</sup> The site of the observatory was conveniently near to the harbour but surrounded by hills and a site with better exposure was chosen at a short distance from the Botanic Garden at Pamplemousses, then 'the principal residential area of the Island until the outbreak of fever drove the wealthy inhabitants to the higher regions of the Island'.<sup>48</sup> In 1866, Meldrum visited the Observatory at Kew (London) to obtain instruments and, on 30 May 1870, Alfred, Duke of Edinburgh, laid the foundation stone of the Royal Alfred Observatory, which, with Meldrum as Director, was fully operational as a Department of Government by 1875.<sup>49</sup> In *The Mauritius Almanac* of 1912, Walter describes the

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<sup>42</sup> *Echoes*, 15-16. Due to erosion, *Le Souffleur* is more a cloud of spray than the fierce jet of water that shot upwards until the 1970s. *Insight Guide: Mauritius Réunion & Seychelles*, 136.

<sup>43</sup> Mauritius became independent on 12 March 1968.

<sup>44</sup> Mauritius Meteorological Service, 1974. *Meteorology in Mauritius, 1774-1974*, Port Louis: The Mauritius Printing Co. Ltd.; Mulnier, K. and B.M. Padya, 1974. Mauritius: two hundred years of meteorology, *WMO Bulletin* **23**: 228-232, and 1975. *Marine Observer*, **45**: 72-76.

<sup>45</sup> Details provided by J. Pougnet (see Acknowledgements).

<sup>46</sup> As given in *The Mauritius Almanac and Commercial Handbook* 1924-5 and previous issues.

<sup>47</sup> *Proceedings of the Meteorological Society of Mauritius* VI, Annual Report for the year 1862, 75. However, Meldrum had directed observations from 1860 as Secretary of The Meteorological Society of Mauritius (information provided by J. Pougnet – see Acknowledgements).

<sup>48</sup> *Echoes*, 11-12.

<sup>49</sup> op. cit. 44.

Royal Alfred Observatory as a handsome building situated in 11 acres of Crown land about 3 miles from the west coast and well equipped as a first class meteorological, magnetical and seismological station. Its principal local interest was in connection with the issue of storm warnings for the safety of the railway and shipping in the harbour and its international importance arose from its

unique position on the northern edge of the great southern anticyclonic system, and from a magnetic point of view in connexion with the survey of the ocean areas for which it forms a most valuable base station.

The Observatory report for 1900 gives the following details:

The Observatory, in Latitude  $20^{\circ} 5' 39''$  S. and Longitude  $3^{\text{h}} 50^{\text{m}} 12^{\text{s}} 6$  E., is situated on a plain about three miles from the West Coast and stands in eleven acres of Crown Land. The reference mark at the entrance of the Main Building is 178.1 feet above sea level.



**Plate 1: The Royal Alfred Observatory, reproduced with the permission of Bodleian Libraries, University of Oxford, from Walter, A. 1910, *The sugar industry of Mauritius*, London: A. L. Humphreys (RHO 912 r. 162, plate 5).**

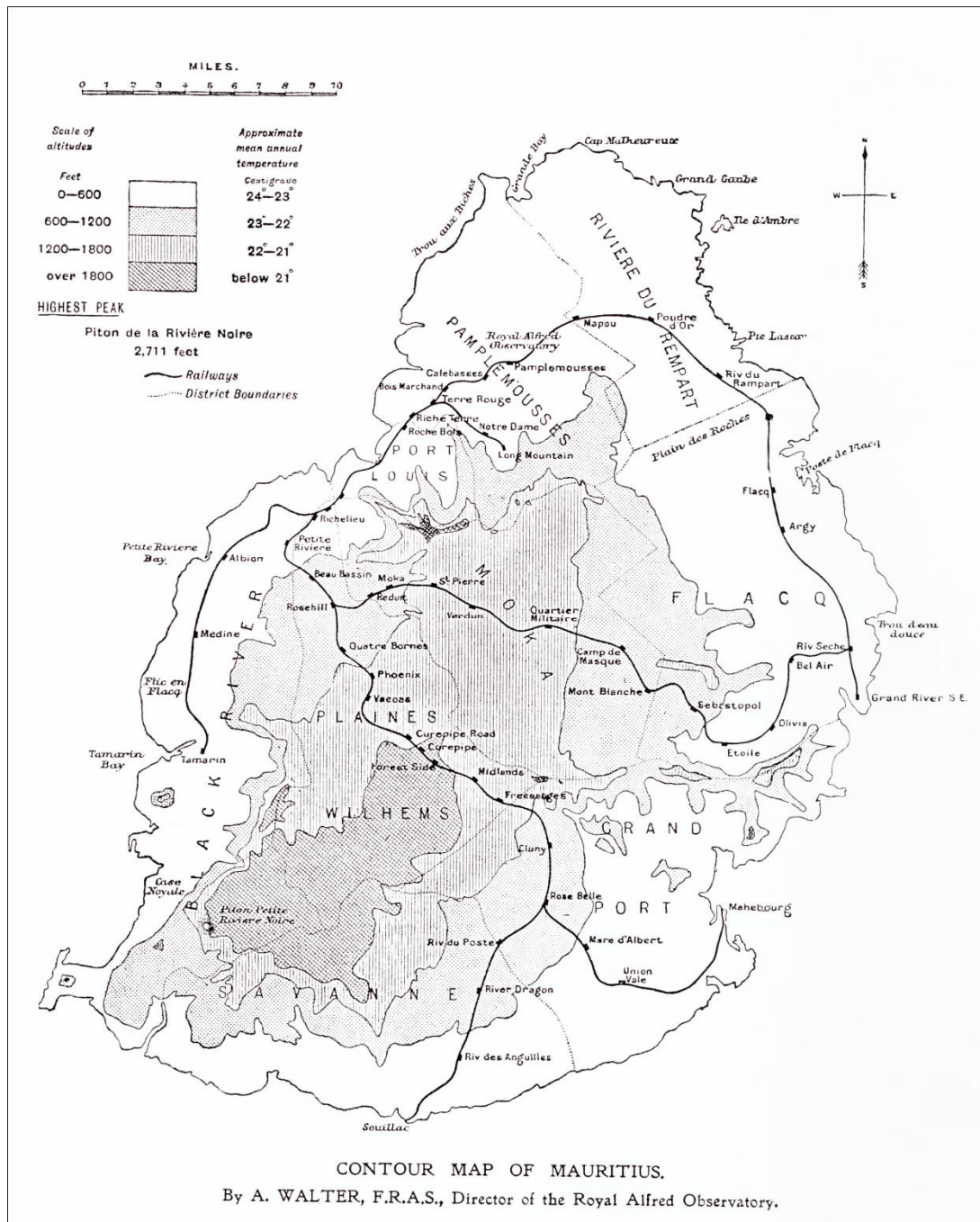
Unfortunately, the site at Pamplemousses also had disadvantages. Night work at the Observatory increased the risks of malaria and Walter was soon to succumb. On the sheer discomfort of the climate, he wrote home:

Sitting down to dinner my hands look as though I had dipped them in water and beads of perspiration are on my forehead. Up country it never gets too warm but at Pamplemousses it is almost unbearable in summer and the mosquitoes are wicked. I am one mass of lumps; hands and face. They even stick their proboscis through my clothes. They too are fewer up country but quite bad enough everywhere especially during the summer period.<sup>50</sup>

His living quarters at the Observatory were later condemned and, although the Observatory building and living quarters were subsequently made mosquito proof, permission was given for the Director and his Assistant to live at Quatre Bornes, about 14 miles away, where richer families from Pamplemousses had migrated to a higher altitude. The return journey by road and rail took four hours.

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<sup>50</sup> *Echoes*, 16-17.



Map 2: Mauritius in 1914, reproduced with the permission of Bodleian Libraries, University of Oxford, from Macmillan, A. (Edit.), 1914. *Mauritius Illustrated*, London: W. H. & L. Collingridge (RHO 912 s. 63, p. 190). The railway, much used by Walter, was closed in 1964.

Not long after his arrival in Mauritius, Walter met Louisa, whose mother, Marie Ernestine Almeria Gallet, was descended from one of the French families who left France prior to the advent of Napoleon (perhaps at the time of the Revolution). Louisa's father, David Garrioch, had moved to Mauritius from Scotland, choosing Mauritius rather than Canada, where his father had gone with his wife Hughina, née Grant, and the remaining family.<sup>51</sup> Albert Walter and Louisa Ernestine Gallet Garrioch were married on 9 October 1900, and their seven sons were born in Mauritius. The older

<sup>51</sup> Personal communication from Lindsay John Joseph Walter, 6<sup>th</sup> son of Albert and Louisa Walter.

sons were sent from Mauritius to St. Aidan's College, the Jesuit school in Grahamstown, South Africa.<sup>52</sup>

### 3.2. Early days at the R. A. O.

Walter's first reactions to the people of Mauritius were mixed, but, of his first comments written home, he writes:

... my views changed radically as time passed and I knew more about the Colony and its inhabitants.<sup>53</sup>

In fact, Walter got on well with all communities and at the Observatory.

The staff was locally recruited, apart from the Director and myself, and were all coloured. They had received no special training for the work they had to do and very close supervision was essential. They were, however, a good crowd and I soon learnt to like them very much.<sup>54</sup>

Routine work of the Observatory included the issue of daily, weekly and monthly meteorological bulletins, most local newspapers receiving weekly and a few receiving weekly and monthly reports. At that time, and more widely in later years, monthly results were sent to G. J. Symons, F.R.S., Secretary of the Royal Meteorological Society; the Adelaide Observatory, Australia; the Meteorological Reporter to the Government of India, who sometimes required more frequent reports in connection with monsoon predictions; the Secretary of the *Revue Agricole*; the Chief Medical Officer and the Senior Officer of the Army Medical Staff.<sup>55</sup> Mortality from fever was regularly compared with temperature, humidity and rainfall in the Annual Reports of the Observatory. Reports were also made on sunspots and magnetical observations. Seismology was introduced in 1898 and plague mortality in 1899, when there was a serious outbreak in Port Louis. Fever and plague reports ceased after 1901.

The ill-health and subsequent retirement of Charles Meldrum and the death of his former assistant had left much for Claxton and Walter to put right. The Observatory was not considered an astronomical one, but they had dreams of carrying out a programme of positional astronomy, although limited staff and resources would not permit astrophysical work. Walter records that there was astronomical work to learn from textbooks. They had some success with double star measurement, meteor observations and variable stars, although their ambitions were thwarted by the unhealthiness of the Observatory at night. One of his first tasks, however, was to catalogue books in the library and new ones purchased by the Mauritian Government.

Self-recording instruments of the Kew pattern were used for the hourly observation of barometric pressure, air temperature, wind direction and velocity, sunshine and rainfall, magnetic declination, horizontal force and vertical force. Further instruments included a Balfour actinometer, earth thermometers, maximum sun thermometers, grass minimum thermometers, instruments of the Kew Pattern for determining the absolute values of the magnetic elements, a 6-inch equatorial telescope, a transit instrument for the determination of time and a photo-heliograph for obtaining photos of the sun. The Time Service was put on a better footing. Wireless signals were not yet available and time was obtained by observation of the sun with a transit telescope, the constants of which had not previously been determined. Latitude was determined with a transit instrument mounted in the Prime Vertical, longitude having been determined by transportation of

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<sup>52</sup> After Walter moved to Kenya, the younger two sons were sent to Ampleforth College in Yorkshire.

<sup>53</sup> *Echoes*, 18.

<sup>54</sup> *Echoes*, 12. Readers should note that use of the word 'coloured' does not imply prejudice, from which Walter seems to have been particularly free.

<sup>55</sup> *R. A. O. Annual Report for 1897, Colony of Mauritius, 1898*, 5. Information supportive of the memoirs can be found in *R. A. O. Annual Reports* held in the National Meteorological Library and Archive. *R. A. O. Annual Bulletins and Annual Reports to 1910* are also available online from the NOAA Central Library.

chronometers between Aden (Walter mistakenly states Cape Town)<sup>56</sup> and Mauritius in 1874, at the time of observations of the transit of Venus. From his arrival in 1897, Walter was listed as a member of the Meteorological Society of Mauritius and later served on its Council.

There was evidence of a great deal of magnetic variation at the Observatory and, when Claxton was on leave in May 1899, Walter conducted a series of absolute observations of magnetic declination, horizontal force and dip at eleven stations, using a boat borrowed from the Inland Revenue through his future father-in-law, later recalling with horror the risks to the boat and equipment he took as a young man. He acknowledged the courteous assistance of several managers of sugar estates<sup>57</sup> and records in his memoirs that Dr L. A. Bauer<sup>58</sup> made use of the results when he completed his survey of the magnetic conditions of the Indian Ocean.

Walter continued to work on speeding up the issue of the monthly bulletin, improving the accuracy of magnetic observations and determining the constants of astronomical instruments. He also wrote on cyclones for the Meteorological Society of Mauritius and studied papers on statistics by Galton, Pearson and others in the *Proceedings* and *Transactions of the Royal Society*. In his report for 1901, the Director wrote:

For his untiring zeal in spite of frequent ill-health from malaria I am much indebted to Mr. Walter, the Chief Assistant, who in addition to his multifarious duties, finds time to superintend the preparation of the monthly bulletin, and the prompt distribution in its present complete form is largely due to his energy.<sup>59</sup>

In 1901, E. W. Maunder and his wife, A. S. D. Maunder,<sup>60</sup> came from Greenwich to observe the total eclipse, bringing with them a Newbegin telescope. The Annual Report of the Observatory for 1901 records that of the 22 persons who slept at the Observatory on the two nights previous to the Eclipse no less than 14 contracted malaria.

Walter was put in charge of the Newbegin and produced a series of photographs from instantaneous to ten seconds and back to instantaneous, using a slow tank development method to bring out detail.<sup>61</sup> Both Maunders acknowledged Walter's successful involvement<sup>62</sup> and E. W. Maunder sponsored him for Fellowship of the Royal Astronomical Society.<sup>63</sup>

After the departure of the Maunders, Walter spent more time improving the accuracy of the absolute magnetic observations<sup>64</sup> and speeding up the issue of the monthly bulletin. During 1904

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<sup>56</sup> R. A. O. *Annual Report* for 1897, 14 and *Echoes*, 25-26. Pougnet (see Acknowledgements) refers to *The Transit of Venus Expedition*, Part II, Chapter 23, 495, *Dun Echt Observatory Publication*, Volume 3. The transportation of chronometers was from Aden to Mauritius and back to Aden. Longitude was taken as the mean of the result deduced by chronometers on the return journey to Aden and that arrived at by moon observations.

<sup>57</sup> R. A. O. *Annual Report* for 1899, 25.

<sup>58</sup> Louis A. Bauer (1865-1932) was the founding Director of the Carnegie Institute Department of Terrestrial Magnetism from 1904. Variations in terrestrial magnetism could affect the behaviour of the compass and the accuracy of a ship's navigation. There was also concern to examine the possible influence of the sun and the moon on observed variations. For background see: J. Cawood (1979) The magnetic crusade: science and politics in early Victorian Britain. *Isis* **70**: 492-518; Bauer, L. A. 1913. The magnetic survey of the oceans, *Geogr. J.* **42**: 517-526.

<sup>59</sup> R. A. O. *Annual Report* for 1901, 16.

<sup>60</sup> Edward Walter Maunder (1851-1928), after whom the Maunder Minimum is called, 'observed eclipses in the West Indies in 1886 and in Mauritius in 1901, obtaining photographs and spectra of the corona', M. T. Brück, 2004. *Oxford DNB*, Oxford: OUP. He had married his second wife, Annie Scott Dill Russell, an astronomer, in 1895.

<sup>61</sup> *Echoes*, 31. Walter thought he might have been the first to use this method.

<sup>62</sup> Maunder, E. W. Total eclipse of the sun, 1901, May 18. Preliminary Account of the Observations made at the Royal Alfred Observatory, Pamplemousses, Mauritius, *Proc. Roy. Soc.* **69**, (1901-1902), 247-261; Maunder, A. S. D., Preliminary note on observations of the total solar eclipse of 1901 May 18, made at Pamplemousses, Mauritius, *Proc. Roy. Soc.* **69**, (1901-1902), 261-266.

<sup>63</sup> Reported in *The Observatory* **25**, 1902, 48.

<sup>64</sup> In 1901, Claxton responded to a request to make magnetic observations in connection with the British (Discovery) and German (Gauss) Antarctic expeditions. He asked whether the [presumably British] ship could call at Mauritius to compare magnetometers, Letters 2 and 5, held by the Royal Geographical Society, RGS AA/10/3/1-13. There is no evidence that this

and 1905, he worked on the improvement of self-recording instruments, modifying the equipment to run for a week instead of a day, working with a lathe and turning special cylinders in brass.

... all this to speed up tabulating and increase accuracy. Scales provided with the instruments introduced errors into the diurnal variations of the results giving rise to a two hourly oscillation due to a defect in the glass scale sent out from Kew.<sup>65</sup>

He invented a machine for etching scales on glass with fluoric acid and found that the simplest way of constructing scales for measuring hourly ordinates from the photographic records was to rule them in Indian ink on photographic plates from which the silver nitrate had been dissolved by fixing in hyposulphite.

### 3.3. Cyclones in the South Indian Ocean

Walter experienced his first cyclone (hurricane) on 5 December 1898 and gives a vivid description of that experience in his memoirs. This began his great interest in the history of storm occurrence and the problems involved in forecasting. An early French account of Indian Ocean cyclones relating to Mauritius and Réunion (formerly Bourbon) had been published in the *Mémoires de l'Académie Royale des Sciences* and covered the period from 1733 to 1754. Almost a century later, in 1848, the then government observer, H. Bousquet, published a *Loi des Tempêtes ou Guide du Navigateur*.<sup>66</sup> However, it was under Charles Meldrum that great strides in understanding were made when the Meteorological Committee in Britain agreed to provide extracts from the logbooks of ships reaching Mauritius on the understanding that Meldrum bore the expense of making the extracts. Thus retrospective coverage of relatively simultaneous observations was obtained for a wide area of the South Indian Ocean. Charts were drawn up and Meldrum was able to analyse the frequency and movement of cyclones and deduce the inflow in the rear quadrant of each storm that was so dangerous to shipping.<sup>67</sup> One or two Indian Ocean cyclones approach Mauritius every year in the period between November and April and, although direct hits are rare, damage can be considerable. The storm of 1892 caused devastation to Port Louis and its harbour.<sup>68</sup> In February 1894, a train was blown off the Grand River Bridge in winds of 40 miles an hour and the Director of the Observatory was subsequently given power to stop all traffic on the railways, close public buildings and prevent ships putting to sea when there was likelihood of such wind velocities.<sup>69</sup>

Methods of communications were limited and this led to an embarrassing incident for Claxton and Walter early in 1902, when they reacted with no sense of urgency to the report that a cyclone had passed near Rodrigues and, heading south, was unlikely to reach Mauritius. When the barometer began to fall rapidly in the night and the wind increased considerably, it was evident that another cyclone was approaching Mauritius (see cyclone tracks 1 and 2 on Map 3). They walked from their homes to Port Louis in terrifyingly high winds, intending to continue to the Observatory at Pamplemousses, but found that no taxi driver would leave Port Louis and telegraphic communication had become impossible. They were consequently unable to issue warning of the second storm approaching from the north east. The Governor demanded that in future the Observatory be manned continuously. The Observatory and living quarters were made mosquito

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took place (personal communication from Anne Savours). Claxton also submitted a paper to the Royal Society: Claxton, T. F., 1905. Preliminary report on a survey of magnetic declination near the Royal Alfred Observatory, Mauritius. *Proc. R. Soc. Lond. A* **76**: 507-511. Walter's work on improvements to the accuracy of the magnetic observations was acknowledged in the *R. A. O. Annual Report* for 1902.

<sup>65</sup> *Echoes*, 40.

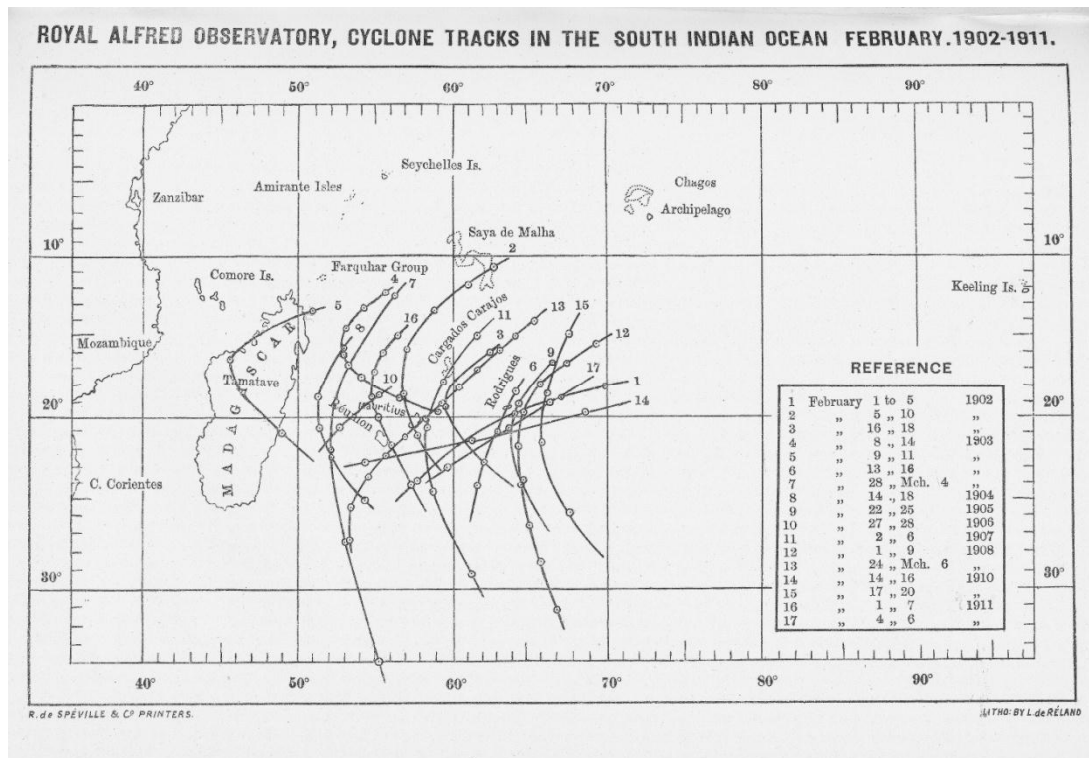
<sup>66</sup> *op. cit.* 44.

<sup>67</sup> Cornford, S. G., *op. cit.* 4, 177-212: Some early synoptic charts for the Indian Ocean. The National Meteorological Library and Archive holds publications by Meldrum and the synoptic weather-charts for March, 1861. See also Claxton, T. F. 1901. The cyclone of 1901, January 9-16, *Proc. Trans. Meteor. Soc. Mauritius* **2** n. s., 52-71.

<sup>68</sup> The storm brought about the death of 1,200 people.

<sup>69</sup> *Echoes*, 24.

proof and cable communication was established from the homes of Claxton and Walter at Quatre Bornes. Walter writes that for several years he was unable to spend Christmas with his family. Nevertheless, when, in 1903, he was in charge of the Observatory during Claxton's absence through an accident, the Governor relaxed the rule, trusting Walter's discretion and experience to decide whether he was needed at the Observatory.



**Map 3: Royal Alfred Observatory. Cyclone tracks in the South Indian Ocean, reproduced with the permission of Bodleian Libraries, University of Oxford, from the *Mauritius Almanac*, February 1914 (RHO 912 r. 64, opp. p. B168).**

Walter's interest grew in what he describes as the 'art' of single station forecasting. He had learned a great deal when sorting the Observatory library, particularly when studying Meldrum's famous charts.

The first series of Synoptic Charts the Scientific World had ever seen on an extended scale emanated from the Royal Alfred Observatory and formed the basis of Meldrum's Law of Storms in the Indian Ocean ... the lessons learnt from them enabled me to develop a technique of Single Station Forecasting which earned me at a later date a great reputation in the Colony even amongst that more critical of all public communities – the Amateur Cyclone Forecaster ... it was only done, I must admit, at the expense of many failures and much heart-burning.<sup>70</sup>

<sup>70</sup> *ibid.* Walter refers later (*Echoes*, 47) to the tragic circumstances of January 1910, when he was left without authority to prevent ships from leaving the harbour. Claxton could not be contacted and the *Loodiana* was lost with all hands on board. I am grateful to J. Pougnet (see Acknowledgements) for drawing attention to the Board of Trade Report: [www.plimoll.org/resources/SCCLibraries/.../19975a](http://www.plimoll.org/resources/SCCLibraries/.../19975a). Although the *Loodiana* was lost at sea, Pougnet points that the normal action taken by ships when a cyclone threatens the island is to leave the harbour as they are usually safer at sea, provided they leave on time to avoid the cyclone.



As he records, there can be no let-up in the case of the single station forecaster if he wishes to succeed. Voluntary observations by fishermen were not always reliable and, even when stations were set up later on the islands of Rodrigues, Seychelles and Réunion, cablegrams were only received by the hour, often too late to be of use.

A general lowering of pressure of a tenth of an inch below normal, strengthening of the south-east wind and the appearance of large amounts of cirrus cloud flowing out from the likely centre of a forming storm would lead to plotting the likely position of a storm and the determination of several possible tracks. A peculiar gustiness could be detected by the observer and self-recording instruments were closely watched. Walter added to his memoirs two pages from a more personal autobiography written for his family, including:

The first sensation was one of an uneasy anticipation accompanied by the perception of a peculiar moaning in the gentle gusts of the wind which to me was always a prelude to a storm. This sensation had become so characteristic that it sent me off to my post at the Observatory to await developments ... to me, the spirit of the storm was an active reality.<sup>71</sup>

### 3.4. The influence of forests on rainfall

In November 1907, Sir Ronald Ross visited Mauritius. As the Sir Alfred Jones Professor at the Liverpool School of Tropical Medicine, he was visiting many countries to give advice on the battle against the mosquito and malaria.<sup>72</sup> Ross had discovered the malaria parasite in the *anophelese* mosquito when working in the Indian Medical Service and, in 1902, was the first Briton to be awarded the Nobel Prize. To assist Ross, Walter wrote a memorandum on the effects of forests on rainfall<sup>73</sup> in which he undertook a review of the relevant literature for Mauritius and elsewhere. Walter was also responding to the continuing anxiety about drought that had led to demands from the sugar estates for re-forestation in the highlands.

Destruction of the natural vegetation had taken place from the period of Dutch occupation, although, as Grove<sup>74</sup> tells us, the loss of American colonies by France and the consequent loss of forest resources in 1763 led to direct intervention by the French Crown in the government of Mauritius and some control of forests as sources of marine timber. Moreover, Pierre Poivre,<sup>75</sup> administrator of Mauritius from 1767 to 1772, developed a policy of maintaining mountain and river reserves, advising the French settlers that preserving the island's forests would ensure a reliable rainfall.

Nonetheless, destruction of forests continued with the development of sugar plantations under the French and the extension of the plantations under the British.<sup>76</sup>

Walter referred to statements 'frequently and persistently made by the Forest Department', to work by Meldrum<sup>77</sup> and by Thompson<sup>78</sup> and Gleadow,<sup>79</sup> both of whom had laid stress on the climatic effects of forests without showing conclusive evidence in the meteorological record.

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<sup>71</sup> *Echoes*, 38.

<sup>72</sup> Sir Ronald Ross (1857-1932) left Liverpool for London in 1912. Bynum, N. F., 2004. *Oxford DNB*, Oxford: OUP.

<sup>73</sup> Walter, A., 1908.

<sup>74</sup> Grove, R. H. 1995. *Green Imperialism: Colonial expansion, tropical island Edens and the origins of environmentalism, 1600-1860*, Cambridge University Press, and Grove, R. H., 1997. *Ecology, climate and Empire: colonialism and global environmental history, 1400-1940*, Cambridge: The White Horse Press.

<sup>75</sup> Pierre Poivre (1719-1786) was responsible for the establishment of the Botanical Garden at Pamplémousses.

<sup>76</sup> Vaughan, R. E. and Wiehe, P. O., 1937. Studies on the vegetation of Mauritius. 1. A preliminary survey of the plant communities, *Journal of Ecology*, **25**: 290-1.

<sup>77</sup> Meldrum, C., 1881. *Weather, health, and forests: a report on the inequalities of the mortality from malarial fever and other diseases, in Mauritius, considered in relation to the inequalities of temperature, humidity, and rainfall; on a possible periodicity of mortality related to the eleven-year periodicity of solar activity; and on the climatic and other effects of forests*, Mauritius.

As extensive destruction of vegetation took place in parts of the island from 1860 and reliable rainfall observations were available from 1862, it was reasonable to suppose that any effect should be evident in rainfall amount or the number of rain days.

Walter summarised his findings as follows:

- 1 Forests appear to increase the probability that rain will fall during the afternoon, on calm days.
- 2 There is *a priori* evidence that transpiration tends to increase water-vapour content of the atmosphere above forest areas during the day time.
- 3 Their effect on the afternoon rains on calm days is probably very local.
- 4 The *absence* of forests may diminish slightly the precipitation on the windward sides and along the summits of the mountain ranges, if the slope is sufficiently gradual, by decreasing the normal adiabatic rate of cooling, although the evidence from Mauritian statistics in support of this is not conclusive.
- 5 Forests do not appear to affect the precipitation from the normal trades to the leeward or in the low-lying districts.
- 6 Their presence does not prevent droughts, as a general shortage of rainfall is probably due to causes which simultaneously affect the precipitation over extensive portions of the globe.
- 7 The decrease in the mean daily temperature of the air, in the uplands, due to *déboisement* must have amounted to at least 0.7 degrees Centigrade in the summer.<sup>80</sup>

Walter noted that two of the most important effects of forest growth are the prevention of erosion and modification of the torrential action of surface drainage. He also recognised the importance of retaining land for sugar production and suggested that re-forestation in the higher land should be confined to the river systems. He pointed out that there was no evidence to suggest that such re-forestation would result in an improvement in the rainfall of the lowlands. Walter writes that, when a commission was appointed in 1908 to look into irrigation prospects, he suggested a division of the Island into natural drainage areas and provided rainfall statistics for each.

### 3.5. The sugar industry of Mauritius

During 1905-1907, Walter was writing a book<sup>81</sup> on the sugar industry of Mauritius, which he published with the encouragement of the Governor, Sir Cavendish Boyle,<sup>82</sup> who found him a publisher. Walter also contributed an article on the same subject to Macmillan's *Mauritius Illustrated*.<sup>83</sup>

Sugar cane was introduced to Mauritius by the Dutch, but its commercial cultivation dates from 1735, under the French administration of Governor Bertrand-François Mahé de La Bourdonnais. Redevelopment and expansion of the industry took place during the British administration, in particular when damaged mills were rebuilt following the extensive destruction brought about by the storm of 1892.

In 1899, a firm of insurance brokers had asked the Director of the Royal Alfred Observatory for particulars of all cyclonic storms that had approached within 100 miles of Mauritius over a 50-year period. Severe damage by storms was infrequent, but the risk of damage caused considerable

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<sup>78</sup> Thompson, R., 1880. *Report on the forests of Mauritius: their present condition and future management*, Port Louis, Mauritius, Mercantile Record Company.

<sup>79</sup> Gleadow, F., 1906. *Report on the Forests of Mauritius with a Preliminary Working Plan*, Mauritius.

<sup>80</sup> *op. cit.* 73, 45; *Echoes*, 59-60.

<sup>81</sup> Walter, A., 1910.

<sup>82</sup> Sir Charles Cavendish Boyle (1849-1916). Governor of Mauritius 1904-1911.

<sup>83</sup> Walter, A., 1914.

anxiety. Walter's interest in statistical records and statistical methods of analysis led him to arrive at a scheme to help insurers and planters make provision for damage to the sugar crop. He wrote:

If the unprecedented storm of April, 1892, is omitted, there are only two which have caused damage of about thirty per cent of the total crop in fifty-six years, and three others under twenty per cent. It should be possible under these conditions to effect an insurance of the crops against serious damage from cyclonic winds ...<sup>84</sup>

Walter's book was reviewed by R. H. Hooker, statistician at the British Board of Agriculture, who had also been working on correlation between weather and crops.<sup>85</sup> He wrote that Walter's researches were of the nature of pioneer work, as no more thorough investigation had previously been undertaken into the precise degree of dependence of a crop upon the weather. He noted that Walter tended to be discursive, but that he discussed each aspect thoroughly and capably. He added that mathematical meteorologists should study the volume by Walter and undertake similar investigations into the relation between climate and crops. Hooker added that a widening appreciation of the scientific value of modern statistical methods would lead to greater reliance on the results yielded by them.

Walter's starting point was that damage by a severe storm was rapidly invisible to the eye. Fields appeared to recover completely within two weeks, despite an ultimate reduction in yield. His aim was to examine the relationship between the sugar crop, rainfall and temperature through the growing season. The potential yield for a particular year could be derived from this relationship and storm damage calculated by comparing actual and potential yield.

The relationship between yield and total rainfall was improved by including the number of rainy days over the number of days in the month, a wetter month for agriculture being one in which the rainfall was well distributed. He also found that consistent results could only be obtained if 'non-effective rainfall' was eliminated. His early attempts at correlation had shown that rainfall above a certain amount resulted in no further improvement in yield. He also found that, despite local faith in the beneficial effect of ozone released in thunderstorms, sunshine was a more important factor. As for the degree of storm damage, Walter took into account maximum wind pressure, the duration of wind over 40 miles per hour and the time in the season when the cyclone occurred. In a summary of the work, he wrote:

The difference between the harvested crop and the yield, estimated from the effect of temperature and rainfall in years of cyclone, indicated the loss caused by the high wind velocities. This loss bears a very close relation to wind velocity, and a simple formula has been derived for the conversion of wind velocities into loss of cane.

It will be seen in consequence that, although it is impossible to determine the damage to the crop by inspection of the cane fields, a close approximation can be arrived at when the wind velocity is known. The basis of insurance thus established eliminates entirely the personal element, and risks can be covered by the adoption of a scale for the payment of premiums dependent on the probability of the occurrence of a given wind velocity. The details of the scheme have been very carefully worked out, but underwriters have not yet acquired sufficient confidence in meteorological statistics to give it a fair trial.<sup>86</sup>

The underwriters believed that planters would not accept the high rates of premium necessarily involved. Indeed, Hooker had doubts whether businessmen would have faith in estimates of crop yield based on weather.<sup>87</sup> It was not until 1946 that a scheme was agreed, when a proposed

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<sup>84</sup> op. cit. 81.

<sup>85</sup> Hooker, R. H. 1912. Review, *Q. J. R. Met. Soc.* **38**: 327-329; see also C. S. 1911. Review, *Nature* **87**: 344. Hooker (1867-1944) was President of the Royal Meteorological Society 1920-21; Pedgley, D. E. 1995. Pen portraits of Presidents – Reginald Hawthorn Hooker, M.A., *Weather* **50**: 25-26.

<sup>86</sup> op. cit. 81.

<sup>87</sup> op. cit. 85.

premium was put to planters and government as 'based upon the work and the estimates of Mr. A. Walter who used statistics going back to 1857'.<sup>88</sup>

Walter had drawn on local knowledge and on reports of work at the Rothamsted Experimental Station in England (now known as Rothamsted Research). He expressed appreciation of all who had provided information and helped in the final production of his book, including his old tutor, W. C. Nash, who read through the proofs of a remarkable piece of work from a busy young meteorologist that might well have earned him a doctorate in the present day. He regarded the work as a preliminary investigation only and did not claim that all factors which determine crop yield had necessarily been taken into account.

Other factors, which undoubtedly exercise considerable influence in some years, are variations in the local consumption and in loss in dock and transport, uncertainty in the normal owing to increase or decline in the area cultivated, variation in the purity of the juice, and, possibly, the influence of other meteorological elements which have not been included in the discussion.<sup>89</sup>

He emphasised the need for further work at adequately equipped experimental stations in differing districts of the island. Walter continued to study the relationship between the sugar crop and weather, later considering the link between rainfall and soil humidity.<sup>90</sup>

### 3.6. Albert Walter: Director of the R. A. O.

Walter's expertise with statistics was in great demand. He was seconded for three months in 1909 to collect information for the Royal Commission set up to enquire into the position of the sugar industry<sup>91</sup> and informed by the Assistant Colonial Secretary, John Middleton,<sup>92</sup> that there would be no additional payment for the work, but that payment would be made for any other statistical work required by Government.

... the additional money which these various activities brought in relieved me of that killing anxiety which financial stress always brings. Moreover, each of the jobs I had undertaken was congenial and I found ready assistance in a number of willing hands.<sup>93</sup>

Thus began a series of public involvements, which helped Walter support his growing family, but threatened his health through overwork and led to misunderstandings with respect to his responsibilities at the Observatory.

In 1910, heads of departments in Mauritius were asked to reduce their budgets. Claxton replied that to do so he would have to get rid of the Assistant Director, adding that this would curtail considerably the work of the Observatory and cause difficulties in the cyclone season. Nonetheless, it was recommended that the post of Assistant Director be abolished. It seems that the Colonial Office suggested Walter for the post of Director of the Hong Kong Observatory, but Middleton would not release him as Walter had been appointed Commissioner for the 1911 Census of Mauritius. Claxton moved to Hong Kong in May 1911, Middleton having suggested that Walter be appointed Director of the Royal Alfred Observatory, provided he help the Government with any statistical work which they might require. Walter would be working with an 'untrained assistant'.<sup>94</sup>

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<sup>88</sup> *Echoes*, 42.

<sup>89</sup> *op. cit.* 81.

<sup>90</sup> Walter, 1922. For correspondence on the difference between the yield of sugar and exports from Mauritius, see Walter, A. (and Gregory, J. W.), 1910. For mention of later work see also *R. A. O. Annual Report* for 1919.

<sup>91</sup> *R. A. O. Annual Report* 1909, 18.

<sup>92</sup> [Sir] John Middleton (1870-1954), Administrator, Mauritius 1907 – 1920; (Acting-Governor 10 March - 22 September 1914; 28 January 1916 – 18 May 1916; 8 February – 17 November 1919).

<sup>93</sup> *Echoes*, 49. Walter's son, Lindsay, has commented that his father worked all hours available and was ever anxious to increase his earnings to help provide for a large family.

<sup>94</sup> *Echoes*, 48.

Despite other demands on his time, Walter's work at the Observatory continued to be innovative. He employed a mechanic. He installed a gas plant in the hope that the paraffin lamps for the self-recording instruments might be discarded. He employed a plumber to show him how to 'wipe a joint'. He completed the laying of the gas pipes himself, but it was some time before the gas lights were sufficiently constant for the self-recording instruments, a problem that was eventually remedied by increasing pressure in the main.<sup>95</sup>

At the end of 1911, Dr. Bauer visited from the Carnegie Institute with regard to the magnetic survey of the Indian Ocean.<sup>96</sup> He compared the Observatory instruments with his own and offered an Earth Inductor for the determination of Dip and an Eschenhagen Vertical Force Magnetometer, both to replace the Kew versions. With the consent of the Governor,<sup>97</sup> Walter built a new basement for the clocks and the Kew self-recording barometer, freeing the magnetic basement for the Eschenhagen. The upper part of the new basement was used for the transit instrument for the determination of time and for storage of records.



A. WALTER, F.R.A.S.,  
Director of the Royal Alfred  
Observatory.

**Figure 2: Albert Walter, Director of the R. A. O., reproduced with the permission of Bodleian Libraries, University of Oxford, from Macmillan, A. (Edit.), 1914. *Mauritius Illustrated*, London: W. H. & L. Collingridge (RHO 912 s. 63, p. 185).**

Walter was leaving Quatre Bornes by the first train and returning home by the last each day. He trained staff in observational and computational work. He introduced a Millionaire calculating

<sup>95</sup> *R. A. O. Annual Reports* 1913 and 1914.

<sup>96</sup> *op. cit.* 58.

<sup>97</sup> [Sir] John Robert Chancellor (1870-1952), Governor of Mauritius, 13 September 1911 to 28 January 1916.

machine and a Remington tabulating typewriter with a Wahl attachment. From 1912, three-hourly observations and inspection of instruments were carried out daily.

Staff changes were made and the Second Assistant was replaced on his retirement with an officer designated Computer. Walter then had the funds to employ someone to deal exclusively with correspondence and the library, but commented in his report for 1911 that, as Director, he was now performing the duties of Director, Chief Assistant and Second Assistant combined. In the report for 1912, he wrote that routine work was kept rigorously up to date and that he had been most ably assisted by the two senior officers (computers), Msrs. Decotter and Koenig, and when Walter was on leave in South Africa for nine months in 1917, Maxine Koenig was appointed Officer-in-Charge.

In 1915, storm signals were extended to include information on the state of the weather over the surrounding ocean areas up to a distance of 500 miles by means of flags for shipping in the harbour and a coded message by telegraph to railway stations and port offices after the 1 p.m. time signal. Details of the weather over the South Indian Ocean, with tracks of such cyclones as it was possible to determine, were published monthly in the Observatory bulletins. Cablegrams with information concerning cyclones were despatched daily to Madagascar, Réunion and Rodrigues, and weekly from May to September to the Director General of Indian Observatories. Metric Units were introduced in 1916. When war began in 1918, information from ship's logs became limited, cable communication between Mauritius, Madagascar and Réunion broke down through temporary cable failure and forecasting became difficult. In his report for 1919, Walter described changes made to speed up routine computational work and the tabulation in lunar hours of 40 years of atmospheric pressure, following a request from the Observatory at Greenwich.

## **4. Public involvements and *The Mauritius Almanac***

### **4.1 Public involvements**

Walter's public involvements, statistical work and editorship of *The Mauritius Almanac* were to play an important part in his call to Kenya as Statistician to the Kenya Government and his subsequent role as first Director of the British East African Meteorological Service. He writes that many of the involvements he undertook would have been regarded by some as full time jobs. He bought *The Mauritius Almanac* from his father-in-law, David Garrioch, in 1910. He completed his work as Commissioner for the 1911 Census for Mauritius and its Dependencies.<sup>98</sup> In 1915, he was nominated a Member of the Board of Directors of the Mauritius Institute, and was appointed by the Governor as a member of the Committee of Public Instruction. For two years from 1915, he worked on revision of the accounts of the Widows and Orphans Fund, applying statistical methods he had recommended in a report for an actuarial investigation in 1911. In 1916, he supplied a representative of the African Life Assurance Company, who was setting out to open a branch of industrial insurance, with a chart showing contours of mortality in Mauritius, indicating an increase in mortality with lower altitudes.

In October 1917, Walter and his wife took their elder boys to the Jesuit School, Grahamstown, South Africa, travelling tourist class on the SS Cluny Castle and having a 'pretty rough time on board'. Walter had taken three months leave, but their doctor in Grahamstown insisted that Walter needed further rest and, following two extensions of leave, he did not return to Mauritius until August 1918. After the first three months, he was on half pay and, with school fees to pay, the family took a smaller house on return to Mauritius.

Walter continued to be considered the most appropriate person for a wide range of work that was imposed upon him. From 27 November 1918 to 10 June 1919, he was asked by Middleton to serve

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<sup>98</sup> Characteristically, Walter devised his own card system for the 1911 Census.

as Acting Assistant Colonial Secretary in the absence on leave of Leon Koenig. Walter found the work fascinating and was grateful to Middleton for the opportunity to gain experience of the functioning of Government.

During the influenza epidemic of 1919, Walter was given the task of preparing equipment for all the additional hospital centres opened by Middleton as Acting Governor<sup>99</sup> and when, in 1920 and 1921, there was need for a system of rationing, Walter took over the duties of Controller of Food, Trade and Commerce.<sup>100</sup> For this he was paid, RS 2000 a year.

The considerable amount of work Walter did outside the Observatory received criticism. When he was working in the Colonial Secretariat with Middleton, the Governor, Sir Hesketh Bell,<sup>101</sup> wrote a minute on the 1919 estimates that he intended to reduce the amount voted for the Royal Alfred Observatory, as 'he had no intention of maintaining an expensive establishment for the sole purpose of providing emoluments for Mr Walter'. Walter reacted by writing a report for the Secretary of State for the Colonies that unless funds were made available to bring the Observatory up to the standards which modern science demanded, it might as well be closed down and he would resign. Fortunately, he was persuaded that his report should not leave the Colony and, when Middleton was Acting Governor in Hesketh Bell's absence, Grannum,<sup>102</sup> then Acting Colonial Secretary, made a grant for the Observatory of Rs. 150, 000.

Walter comments in his memoirs that he could see in retrospect that the Governor's view had had some validity, as his supervisory work at the Observatory was not obvious. Despite his antagonism, however, Hesketh Bell continued to use Walter's services. Walter writes:

At no time did I solicit the additional work but was always ordered to carry it out in the interests of the [colonial] service.<sup>103</sup>

Walter was Census Commissioner for the 1921 Census. Having the use of a car, he visited every nook and corner of the island to make certain that his instructions with regard to numbering of houses and huts was carried out. He visited the island of Rodrigues to instruct the enumerator there. He cancelled all leave from ships in the harbour in order to avoid the complication of having to enumerate strangers in the brothels of Port Louis and on 20 May 1921, the night of the census, he visited them all to ensure his instructions had been carried out, walking the streets and making 'Port Louis virtuous for one night at least'.<sup>104</sup>

Walter's close collaboration with two administrators, John Middleton<sup>105</sup> and his successor, Edward Brandis Denham,<sup>106</sup> was to be more important for his future than he could possibly have recognised at the time. He writes:

Denham's appointment to Mauritius was destined to play a decisive part in shaping my future career. He became an enthusiastic admirer of the Almanac which, indeed, for a newcomer to the Colony constituted a mine of information which could not be obtained from any other source. He also took a keen interest in all the other activities on which I was engaged, visiting the Observatory both at Pamplémousses and Vacoas, as well as the Census Offices and the Food Control.<sup>107</sup>

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<sup>99</sup> *Echoes*, 72. Inoculation against influenza brought on an attack of malaria for Walter for the first time since 1902. He was not to suffer from the disease again.

<sup>100</sup> *Echoes*, 73. Walter writes that he was required to do this having been given to understand that he had no alternative.

<sup>101</sup> Sir Henry Hesketh Joudou Bell (1864-1952), Governor of Mauritius, 18 May 1916 to 16 August 1924.

<sup>102</sup> Edward Allan Grannum ( 1869 -1956 ) was later Acting-Governor of Mauritius from 16 August 1924 to 19 February 1925, and again for two periods after Albert Walter had left Mauritius.

<sup>103</sup> *Echoes*, 71.

<sup>104</sup> *Echoes*, 80.

<sup>105</sup> op. cit. 92.

<sup>106</sup> [Sir] Edward Brandis Denham (1876-1938). Colonial Secretary of Mauritius 1920-1923 (Acting Governor of Mauritius, 2 February 1921 - 3 April 1921; 8 May 1922 - 3 March 1923). He became Colonial Secretary, Kenya, 1923-1928 (Acting Governor of Kenya, February - October 1925; January - August, 1927).

<sup>107</sup> *Echoes*, 84.

Denham was appointed to replace Middleton from 1921. He continued to use Walter's services and, in 1922, Walter was appointed Protector of Immigrants and Poor Law Commissioner, when the Government had difficulty finding someone else to serve. For this, he was paid Rs. 5,000 a year, was an ex-officio member of the Council of Government and for a time was entitled the Honourable Mr. A. Walter. Walter records that from the beginning of 1922, he was winding up Food Control, Superintending work at the Observatory and a station at Vacoas, Protector of Immigrants and Poor Law Commissioner, analysing the census returns and writing the report, bringing out *The Mauritius Almanac*, and serving on various committees. The result was inevitable: 'I had a complete nervous breakdown'.

He left for a break in Réunion, a 'busman's holiday' as he arranged to meet his opposite number in meteorology, taking equipment for stations at Saint Benoit and Cilaos. There was little or no let up to his work on return to Mauritius. He distributed relief as the Protector of Immigrants and Poor Law Commissioner. He opened a laundry and provided a crèche so that women could earn instead of receiving relief. He took charge of an official crèche and was an official visitor at the lunatic asylum. He served on what he describes as a not very successful committee with two Doctors, Balfour and Gilchrist, to consider better sanitation on the sugar estates.<sup>108</sup>

As Protector of Immigrants, Walter was asked to lead a 1923 delegation to India in the hope of re-opening the immigration of Indians to work on the sugar estates in Mauritius, which had been curtailed with the development of increasing sensitivity of Indian opinion on the question of emigration of unskilled or skilled labour and the position of Indians in the colonies and dominions.<sup>109</sup> For this responsibility, Walter was offered no additional pay and no freedom to refuse. The Indian government had stopped migration to Mauritius, but on 9 March, following discussions with Walter's delegation, the Legislative Assembly in Delhi agreed to its resumption. Walter was delighted that some evidence from *The Mauritius Almanac* was used in the debate. Planters in Mauritius were extremely grateful and the Chamber of Agriculture arranged to pay for Walter and his wife to visit England with three of their sons, leaving on SS Garth Castle on 6 July, his birthday, and returning to Mauritius in June 1924.

Eventually the Legislative Council voted a sum of Rs. 10, 000 for Walter, as it was

the general wish of the community ... and those gentlemen who accompanied him ... that Mr. Walter's exceptional services should be recognised.<sup>110</sup>

During his stay in India, Walter travelled widely (for example, visiting Lucknow, Calcutta and Benares) and includes a nineteen-page account of the places he visited and the people he met in his memoirs.

#### 4.2. *The Mauritius Almanac*<sup>111</sup>

Walter writes that:

In spite of the absorbing work which I was carrying out at the Observatory, leaving Quatre Bornes by the first train and returning by the last, work on the Almanac was continued in evenings at home.<sup>112</sup>

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<sup>108</sup> *Echoes*, 89-90.

<sup>109</sup> For background, see Rushbrook Williams, L. F., 1923. A Statement prepared for presentation to Parliament in accordance with the requirements of the 26<sup>th</sup> Section of the Government of India Act, Calcutta: Superintendent Government Printing, India. Also, Allen, R. B., 1999. *Slaves, Freedmen and Indentured Laborers in Colonial Mauritius*, Cambridge University Press.

<sup>110</sup> *Echoes*, 111. Walter also records that Middleton told him that Hesketh Bell cancelled a recommendation that his name be put forward for the OBE in recognition of his service to Mauritius in India.

<sup>111</sup> The first edition of *The Mauritius Almanac* began in 1769, a New Series in 1869. Walter purchased the *Almanac* in 1910. The copies held in the Bodleian Library of Commonwealth and African Studies at Rhodes House, Oxford, were deposited by Albert Walter.



Much of the material was derived from local experts and he always recorded his thanks to the various heads of departments and others who gave valuable assistance, although many articles were prepared by Walter himself. He achieved an increase in distribution, despite an increase in price, and an increase in the number of advertisements. The Preface to the 1912 edition records a delay in production arising from a complete revision of information, with new paging and special attention to indexing. The quality of paper was improved, despite difficulties and delays during the 1914-1918 war, although in 1916 he apologised for the bulky nature of the volume resulting from thicker paper procured from Europe. New features included a chapter devoted to agriculture. Sections on the Observatory and its work were expanded and summaries of climate were included with historical information on the occurrence of cyclones and severe droughts. A chart showing the tracks of cyclones across the island was introduced.

We learn something of the pressures under which Walter was working from the editorials. The 1914 issue records an apology from the compiler for a month's delay in its appearance, due to 'the many changes introduced, pressure of official work and printing difficulties, in addition to ill health'. In the 50<sup>th</sup> issue of the New Series, the editorial dated 17 January 1918 records that

In spite of the great difficulties which have arisen out of war conditions and the necessary limitations which they have imposed on all printed matter, the compilers have done everything in their power to maintain the standard which previous issues had reached ... After preparing the greater part of the manuscripts for press Mr. Walter was constrained on medical grounds to leave the Colony after 21 years continuous service.

Post-war conditions continued to cause problems and the 1919 edition was brought out with 'considerable difficulty', although it was suggested that users were unlikely to notice any deterioration from previous standards.

Walter continued as editor of *The Almanac* until 1926. In an editorial, dated 10 September 1927, his immediate successor, Mr. Pitot, conveyed his thanks to his predecessor for his 'kind appreciation of my abilities to continue the excellent work by him in bringing the *Mauritius Almanac* to the degree of excellence and to the fullness of information and presentation it possesses'. A further change in editorship followed rapidly when Pitot was appointed Secretary to the Mauritian Commercial Bank.

In 1944, when Walter visited Mauritius from his base in East Africa on war-time duties, an article on agriculture in *Le Cernéen*, under the signature of 'A Patriot', drew on the 1914 issue of the Almanac, adding the following comment:

On sait, en effet, que M. Walter qui revint a Maurice récemment, chargé d'une importante mission par le Government Impérial, laissa jadis, chez-nous, la réputation d'être un des fonctionnaires anglais les plus capable et les plus consciencieux dont notre île eut jamais se louer.<sup>113</sup>

## 5. Vacoas

### 5.1. Upper air research

According to Walter, Mauritius was asked to report on upper air conditions in 1911,<sup>114</sup> but it was not until 1919, when the exchange rate was low, that the finances of the Colony allowed the Acting Governor, John Middleton, to authorise purchase of kites, balloons, barometers and anemometers to equip additional stations in the Colony for that purpose. Even then, manufacturing difficulties in Europe after the First World War meant that the final delivery of new instruments was received five

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<sup>112</sup> *Echoes*, 54.

<sup>113</sup> *Echoes*, 56. *Le Cernéen*, published from 1832 to 1981, was the French-language organ of the sugar industry (information provided by Mauritius National Archives).

<sup>114</sup> For background, see: C. J. P. Cave 1914. Upper air research. *Q. J. R. Meteorol. Soc.* **40**: 97-110.

years after ordering. Cloud observations with a Marvin nephoscope had been interrupted and were not begun again until 1923 with a Fineman nephoscope. Kite observations had reached only 4,000 feet.

On 26 February, 1923, Walter took the opportunity on government business in India to spend time with J. H. Field, then meteorologist at the Aerological Station, Agra.<sup>115</sup> Upper air observations in India had begun at Simla in 1905 and the station at Agra was set up in 1912. Field was doing pioneering work with balloons and Walter took away several useful guidelines.

Field was making his own balloons from sheet rubber as he had found difficulty in preserving the rubber balloons of commerce. He was also using the tail method, which I think he was the first to introduce to upper air investigation by balloon.<sup>116</sup> He showed me how to set the dividing lathe to rule a reticule in Radians for fitting into the eyepiece of the telescope of the theodolite used for observing the flight of the balloon.<sup>117</sup>

After returning to Mauritius from his visit to Britain in June 1924, Walter was at last free from major government commitments. He and his wife moved to Vacoas (425 metres above sea level), recognised as the main station for upper air observations. Their son Maurice joined them. Aerological buildings were completed by the end of June 1925 and, from July to mid October, Maurice Walter worked with his father on pilot balloon observations.<sup>118</sup> Tails of 10 or 40 metres length were used, the longer ones reduced to 30 metres in very high winds. By 30 November 1925, 137 flights had been observed, 24 reaching 6,000 metres, after which the observations had to be curtailed through lack of sufficient assistance for routine work at the Royal Alfred Observatory. An account of the upper air observations was published locally in 1926<sup>119</sup> and a summary was reported by the Royal Meteorological Society.<sup>120</sup> A full report was published as a *Geophysical Memoir* in 1927 (by which time Walter was in Kenya).<sup>121</sup>

Walter wrote that the Mauritius Synoptic Service was not sufficiently developed to permit a satisfactory classification of weather types and, in any case, the observations had not been numerous enough to allow detailed analysis according to weather type and not all seasons were covered. He noted that calm conditions prevailed above the steady south-east trade between 1,000 and 2,000 metres above sea level and that westerly winds dominated above 4,000 metres. The westerlies were from the north-west or south-west, becoming almost due westerly, though variably, between 6,000 and 7,000 metres. With the passage of a trough, westerlies were encountered as low as 1,000 metres above sea level, but there were occasions when westerlies were entirely absent below 6,000 feet. He referred to a peculiar weather type, exemplified on 13 February 1926, when a south-westerly wind was sandwiched between two easterly currents. Even in those conditions, wind velocities at flying height were light, which had direct bearing on the proposed Cape to Cairo air route and its possible extension to Australia, first conceived as using airships and much talked about at the time.

Walter drew attention to the importance of the meteorology of the South Indian Ocean for weather over India, Australia and much of Africa, and that it had been customary for that reason to despatch weather telegrams from Mauritius to the Indian, Egyptian and Rhodesian weather services. He was convinced that the study demonstrated the importance of the island's location for upper air

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<sup>115</sup> Field became Director-General of Observatories in India (1924-7), following the retirement of Sir Gilbert Walker in 1923.

<sup>116</sup> See a review of Field, J. H., 1924. The free atmosphere in India. Introduction, *Memoirs of the Indian Meteorological Department*, 24 (Part V), 133-166, by L. H. G. D., who writes 'It is interesting to note that, contrary to general practice, the tail method was developed to a high degree and found the best', *Q. J. R. Meteorol. Soc.* 51, 1925, 66.

<sup>117</sup> *Echoes*, 101.

<sup>118</sup> *Echoes*, 112. 'I doubt whether I could have completed the Upper Air Survey without him.'

<sup>119</sup> Walter, A., 1926.

<sup>120</sup> Mauritius, Upper Air Investigation, *Q. J. R. Meteorol. Soc.* 52, 1926, foot of page 176.

<sup>121</sup> Walter, A., 1927.

research and its relevance for air transport and saw in the Upper Air Survey the germ of a development in air transport, which

might perhaps bring to the little island I loved so much a return of the important role which it enjoyed before the opening of the Suez Canal.

In a report to the Mauritian Government, he wrote:

The unique position in which Mauritius is placed from a meteorological point of view is too well known to require emphasis at the present time ... The early results of upper air research have, however, opened other horizons to the Mauritius service. It is evident to anyone possessing even a superficial acquaintance with the requirements and progress of the air service that the principal conditions for successful air traffic are:-

- (1) Absence of fogs
- (2) Absence of electrical disturbance
- (3) Absence of storms, or the possibility of forecasting them with reasonable accuracy
- (4) Favourable air-currents

Now the region extending between 19 degrees and 23 degrees South Latitude between Africa and Australia appears to present all the most favourable conditions. In the first place fogs are unknown. Thunderstorms occur only during the summer months from December to May and are generally associated with well-defined weather types. Cyclones occur in these regions only between November and April and are so regular in progression that their tracks can be forecast with considerable accuracy many hours in advance. They present none of the extraordinary irregularities of the typhoons of the China seas. Lastly there exists (1) a strong and steady S.E. trade which would facilitate traffic from East to West. (2) A nearly calm belt for stable passenger traffic either way at a serviceable altitude. (3) A steady and strong anti-trade current at an altitude varying between 1000 metres and 4000 metres with a large Westerly Component and at still higher altitudes (5000 metres) an express postal current which would place Mauritius within 24 to 36 hours of Australia.

Although a great deal more work on the upper current is necessary before normal conditions can be determined, it is practically certain, so far as meteorological conditions are concerned, that an alternative route to Australia could be branched from Egypt to Kenya and Mauritius.<sup>122</sup>

## 5.2. Meteorology at Vacoas

Walter's plans for Vacoas were not confined to an upper air survey and the meteorological headquarters for Mauritius moved to Vacoas from Pamplemousses in 1925.<sup>123</sup> Walter writes:

During the latter part of 1924 I was laying the foundation of a service for Mauritius of which I had dreamed for many years. First of all the work at Vacoas was being carried out in a healthy climate; the long journey to Pamplemousses as part of the routine was a thing of the past; there was a possibility of carrying out a programme of positional astronomy in the Southern Hemisphere which I had long hoped to do; and more than anything else, the dream of an Upper Air Survey over the Indian Ocean was at last realisable.<sup>124</sup>

It was recorded in the *R. A. O. Annual Report* for 1919 that preparations for the new aerological station at Vacoas had begun. The anemometer tower was completed, rising at 40 feet, well above any obstruction by houses or trees, with a hut at the base for the recording apparatus. The foundations of a new transit hut were dug and the orientation determined. In 1922, A. J. P. Walter

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<sup>122</sup> *Echoes*, 120-121.

<sup>123</sup> *op. cit.* 44. From 1950, the Mauritius Department of Meteorology focussed on meteorology and gave up other interests. The R. A. O. building at Pamplemousses was pulled down in 1961.

<sup>124</sup> *Echoes*, 114.

(Walter's son Petrie), having returned from three years at Rhodes University,<sup>125</sup> was appointed Assistant Director for five months and helped with the experimental work on clocks and supervised the work at Vacoas, before he was replaced by Maurice Walter.

Buildings at Vacoas were constructed from July 1924. Latitude and longitude were determined, provision was made for time observations, and an anemometer, sunshine recorder, rain gauges, thermometers, barometer and Fineman nephoscope were brought into use before the end of the year. The new transit instrument was set up in 1925 and two clocks and a wireless receiving station were erected. A workshop was fitted with a Lorch-Schmidt dividing 'tooth-cutting and screw cutting bench lathe driven by a half horse-power electric motor taking current off the electric mains'.

A very efficient and modern equipment for electric light and power was erected in July and a set of 20 Fuller 90 amp hour cells successfully brought into use. The charging set consist of a direct current dynamo, belt driven, from either a 5 b.h.p. Ruston-Hornby Petrol-Paraffin Engine or from an electric motor taking current off the electric mains.<sup>126</sup>

An anemograph was set up in the extreme north of the island at Cap Malheureux and a self-recording tidal gauge.

...these extracts do not give any idea of the amount of work involved and the ingenuity required to secure efficiency with the inadequate facilities in a Colony so far removed from centres where technical aid and advice necessary for their installation could be procured

Freed from public commitments for the first time for many years, however, Walter was enjoying new challenges.

It was great fun and the varied interests interspersed with the routine office work was exactly what was required to remedy the effects of the severe strain I had undergone in 1922.<sup>127</sup>

## 6. Conclusions

### 6.1. A call to Kenya

... my dream castle was soon to be shattered.

Towards the end of December, 1925, Walter received a telegram offering him the post of Statistician to the Kenya Government with a salary of £800-900. The then Colonial Secretary of Mauritius, E. W. Evans,<sup>128</sup> advised him that, if he refused promotion, it would not be renewed. On further advice from Evans, Walter cabled Kenya that he would accept with a salary of £1,000 and quarters. Acceptance came on 24 December and Walter arranged to leave Mauritius for East Africa on 31 December on the French mail boat.

Mrs Walter was:

As usual ... ready to follow me bravely in whatever I decided to do in my own interests and especially in the interests of the boys.<sup>129</sup>

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<sup>125</sup> The oldest of the seven sons of Albert Walter. He was back from Rhodes University for a spell before going on to McGill University, where he passed out with a degree in mining engineering. Private communication from John and Lindsay Walter.

<sup>126</sup> *Echoes*, 116.

<sup>127</sup> *ibid.*

<sup>128</sup> Edward Walter Evans (1890–1985) was to serve as Acting Governor of Mauritius for several periods during the 1930s.

<sup>129</sup> *Echoes*, 118.

## 6.2. Summary

Walter describes in his memoirs how he had become a trusted member of the Mauritian community.

As Claxton had insisted on my going to the Observatory by the first train and returning by the last I usually travelled with the planters from the North of the Island. The fact that I had married into a well-known Mauritian family and that I had become a Catholic led them to look on me as one of the Mauritian community, a fact that was to stand me in good stead in the work which I was asked to perform by the government at a later date.<sup>130</sup>

His life on the Island had not cut him off from developments elsewhere. He took every opportunity to make contact with meteorologists and other scientists when visiting London, India, South Africa or islands in the Indian Ocean, whether on official or personal business, even when recovering from illness. When, in 1917, the Walters took their eldest boys to school in Grahamstown, he did some research with Professor R. W. Varder in the Physics Department at Rhodes University, using their new Kew magnetometer. When in India in 1923, he had talks with Sir Gilbert Walker, Director-General of Observatories, in addition to meeting Field at Agra. On his way out to India, he met his 'counterpart' in Colombo. When he was in England with his family for the first time for 26 years, his fare having been paid by the Chamber of Agriculture at the wish of grateful sugar planters, he spent time visiting instrument makers to acquire clocks, one by 'Cottingham and another of the Reifler type'.<sup>131</sup>

Walter took part in the introduction of wireless to meteorology in Mauritius. He saw the introduction of the motor car to the Island in 1901. He met the Maunders (1901), Sir John Ross (1907) and L. A. Bauer (1911). He photographed the transit of Mercury in 1907. He viewed Halley's Comet in 1910, following it from a faint telescopic object until it became visible to the naked eye.<sup>132</sup>

The 1914-18 war had limited consequences for life in Mauritius, except to bring increased prosperity to the sugar planting community, which helped the financial stability of the Government, until the importation of essential foodstuffs became difficult in the last years of the war. In 1922, Walter heard a lecture by Major Honnet on developments in aviation<sup>133</sup> and he and his wife flew for the first time with Honnet in an Avro, an improvised airport having been set up at Vacoas.

Walter records details of the report he submitted when Hesketh Bell threatened to reduce the grant to the R. A.O. for 1919.<sup>134</sup> In the report, Walter pointed out that the annual budget for the Observatory was less than 0.2% of the Colony's expenses. He referred to the opening of the Observatory, Meldrum's important work on cyclones that had saved lives, the continuing importance of cyclone warnings, the provision of the correct time for shipping, the recording of meteorological and magnetic observations - temperature, barometer, wind, sunshine, variations of the compass and the component magnetic forces, and the seismographic work begun in 1898 by Claxton and himself that had allowed the safe laying of cables by avoiding regions of the ocean most subject to seismic disturbance.

He referred to the statement by Dr. Simpson, Director of the Meteorological Office, that of all the Colonial Observatories the records of the R. A. O. had been the most widely used in the attempt to solve the many and difficult problems of the meteorology of the world. He recalled the recommended closure of the R. A. O. in 1909 that had led to the abolition of the post of Chief Assistant and yet improvements had subsequently been made such that, by 1917, most of the instrumental equipment, properly mounted, remained in adjustment for several years and that the

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<sup>130</sup> *Echoes*, 44-45.

<sup>131</sup> *Echoes*, 111.

<sup>132</sup> *Echoes*, 47.

<sup>133</sup> The first recorded flight over Mauritius from a field near Vacoas was undertaken by Major F. W. Honnet on 2 June 1922. Guttery, B. R., 1998. *Encyclopedia of African Airlines*, 123.

<sup>134</sup> *Echoes*, 68-70.

records being automatic could be secured by officers 'possessing only elementary training'. The recording apparatus had been modified to run for 15 days instead of one, with gas and electric illumination installed. A building for the time equipment had been granted by Sir John Chancellor. A monthly bulletin was issued instead of an annual volume.

He explained that improved efficiency at the Observatory had made it possible for him to give assistance to the administration in several branches in which his special knowledge of local conditions had been considered important, but that could not have been continued indefinitely, as discussion of results and instrumental constants had fallen into arrears though not materially affecting the efficiency and accuracy of the records. He referred to the important work then beginning on the study of upper air currents.

Walter's optimism for Vacoas was to be vindicated:

In 1963 when these memoirs were written, the Mauritius Service has realised all that I had dreamt of and indeed had predicted in my memorandum of the Upper Air Survey in 1926. The Observatory at Pamplémousses has been demolished and a new building erected at the Aerological Station at Vacoas opened by me in 1921 while the Magnetic section has been transferred to a new site at Plaisance where the local magnetic disturbance is less marked than at Pamplémousses. The staff now consists of a personnel of 62 as compared with my staff of 8. The Island is a stopping place for the Air Lines between Africa and Australia.<sup>135</sup>

When the call came to Kenya, he was forty-eight.

... it would mean abandoning once and for all time the work I loved so dearly; leaving the little island that had meant so much to me; parting from so many wonderful friends; tearing myself away from surroundings which were intrinsically Catholic in their associations and saying good-bye, probably for ever, to a country which had given me so much happiness, afforded me so many great opportunities and where my work and reputation were so deeply appreciated. It meant giving up all this for what? A new country; new surroundings; new fundamental work and the ... unknown.<sup>136</sup>

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<sup>135</sup> *Echoes*, 70, footnote. The international airport is at Plaisance, 48 kms south-east of Port Louis.

<sup>136</sup> *Echoes*, 118. I refer in Part II to Walter's return to Mauritius in June 1926. He reached Mauritius on 1 June, winding up his connection with the Observatory and handing over to his successor before leaving again for Kenya on 27 June, this time with his family. *R. A. O. Annual Reports* for 1925 and 1926 (information from J. Pougnet). Walter revisited Mauritius several times during the Second World War.

## Major publications by Albert Walter from his time in Mauritius

The following can be found in the National Meteorological Library and Archive at Exeter and/or in Oxford at the Radcliffe Science Library or the Bodleian Library of Commonwealth and African Studies at Rhodes House. The list is not complete. Walter published articles in *Miscellaneous Publications of the Royal Alfred Observatory* on the influence of forests on rainfall and on the cyclone of 1908. He read papers to the Meteorological Society of Mauritius, which are recorded in the *Proceedings and Transactions* of the Society held in the National Meteorological Library and Archive at Exeter. The *Mauritius Almanac*, with articles by Walter, is available in Bodleian Library of Commonwealth and African Studies at Rhodes House, Oxford.

1902. On the origin and propagation of cyclonic storms, *Proc. Trans. Meteor. Soc. Mauritius* **3** (n.s.): 19.

1907. Discussion of the errors of certain types of minimum spirit thermometers in use at the Royal Alfred Observatory, Mauritius, *Trans. S. Afr. Phil. Soc.* **16**: 419-436.

1908. On the influence of forests on rainfall and the probable effect of 'deboisement' on agriculture in Mauritius, *Miscellaneous Publication, Royal Alfred Observatory*, Published by order of His Excellence the Governor, Colony of Mauritius.

1909. On errors of estimation in thermometric observation, *Q. J. R. Meteorol. Soc.* **35**: 249-256; Discussion: 256-257.

1910. *The sugar industry of Mauritius: a study in correlation; including a scheme of insurance of the cane crop against damage caused by cyclones*, London: A. L. Humphreys, 228 pp. and 22 plates.

1910. (and J. W. Gregory) Sugar production in Mauritius. *Geogr. J.* **36**: 500-501.

1913. The cyclones of 22<sup>nd</sup> February to 8<sup>th</sup> March 1913. *Miscellaneous Publication* **4**, Mauritius: Royal Alfred Observatory.

1914. Climate (chapter). Contrib. to Macmillan, A. (Edit.), *Mauritius Illustrated*, London: W. H. & L. Collingridge, 185-192.

1914. The Sugar Industry (Chapter). Contrib. to Macmillan, A. (Edit.), *Mauritius Illustrated*, London: W. H. & L. Collingridge, 208-232.

1922. The relation between sugar crops and weather, *Miscellaneous Publication* **5**, Mauritius, Royal Alfred Observatory.

1926. Report on upper air observations, Mauritius, Royal Alfred Observatory, Mauritius, Port Louis: P. G. Bumstead, Government Printer. See also: 1926. Mauritius, Upper Air Investigation. *Q. J. R. Meteorol. Soc.* **52**: foot of page 176.

1927. Results of observations on the direction and velocity of the upper air current over the South Indian Ocean, *Geophysical Memoirs* **4** (39), Air Ministry: Meteorological Office, London: HMSO.