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COMMUNICATION ISSUES IN WAR-TIME ASTRONOMY: INDEPENDENT AUSTRALIAN, INDIAN, NEW ZEALAND AND SOUTH AFRICAN DISCOVERIES OF COMET C/1941 B2 (DE KOCK-PARASKEVOPOULOS)

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Abstract: In this paper we briefly examine the communication problems that occurred in international astronomy during World War II by discussing independent discoveries of Comet C/1941 B2 that were made by Australian, Indian, New Zealand and South African astronomers.

Keywords: WWII, Australia, India, New Zealand, South Africa, C/1941 B2 (de Kock-Paraskevopoulos), J.F. Skjellerup, S. Iyer, R.A. McIntosh

1 INTRODUCTION

In 1966 the Australia historian Professor Geoffrey Blainey introduced the concept of the 'tyranny of distance' in order to explore the role that geographical isolation from England played on the social, economic and political development of nineteenth century Australia. In Antipodean science the 'tyranny of distance' also held sway, and the geographical and intellectual isolation of Australia from Britain and the main metropolitan centres of Europe and the United States has been explored by a number of researchers (e.g. see Home, 1984; 1988; Inkster, 1985; Minard, 2013; Todd, 1993).

In the world of cometary astronomy, the physical isolation of Australia was important during the nineteenth century, especially prior to the completion of a telegraphic link between England and Australia in 1882 (see Baracchi, 1914). The only communication option was to send a letter or newspaper by ship, and before the opening of the Suez Canal the record for the England-Australia run was 68 days (achieved by the *Marco Polo* in 1852), but many vessels took twice as long (Jackson, 1991: 32). For example, when William Scott, the founding Director of Sydney Observatory, sailed to Sydney in 1856 the journey took 123 days (Orchiston, 1998). After the Suez Canal opened in 1869 the typical duration dropped to six or seven weeks. For more distant New Zealand, these delays were even more pronounced.

Lengthy communication delays were particularly pertinent in the case of comets discovered by Australian and New Zealand astronomers (e.g. see Orchiston, 1997, for some Australian case studies), but it also meant that news of comets discovered elsewhere sometimes reached the Antipodes long after these objects had faded from view or moved out of the southern sky.

Sometimes formal international communication channels were disrupted or closed entirely during wars, but particularly in World War II, portraying yet another instance of the 'tyranny of distance'. After summarizing protocols associated with cometary discovery and naming, we explore these communications issues by examining Comet C/1941 B2 (de Kock-Paraskevopoulos), which was independently discovered by Australian, Indian, New Zealand and South African astronomers. This paper therefore expands, in part, on Orchiston (1997), which examined comets discovered by the well-known Australian amateur astronomers Francis Abbott (1799–1883; Orchiston, 1992), Dr William Bone (1836–1885; Orchiston, 1987), Mark Howarth (1884–1971; Orchiston and Bembrick, 1997) and Frank Skjellerup (1875–

1950; Orchiston, 1999b; 2003) in 1865, 1880, 1941 and also 1941, respectively, for which they were not assigned due credit.

2 COMET DISCOVERIES AND NOMENCLATURE

During the nineteenth century Germany was one of the leading nations in Solar System positional astronomy, and the Kiel Observatory was regarded as the international centre for the reception and transmission of data on known comets and newly discovered comets. Heading the 'World Centre' (as it was sometimes referred to) was Professor Heinrich Kreutz (1854–1907; Frommert, 2014), who also edited the influential journal, *Astronomische Nachrichten*. After the founding of the International Astronomical Union in 1919, Commission 6 established the Central Bureau for Astronomical Telegrams with responsibility for disseminating cometary (and other) information, and the IAU Circulars have served this role most effectively ever since.

Most nations had their own national reporting centres which interfaced directly with the international centre, and in Australia Melbourne Observatory initially served this role. It also was responsible for systematically and efficiently communicating information on all comets visible in the southern sky to Australian

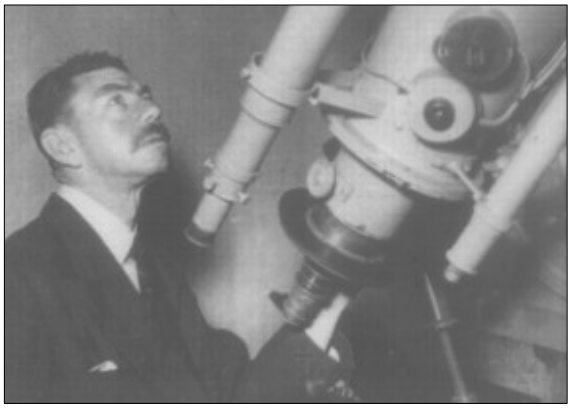

Figure 1: Reginald de Kock, at the Royal Observatory, Cape of Good Hope (A.S.S.A. Symposium 2002: Paper 02 Mattei: Danie Overbeek Memorial Lecture).

and New Zealand professional observatories and to those amateur astronomers actively engaged in cometary astronomy. However, escalating problems encountered between Melbourne Observatory's Pietro Baracchi (1851–1926; Perdrix, 1979) and leading Australian and New Zealand amateur astronomers led to the centre being transferred to Sydney Observatory in 1907, only to return to Melbourne Observatory, when former amateur astronomer C.J. Merfield (1866–1931; Orchiston 2015), who had initiated the transfer, accepted a position at the latter Observatory and moved from Sydney Observatory (Orchiston, 1999a).

Similarly, convention dictated that data on any comet newly discovered by an Australian or New Zealand astronomer should be transmitted to the Australasian national centre, which, after obtaining formal confirmatory observations, would notify other local astronomers as well as the International Centre.

During the nineteenth century, there was no formal arrangement for the naming of new comets, with the notable exception of "... short-period comets that had been observed at more than one perihelion passage." (Marsden, n.d.). However, other comets often were traditionally associated with the names of their discoverers, and it was only in 1925 that the Central Bureau for Astronomical Telegrams began assigning formal names to new comets and publicizing these via the *IAU Circulars* (*ibid.*). This soon produced the first hyphenated comet name, to indicate more than one independent discoverer, and in 1930 the first three-name comet was identified. In 1939, the Bureau introduced the current 'trinomial nomenclature', which recognized the names of up to three independent discoverers of a comet, listed in discovery-order (Anonymous, 1941c).

3 COMET C/1941 B2 (DE KOCK-PARASKEVOPOULOS)

Kronk (2009: 126–133) and Vsekhsvyatskii (1964: 499–501) both provide useful overviews of Comet C/1941 B2. There is no dispute about the initial discovery of this comet:

> R.P. de Kock (Paarl, South Africa) was preparing to observe the variable star R. Lupi, when he discovered this comet in the morning sky on 1941 January 15.09. The head was prominent, while the tail was well developed and over ½° long. The comet's magnitude was determined as 5.8 and he estimated the position as $\alpha = 15^h 36^m$, $\delta = -32°$. De Kock immediately notified nearby Royal Observatory (Cape of Good Hope, South Africa), where J. Jackson confirmed the discovery on January 18, 19, and 20. (Kronk, 2009: 126).

Reginald Purdon de Kock (1902–1980: Figure 1), a dedicated variable star observer since the early 1930s,

> … was one of South Africa's most prolific amateur astronomers. Up to the time of his death in 1980, he had reported no fewer than 160,777 observations of variable stars to the AAVSO (American Association of Variable Star Observers), their all-time record. (Glass, 1986: 113).

De Kock received rather serious injuries at birth, and as a result his left eye was almost

useless and his left arm had no proper feeling in it (which prevented him from driving a car). In 1924 or 1925 de Kock joined the Astronomical Society of Southern Africa, and soon after discovering Comet C/1941 B2 he was invited to join the staff of the 'Cape Observatory' as a 'supernumerary computer'. Glass (1986: 114) explains that this was someone

> …whose job was to carry out computational work associated with the reduction of observations of the preparation of tables. Electronic computers were unknown in those days and only simple mechanical calculating machines were in use … However "computers" were used as general assistants also, and de Kock had other tasks such as taking the daily photographs of the sun and developing them. Processing the large plates was not easy for him with his disability … In 1962, at age 60, he should have retired but was kept on … His retirement took place in 1967.

By day de Kock was a professional astronomer, but by night he remained a dedicated amateur, often using the Observatory's 6-inch refractor to make his variable star observations. From 1948 until 1975—just five years before his death—he was Director of the Astronomical Society's Variable Star Section. Further details of de Kock's life, his astronomical achievements and his other interests are included in Glass' (1986) biography.

Reginald de Kock was not the only astronomer—or even the only South African—to discover Comet C/1941 B2. Vsekhsvyatskii (1964: 499) mentions that

> European and American observatories were notified telegraphically by Paraskevopoulos (Bloemfontein), who discovered the comet independently on 23 Jan. in Ara as a 2^m object with a 5° tail.

At the time, Greek-born Dr John Stephanos Paraskevopoulos (1889–1951; Figure 2; Bok, 1952) was Superintendent of the Boyden Station of Harvard College Observatory in Bloemfontein, South Africa. Papers by him listed in ADS indicate he was mainly interested in galactic variable stars, novae and gaseous nebulae, and in galaxies and clusters of galaxies. Cometary astronomy was not his forte so his detection of the 1941 comet was merely good luck rather than the outcome of a planned search program.

Kronk (2009: 127) outlined how Paraskevopoulos' telegram successfully reached his employer, Harvard College Observatory in Cambridge, Massachusetts, and

> Since earlier news of the comet's discovery had not yet been received in the USA, the comet became known in that country as "comet Paraskevopoulos" and received a preliminary designation of 1941c. Although a telegram had been sent to the Central Bureau for Astronomical Telegrams (Copenhagen, Denmark) shortly after de Kock's discovery, notification did not immediately reach the USA or other countries outside of Europe. Also, although the discovery was made in South Africa, news did not spread rapidly around that country.

Table 1: Independent discoverers of Comet C/1941 B2 discussed in this paper, listed in date order.

Astronomer	Country	City	Date(1941)
De Kock	S. Africa	Paarl	15 January
Skjellerup	Australia	Melbourne	21 January
Barnes	Australia	Melbourne	21 January
Iyer	India	Trivandrum	23 January
Paraskevopoulos	S. Africa	Bloemfontein	23 January
McIntosh	NZ	Auckland	24 January

Eventually Comet C/1941 B2 became known officially as de Kock-Paraskevopoulos (e.g. see Kronk, 2009; Marsden and Williams, 1996). To aid in our subsequent analysis, Table 1 lists information on the independent discoverers of Comet C/1941 B2 who are discussed in this paper.

From the time of its initial discovery on 15 January 1941 Comet C/1941 B2 continued to brighten, and it reached a maximum visual magnitude of around 2.6 near the end of January.

Figure 2: John Paraskevopoulos (courtesy: University of Chicago Photographic Archive, apf6-04190, Special Collections Research Center, University of Chicago Library).

Figure 3: A photograph of Comet C/1941 B2 (de Kock-Paraskevopoulos) taken with the 61-cm (24-in) reflector at the Yerkes Observatory (courtesy: University of Chicago Photographic Archive, apf6-02105, Special Collections Research Center, University of Chicago Library).

Thereafter, it faded rapidly. The British-born astronomer and Director of the Union Observatory in Johannesburg, Harry Edwin Wood (1881–1946; Stoy, 1947), reported the following magnitude estimates from 23 January through 2 March:

> … 23 Jan., m = $4^m.5$; 24 Jan., $4^m.2$ to $3^m.4$; 25 Jan., $3^m.8$ to 3m.1; 27 Jan., $3^m.3$ to $2^m.8$; 28 Jan., $3^m.3$ to $2^m.7$; 30 Jan., $2^m.9$ to $2^m.6$; 1 Feb., $3^m.2$; 7 Feb., $4^m.4$ to $4^m.2$; 8 Feb. and 9 Feb., $4^m.8$; 12 Feb. and 14 Feb., $^{5m.}4$ to $5^m.5$; 16 Feb., $6^m.2$; 23 Feb., $6^m.6$; 28 Feb. to 2 March, $7^m.1$. (Vsekhsvyatskii (1964: 500).

After passing just 0.6° from the Sun on 28 April, the comet was only observed on four more occasions, the last being on 17 September 1941 when H.M. Jeffers photographed it with the Lick Observatory's 91-cm Crossley Reflector. He then "… estimated the magnitude as 17, and described the coma as sharp, 10″ across, and surrounded by a faint haze." (Kronk, 2009: 132).

When de Kock first detected the comet it had a well-developed tail about half a degree long while, as we have seen, Paraskevopoulos reported it as 5° on 23 January. This same day, in Australia, the Director of Sydney Observatory Dr Harley Weston Wood (1911–1984)[1] gave the length of the tail as 3.5°. The following day two Uruguay professional astronomers noted the tail as 5° long, while the New Zealand astronomer Ronald A. McIntosh,[2] one of those who also independently discovered the comet, estimated the length of the tail as 7° (Kronk, 2009:128). The comet passed closest to the Earth on 29 January, and by 5 February the tail was down to 4°. On the 7th it was 2.3° and the following night 2° (Kronk, 2009: 129–130). The comet continued to fade during February but the tail grew slowly, being between 3° and 5° on 14 through 17 February. But by 20 February it was back to between 2° and 3° and on 26 February was just 1° long. On 18 March, ten days before its conjunction with the Sun, the tail was just 25′. This was

the last occasion on which a tail was visible (Kronk, 2009: 131–132).

According to Vsekhsvyatskii (1964: 500), the comet was photographed at

> … Cape Town Observatory, Kiev, Simeis, Uccle, Toulouse, Yale Observatory, McCormick Observatory, Paris and other observatories.

Included among these "other observatories" was Yerkes, and one of their photographs is shown here in Figure 3, with the comet displaying a brilliant head and an equally impressive tail.

4 INDEPENDENT AUSTRALIAN, INDIAN AND NEW ZEALAND DISCOVERIES OF COMET C/1941 B2

4.1 Frank Skjellerup in Australia

John Francis (Frank) Skjellerup (Figure 4) is well-known for his cometary discoveries (see Hughes, 1991; Orchiston, 1999b; 2003). He was born in Victoria (Australia) in 1875 and after serving as a telegraph operator moved to South Africa in 1900 where he worked as a telegraphist in Cape Town. Upon retiring in 1923 he returned to Australia, settling in Melbourne. Late in life, Skjellerup was described as "... a tall, slimly-built, quiet-spoken man, of studious habit, who spoke of his hobby with shy enthusiasm." (Skellerup, 1961: 32). He died on 6 January 1952.

It was discussions about the forthcoming appearance of Comet 1P/Halley that whetted Skjellerup's appetite for astronomy, and he carried out his first astronomical observations in 1909. He soon acquired a 7.6-cm altazimuth-mounted refractor but never constructed an observatory.

From the start, Skjellerup had two primary observational interests: comets and variable stars (see Orchiston, 1999b; 2003). In 1911 he began systematically searching for new comets, and in 1912 independently discovered C/1912 R1 just two days after Walter Gale (1865–1945) made the initial discovery from Sydney, Australia. One can well imagine Skjellerup's disappointment! His next 'discovery', in 1915, also turned out to be a false alarm—it was merely the recovery of periodic comet 7P/Pons-Winnecke.

After two 'near misses' Skjellerup was due for a change of luck, and this occurred on 19 December 1919 when he was searching for the variable star RS Librae and instead discovered Comet C/1919 Y1. Almost exactly one year later he discovered C/1920 X1, and this was followed in May 1923 by another discovery which, upon further examination (Merton, 1927), proved to be the 'lost' comet that the New Zealander John Grigg (1838–1920; Orchiston, 2016: 271–291; 481–508; 597–625) had discovered in 1902 (see Orchiston, 1993). Comet 26P/Grigg-Skjellerup has one of the shortest periods of any known comet, and is also famous for its association with the Puppids meteor shower (Porter, 1952).

Skjellerup continued his searches, and, in November 1922 he discovered C/1922 W1. After returning to Australia he discovered two further comets, on 3 December 1927 (C/1927 X1) and in 1941. In fact, the 1927 comet was independently seen by astronomers in New Zealand and other amateur astronomers in Victoria on the same evening as Skjellerup, but as Crommelin (1928a) properly points out, Skjellerup's name must be given priority since he "… apparently was the first to determine a fairly accurate position, and communicate it to the principal observatory in his district." Yet this comet has been assigned to both Skjellerup and Maristany, even though the latter (from the La Plata Observatory) only made his independent discovery on 6 December, three days after Skjellerup. Crommelin is quite certain that Maristany does not deserve this honour:

Figure 4: Frank Skjellerup and his wife in their garden in Cape Town not long before they returned to Australia (Orchiston Collection).

> Mr. Maristany's name should not be retained in the official title of this comet. His discovery came too late for this; when he

> sent his telegram the comet was already known (even to the "man in the street") in New Zealand, Australia and South Africa; the mere fact that he sent a telegram to Europe does not entitle him to be singled out from the very numerous previous discoverers... (Crommelin, 1928b).

Skjellerup discovered his sixth and final comet on 21 January 1941 and it is this comet that is the focus of this research paper. At the time Skjellerup was conducting a binocular search for Comet C/1940 R2 (Cunningham), and reported in his field book:

> 3 am up to see Cunningham's Comet. In few minutes saw a comet in Norma. Position plotted at 3.30 am RA 16h6m Dec 40°. Magnitude about 4.5 short, broad tail about ¾ degree long. Possibly a new comet. (Skjellerup, 1912–1948).

Next morning this comet was found to be moving in the wrong direction for Comet Cunningham, and this is when Skjellerup realized that he had made a new discovery. That same day he advised Melbourne and Sydney Observatories accordingly (Skjellerup, 1941), and the following day a report appeared in the Melbourne newspaper, *The Age* (Skjellerup, 1912–1948).

Mr J.A. Moroney (1941: 110–111), President of the Astronomical Society of Victoria and a staff member of Melbourne Observatory, provides further details of the discovery:

> With pardonable pride the Astronomical Society of Victoria was delighted to know that its worthy senior Vice-President of several years standing, Mr F.J. Skjelleup [*sic*] was one of the first in Australia to announce the exact position of the new comet. In point of time he actually observed it about half an hour earlier than a Mr. Barnes, a resident of our suburb of Canterbury, on January 21st. Mr. Barnes reported it that day to the Melbourne Observatory at about 10 a.m., but he was unable to exactly describe its location …
>
> Mr. Skjellerup, although a seasoned observer, waited until the next morning, January 22nd, to confirm his position and rang the Observatory … at 2.15 p.m. being under the impression he had observed [Comet] Cunningham … he asked for the latest position of Cunningham. I had scarcely quoted the Right Ascension than he excitedly ejaculated 'Then I've got another one.' I was astonished, and after he gave positions and constellations I heartily congratulated him …
>
> That afternoon, at 4.15 p.m., Mr Skjellerup called at the Observatory. Generally calm and forever modest one could see that there was an undercurrent of excitement. [But] He poohpooed any priority. 'Oh, there'd be dozens who possibly saw it before me, etc.'

Following the discovery, Skjellerup observed the comet on nine different dates between 22 January and 9 February, noting on 30 January that it was "... fairly bright with tail 6 or 7 degrees long, slightly curved." (*ibid*.).

During the two weeks that it remained a naked-eye or binocular object, this comet generated considerable public interest in Australia, and attracted the attention of some of the nation's professional astronomers. Photographs of it were taken at the Riverview College, Sydney and Melbourne Observatories (see Wood, 1941).[3]

4.2 Dr Subramania Iyer in India

One of those who independently discovered Comet C/1941 B2 was Subramania Iyer, on 23 January 1941, from Trivandrum Observatory, in what is now the far southern Indian city of Thiruvananthapuram. This was long before news of the prior discovery in South Africa reached India.

Subramania Iyer was a Professor of Mathematics at the newly-formed University of Kerala, which also was responsible for Trivandrum Observatory. Iyer had a PhD in astronomy from the University of London in England, and had observing experience at that University's Observatory, and at the Radcliff Observatory in Oxford and the Solar Physics Observatory in Cambridge. Before accepting the Kerala academic appointment in 1927 he also visited Paris and Meudon Observatories in France and Potsdam Astrophysical Observatory near Berlin (Kurien, 2009).

The Government felt that Professor Iyer's experience and training could best be utilised in improving and developing Trivandrum Observatory which had a long and proud history, but by 1927 specialised in meteorology and geomagnetism rather than astronomy. This was not always the case (*ibid*.). When Trivandrum Observatory was founded in 1837 by Raja Varma (1813–1846), the King of the Southern Indian princely State of Travancore, it was

> … with the double view of affording his aid to the advancement of astronomical science, and of introducing by its means correct ideas of the principles of this science amongst the rising generation under his government … (Caldecott, 1837: 56).

Raja Varma also was eager that "… his country should partake with European nations in scientific investigations." (Menon, 1878: 416).

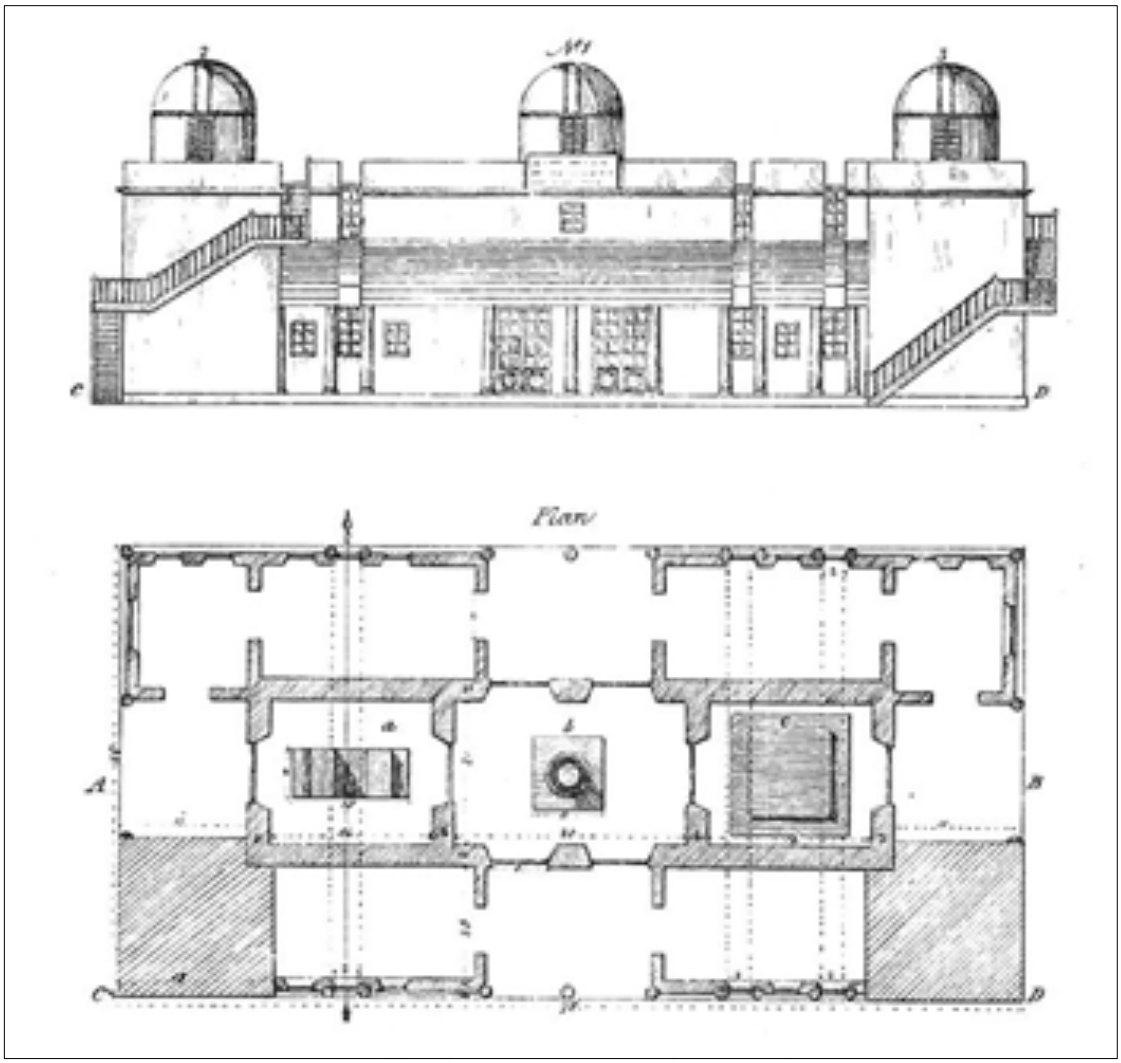

Figure 5: Drawings made in 1837 of Trivandrum Observatory (https://en.wikipedia.org).

The King and the State of Travancore funded the construction of an impressive observatory (Figure 5), measuring 78 ft. × 38 ft. (i.e. 23.8m × 11.6m). They also appointed an Indian-based British amateur astronomer, John Caldecott (1800–1849) as the 'Astronomer', and he ordered state-of-the-art astronomical, meteorological and geomagnetic instruments from England, making this one of the best-equipped observatories in India. Caldecott proved to be a dedicated observer, and by 1846 he had "… accumulated a large mass of astronomical, geomagnetic (Ratcliff 2016) and meteorological data …" (Kochhar and Orchiston, 2017: 731). He was preparing these observations for publication when he fell ill, and he died about one year later on 17 December 1849.

Caldecott's replacement was the Scottish scientist John Allan Broun (1817–1879), who arrived in Trivandrum in January 1852 and decided to abandon astronomy and focus on geomagnetism and meteorology (Broun, 1857). These fields were still the mainstay of the Observatory's research when Professor Iyer assumed responsibility for the facility 75 years later.

Professor Iyer had access to one of the Observatory's original instruments, an historic equatorially mounted 5-inch (12.7-cm) f/16.8 Dollond refractor (see Figure 6), and he used this to observe the comet and record its right ascension and declination for nearly a month. Meanwhile, his assistant, Kuttan Nayar, calculated the orbital parameters of the comet based on the Professor's observations. The University then reported Iyer's discovery of the comet and Nayar's orbital parameters to the Royal Society in London (Kurien, 2009), but these were not published and currently neither report can be traced. We suspect that had the University followed the correct course of action and forwarded the reports to the Royal Astronomical Society then the outcome may have been very different.

Nonetheless, in India, Iyer's discovery was considered a great achievement at the time:

Figure 6: Left: a recent photograph of the historic equatorially-mounted 5-inch refractor at Trivandrum Observatory used by Professor Iyer to track Comet C/1941 B2 (de Kock-Paraskevopoulos) in January 1941. Right: The mobile 'observatory' in which the telescope currently is housed when not in use on public viewing nights (photographs courtesy: Pramod Galgali).

see the citation in the biography of his son-in-law, Professor Alladi Ramakrishnan (1923–2008), from the Institute of Mathematical Sciences in Chennai (Alladi, 2019: 114).

Although he was not associated with an independent discovery, T.P. Bhaskaran (1889–1950), Director of Nizamiah Observatory in Hyderabad from 1918 to 1944, observed Comet C/1941 B2 for over a month from near the end of January, even taking photographs of it with a 4-in astrocamera (for details, see Kapoor, 2013). In February 1941, M.A. Rahman Khan (b. 1881) from Osmania University College and the noted Indian amateur astronomer Ragha Gobinda Chandra (1878–1975; Biswas et al., 2011) from Bagchar (now in Bangladesh) also observed the comet (Kapoor, 2013).

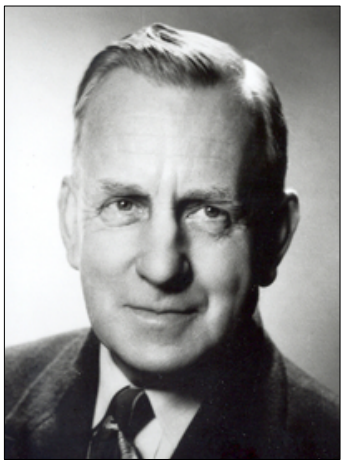

Figure 7: Ronald A. McIntosh (Orchiston Collection).

4.3 Ronald A. McIntosh in New Zealand

The New Zealand amateur Ronald Alexander McIntosh (1904–1977; Figure 7; Bateson, 1977) was another astronomer who independently detected C/1941 B2, in this case on 24 January 1941 (UT), before news of the South African discovery reached New Zealand. For New Zealand localities mentioned in the text see Figure 8.

Despite his amateur status, Auckland-based McIntosh was one of New Zealand's leading mid-twentieth century astronomers, who emulated his religious upbringing by adopting a catholic approach to astronomy. Apart from forging an international reputation in meteor astronomy (Luciuk and Orchiston, 2021), he made extensive telescopic observations of the Moon and Jupiter; researched and wrote on the history of astronomy in New Zealand; was one of those instrumental in founding the Auckland Observatory (with its impressive 0.5-m Zeiss reflector); and played a key role in the development of various New Zealand astronomical societies (see Table 2). Then, when his observing days were all but over, he focussed his energies on astronomical education, through Public Nights' at Auckland Observatory

and as the Lecturer-Demonstrator at the Auckland War Memorial Museum Planetarium (Luciuk, 2007; Orchiston, 2016: 523–561).

Like many a young boy in 1910, it was glimpses of a rather majestic Comet 1P/Halley that attracted McIntosh to astronomy (Comet was his introduction …, 1972), and from 1927 to 1941 he observed 5 different comets (McIntosh, n.d.). These are listed in Table 3.

McIntosh (1941b) observed C/1941 B2 on 24 and 31 January and 1, 5 and 15 February (UT), recording its right ascension and declination, its apparent visual magnitude and the length of the tail (which shrank from 7° to 4°). He also observed the comet on 26, 29 and 3 January and on 2 February, but "… being absent from my observatory positions were not obtained with accuracy." (McIntosh, 1941b: 320). He also mentions that

> February 15 was the last occasion on which I was able to examine the comet, owing to a poor western horizon from my observatory. By then, although much fainter, the tail had developed into a parabolic shell of light, giving a bifurcated appearance. (McIntosh, 1941b: 321).

Following the New Zealand discovery of Comet C/1941 B2, Carter Observatory (the nattional observatory in the nation's capital, Wellington) distributed information throughout New Zealand, and the following astronomers joined Ronald McIntosh in making estimates of its right ascension, declination, apparent visual magnitude and length of the tail: K.A. Adams (Dunedin), M. Geddes (Carter Observatory); W.H.B. Hobbs (Dunedin), G.V. Hudson (Wellington), I.L. Thomsen (Wellington) and C.J. Westland (Christchurch). Details are provided in the tables in Anonymous (1941a: 55 and 1941e: 27). Mr Geddes also used the 9-inch (23-cm) Cooke photovisual refractor at Carter Observatory to obtain a series of photographs (see Anonymous, 1941e). Then after G.M. Townsend of Hawera recovered Comet C/1940 R2 (Cunningham) on 27 January, the positions

Figure 8: New Zealand localities (map: Wayne Orchiston).

of both southern comets were circulated to further New Zealand astronomers, but most notably A. Bryce (Hamilton), D. Matheson (Pukemaori) and F.J. Morshead (New Plymouth)(Anonymous, 1941b: 26). Ken Adams (1920–1999; Orchiston, 2016: 329–330; 358–360), Murray Geddes (1909–1944; Thomsen, 1945), George Vernon Hudson, Ivan Leslie Thomsen (1910–1969; Eiby, 1970), Charles James Westland (1875–1950; Orchiston, 2016: 509–522), George Mortimer Townsend (1895–1954; Obituary, 1954) and Francis Joseph Morshead (1884–1967) all figure prominently in the history of New Zealand astronomy. Like Geddes and Adams, Ivan Thomsen became a professsional astronomer, replacing Murray Geddes as Carter Observatory Director, following the latter's premature death in 1941, while earlier in the century Westland worked as the Assistant to Dr Charles Edward Adams (1870–1945), the

Table 2: R.A. McIntosh's society involvement.

Society	Year Joined	President	Remarks
American Meteor Society	1919		
Auckland Astronomical Society	1928	1940–1948 1952–1954 1956–1957	Elected Life Member in 1961
British Astronomical Association	1927		
International Astronomical Union	1936		Member of Commission 22
New Zealand Astronomical Society (later the Royal Astronomical Society of New Zealand)	1921	1942–1943	Vice-President 1943–1948 Elected Fellow of the RASNZ 1965 Meteor Section Director 1928–1955
Royal Astronomical Society	1929		Elected a Fellow
Royal Astronomical Society of Canada	1931		
Societé Astronomique de France	1928		

Table 3: Comets observed by Ronald McIntosh, 1927–1941 (after Orchiston, 2016: 545–547).

Year	Comet	Observations
1927	C/1927 X1 (Skjellerup-Maristany)	5 nights, 5–10 December
1931 & 1932	C/1931 O1 (Nagata)	No details provided.
1932	C/1932 M2 (Geddes)	13 nights, 30 June–15 July
1933	C/1932 Y1 (Dodwell-Forbes)	2 observations, 1 & 29 January
1936	C/1936 K1 (Peltier)	18 nights, 7–28 August; 1 photograph
1941	C/1941 B2 (de Kock-Paraskevopoulos)	27 January–8 February

Government Astronomer at the Hector Observatory in Wellington. And just like Geddes, prior to 1941 Morshead and Westland had independently discovered comets (see Orchiston, 2016: 500–503; 515–517), although it has been suggested that Morshead's 'discovery' came far too late to be counted as a legitimate independent discovery (Orchiston, 2016: 503).

In addition to supplying six sets of regular observations between 27 January and 6 February, Hobbs

> … made estimates of the colour of the comet using the scale of the Star Colour Section. His results show that he considered the nucleus to be between yellow and orange, and the coma between a very pale blue and pale blue (Anonymous, 1941e: 29).

On 8 February McIntosh (Anonymous, 1941e) calculated the orbital elements of the comet (which he later amended on the basis of further observations—Anonymous, 1941a), an illustration of his computational skills. Westland (1941e) also calculated the orbital elements.

The sequence of events that occurred after McIntosh telegrammed Carter Observatory of his discovery provides an excellent illustration of how a nation went about determining priority when a new comet was reported. In a newspaper article titled "Discoverer of comet …" and dated 5 February 1941, Murray Geddes, Director of the newly founded Carter Observatory, reported:

> The name of Mr R. A. McIntosh, an amateur astronomer of Auckland, will be sent overseas as the New Zealand discoverer of the new comet …
>
> Reports made by observers throughout the country have now been investigated, Mr Geddes said. These made it clear that Mr McIntosh, who saw the comet about 2.30 am on Saturday, January 25 [local time], was the first. The next two were Mr R. B. Newport, of Nelson, who saw it at 11.35 p.m. on January 25, and Mr K. D. Adams, Dunedin, who saw it at 11.55 p.m. the same day. In the next four hours the names of six independent discoverers in other parts of the Dominion, had been established; and there were many more on the following night.

A report published in *Southern Stars*, the journal of the New Zealand Astronomical Society, describes how

> … the whole country saw a comet. It was a good comet with a head and tail, and so easily seen that anyone glancing round the sky could not miss it. (Anonymous, 1941d: 21).

This report, also publicised the first nine independent New Zealand discoverers of the comet, and they are listed in Table 4. It is notable that one of the nine is a woman; that two of the men, Ron McIntosh and K.D. (Ken) Adams (1920–1999), were destined to become professional astronomers;[4] and that Norman Dickie (1918–2017) would later achieve national prominence as an observer of aurorae. The other notable feature of the Table 4 listing is the wide geographical distribution of the observers, from both North and South Island, reflecting the view later expressed by Murray Geddes' successor, Ivan Thomsen, that New Zealanders in general had an interest in astronomy out of all proportion to the nation's modest population, and that in the 1950s on a *per capita* basis New Zealand probably was home to more amateur astronomers than any other country in the world (Thomsen, 1954: 79–80). We believe that these comments would apply equally to January 1941.

Mr Geddes made the point that the independent discoveries of all those listed in Table 3, and others who made even later detections,

Table 4: The first nine independent New Zealand discoverers of Comet C/1941 B2 (after Anonymous, 1941d: 22).

No.	Name	Location	North or South Island	Discovery Date and Time (G.M.T.)
1	Mr R.A. McIntosh	Auckland	North	24 January, 14h 30m
2	Mr R.B. Newport	Nelson	South	25 January, 11h 35m
3	Mr K.D. Adams	Dunedin	South	25 January, 11h 55m
4	Mr L.G. Kelly	Ohakune	North	25 January, 12h 00m
5	Mr N.R. Dickie	Gore	South	25 January, 13h 30m
6	Mr W. Knight	Paraparaumu	North	25 January, 14h 00m
7	Dr Corban	Hokitika	South	25 January, 15h -----
8	Mrs J. Lindsay	Wellington	North	25 January, 15h 45m
9	Mr C.H. Jones	Palmerston North	North	25 January, 15h 50m

were

> … equally meritorious as that of Mr. McIntosh—but they were just a bit unfortunate in being a bit late. *Nonetheless these people have had the rare privilege of knowing what it feels like to discover something unexpected in the sky*. (Anonymous, 1941d: 22; our italics).

Murray Geddes (see Drummond, 2020) also knew that feeling well, as the discoverer of Comet C/1932 M2 (Geddes).

The afore-mentioned newspaper article "Discoverer of comet …" (1941) states that as of 5 February

> … no official advice had yet been received from overseas reporting the discovery of the comet, but press reports established that a Melbourne amateur astronomer, Mr J. F. Skjellerup, had located it four days before Mr McIntosh …

The comet soon became known as 'Comet McIntosh' or 'Skjellerup-McIntosh' (Anonymous, 1941c) throughout New Zealand.

On 28 January, just one day after Townsend's recovery of Comet Cunningham, a cable was sent from Carter Observatory to Melbourne Observatory, informing them that this comet and the new comet first seen by McIntosh, were both now visible in the New Zealand sky. Then three days later

> … air-mail letters were dispatched by the fort-nightly Trans-Pacific service to the Harvard College Observatory and the Astronomical Society of the Pacific informing them of the discovery of the comet by Mr R. A. McIntosh and eight others, and such information as was available at the time. (Anonymous, 1941b: 26).

5 DISCUSSION

Under normal circumstances the naming of a new comet was straightforward, even if a somewhat protracted affair, but 'normal circumstances' hardly prevailed in January and February 1942. The world was embroiled in World War II, and with the German occupation of Denmark, the IAU's Central Bureau for Astronomical Telegrams in Copenhagen ceased to function (and, sadly, it appears that no substitute back-up facility had been arranged). So astronomers throughout the world were uncertain about how the naming of newly-discovered comets would be determined, although there was an assumption that the Comet Medal Committee of the Astronomical Society of the Pacific might play a role, given that it vetted new comet discoveries before assigning Donohoe Comet Medals to those it identified as responsible for legitimate independent discoveries (see Anonymous, 1941c).

Notwithstanding this expectation, the fact is that the international network had collapsed following the demise of the Copenhagen Centre, and national and regional centres throughout the world were impacted to a greater or lesser extent. Thus, it was the international press, not Melbourne Observatory, that notified New Zealand astronomers that Melbourne's Skjellerup and Barnes had detected Comet C/1941 B2 several days before McIntosh's discovery. Writing from Wellington, New Zealand, on 12 February, Murray Geddes noted that

> … no information of any kind has yet been received from Australia through official channels. Apparently Sydney Observatory was advised. On February 1st Riverview Observatory [in suburban Sydney] reported that Cunningham's Comet had been found and apparently did not know that it had been seen a week earlier in Melbourne and on January 27th in New Zealand. Moreover, on February 3rd the Perth Observatory wrote direct to the Carter Observatory asking for information concerning Comet 1941a. *Hence it would appear that comet information was not circulating too well within Australia leave alone information getting out from Australia*. (Anonymous, 1941b: 25; our italics).

The presence of Comet C/1940 R2 (Cunningham) also contributed to the confusion surrounding the discovery circumstances of Comet C/1941 B2. According to various astronomical journals, in December 1940 Cunningham's Comet

> … was visible in the northern hemisphere, *and was slowly drifting to us "down under."* (Anonymous, 1941d: 21; our italics).

So Southern Hemisphere astronomers were on the look-out for this comet, little imagining that a totally different comet would also make its appearance in the southern sky at about the same time. The fact that there was uncertainty about the expected location of Cunningham's Comet and the timing of its appearance did not help, with two published ephemerides showing

> … the possibility of a divergence in right ascension after the middle of January of at least one hour. Scouring the skies was all that could be done … (Anonymous, 1941d: 21).

So astronomers were looking for Comet Cunningham, and as we have already seen, even Skjellerup—a veteran comet discoverer—at first suspected that all he may have done was recover Comet C/1940 R2 (Cunningham).

Immediately the new comet became known as 'Comet Barnes-Skjellerup' in Victoria and

'Comet Skjellerup' in Sydney (Moroney, 1941: 111), but eventually news filtered through to Australia and New Zealand from a war-weary Northern Hemisphere that Cape Town's Reginald de Kock was the first to detect the new comet, on 15 January (McIntosh, 1941a), but because circulation of this discovery was restricted, even within South Africa, it was the independent discovery on 23 January by Boyden Observatory's Dr John Stefanos Paraskevopoulos, telegraphed to Harvard College Observatory, that reached an international astronomical audience.

Thus, the new comet was known as 'Comet Paraskevopoulos' in the USA. Then when an official name had to be assigned, it became Comet de Kock-Paraskevopoulos 1941c (and later C/1941 B2 (de Kock-Paraskevopoulos)). The irony is that Dr Paraskevopoulos was only the fifth person to detect the comet (see Table 1) and the fourth to officially report it to a professional observatory. The comet should by rights have been named Comet de Kock-Skjellerup-Barnes, but through the vagaries of wartime communications Dr Paraskevopoulos ended up being awarded the comet and Skjellerup and Barnes denied it. On this basis there is a valid case for renaming the comet C/1941 B2 (de Kock-Skjellerup-Barnes). Professor David Hughes (1991) also supports a renaming.

From an historical viewpoint the naming of new comets is sometimes an area of concern—especially where national aspirations are involved—and Comet C/1941 B2 is merely one of a number of comets independently discovered by Australian amateur astronomers who, for one reason or another, were not officially credited with their discoveries (see Orchiston, 1997).

5 CONCLUDING REMARKS

In the nineteenth century Blainey's 'tyranny of distance' permeated Antipodean cometary astronomy, but during WWII it translated into a 'tyranny of communications' that deprived the well-known Australian cometary astronomer, John Francis (Frank) Skjellerup and another Melbourne man, a Mr Barnes, being credited with the independent discovery of comet C/1941 B2. In this paper we show that instead of being assigned to the South African amateur astronomer Reginald de Kock and South African professional astronomer, Dr John Stephanos Paraskevopoulos, this comet should rightly have been named C/1941 B2 (de Kock-Skjellerup-Barnes). We also show how one of New Zealand's leading twentieth century amateur astronomers, Ronald Alexander McIntosh, and the Indian academic, Professor Subramania Iyer, independently discovered this comet, but in each case they were too late to claim naming rights. However, their independent discoveries show the commitment of New Zealand and Indian astronomers to cometary astronomy (see Orchiston, 2016: 481–508, Kapoor, 2011; 2013; 2015; 2019a; 2019b; 2020) and the intense competition that existed to be the first to detect a new comet—notwithstanding the innumerable and inevitable distractions encountered during war-time.

6 NOTES

1. Two different astronomers with the surname 'Wood' and the first initial 'H' were involved in observing the comet, Dr Harry Wood in South Africa (Stoy, 1947) and Dr Harley Wood in Australia (Robertson, 1985). Both were professsional astronomers with doctorates, and both were observatory directors. It is no surprise then that there is sometimes confusion in the literature about which Wood carried out which particular observations of the comet.
2. Note that Vsekhsvyatskii (1964: 500) incorrectly identifies McIntosh's place of residence as 'Oakland' (a well-known suburb of San Francisco) instead of Auckland, New Zealand's largest city.
3. In researching Skjellerup's cometary discoveries and observations, the first author of this paper (WO) had access to Skjellerup's original observing diaries, archival letters and newspaper clippings, all of which were kindly loaned to me by one of Skjellerup's descendants (and subsequently bequeathed to me upon her death). When he was researching *The Physical Characteristics of Comets*, Vsekhsvyatskii (1964) was not aware to this rich archival resource, or of the independent discoveries of Comet C/1941 B2 by Skjellerup and Barnes, or that photographs of the comet were taken at some of Australia's professsional observatories.
4. After constructing an 18-inch reflector Ken Adams (1920–1999; Orchiston, 2016: 329–330) was appointed Assistant Astronomer at the Carter Observatory, and in 1948 and 1949 carried out pioneering photoelectric photometry (e.g. see Orchiston, 2016: 259–260). From "… these humble beginnings … New Zealand went on to establish an international reputation for variable star photometry." (Orchiston, 2016: 358).

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Wayne's recent books include *Eclipses, Transits and Comets of the Nineteenth Century: How America's Perception of the Skies Changed* (2015, Springer, co-authored by Stella Cottam), *Exploring the History of New Zealand Astronomy: Trials, Tribulations, Telescopes and Transits* (2016, Springer); *John Tebbutt: Rebuilding and Strengthening the Foundations of Australian Astronomy* (2017, Springer), and *The Emergence of Astrophysics in Asia: Opening a New Window on the Universe* (2017, Springer, co-edited by Tsuko Nakamura). Three further books (on the 1868 Total Solar Eclipse, South-east Asian Astronomical History and Early Australian Radio Astronomy) will be published by Springer in 2021). Wayne has also edited or co-edited a succession of conference proceedings.

Since 1985 Wayne has been a member of the IAU, and he is the current President of Commission C3 (History of Astronomy). He is also a member of the International Society for Archaeoastronomy and Astronomy in Culture (ISAAC); the IUHPST's Commission for the History of Ancient and Medieval Astronomy; and the IAU Working Groups on Archaeoastronomy and Astronomy in Culture, and Ethnoastronomy and Intangible Heritage. He is the Founding Chair of the History & Heritage Working Group of the SE Asian Astronomy Network (which is very involved in archaeoastronomy and ethnoastronomy). In 1998 he co-founded the *Journal of Astronomical History and Heritage* and is the current Editor. He and Dr Stella Cottam were co-recipients of the American Astronomical Society's 2019 Donald Osterbrock Book Prize, and minor planet '48471 Orchiston' is named after him.

John Drummond became fixated with astronomy at the age of ten when his mother pointed out the Pot in Orion to him. From that moment on he was hooked on the Universe. Joining the Junior Section of the local Gisborne Astronomical Society not long after, John would regularly do group meteor watches, telescope viewing and listen to astronomy talks. He also developed an interest in photography, and it was not long before he combined these two interests and began astrophotography. John's photographs have been used in many overseas books and magazines—and were used on two New Zealand stamps. He was the Director of the Royal Astronomical Society of New Zealand's Astrophotography Section for thirteen years until 2018. He is currently the Director of the Society's Comet and Meteor Section.

John lives about 10km west of Gisborne, on the east coast of the North Island of New Zealand, and has a range of telescopes up to 0.5 metres in diameter. He regularly images with these telescopes and CCDs, and also carries out astrometry of comets, asteroids and NEOs, and sends his observations to the IAU Minor Planet Center. In 2018 John made 466 observations (the second-highest number of observations taken in New Zealand, the University of Canterbury's Mount John Observatory supplying the most). John has also confirmed several comets. His Possum Observatory has the IAU code E94. John has also co-discovered about 20 exoplanets in collaboration with the Ohio State University—including the unusual 2-Earth-mass planet orbiting a binary star, which forced astronomers to rethink planetary formation models. John is a co-author of more than 60 research papers, and he is also a contributing editor for the *Australian Sky and Telescope* magazine. He enjoys giving talks around New Zealand on historically-famous astronomers.

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After a brief stint at the Physical Research Laboratory at Ahmedabad, Dr Shylaja joined the Planetarium in Bengaluru where she taught basics of astronomy and astrophysics to highly motivated students, along with the popularisation activities of the planetarium.

She initiated research in history of astronomy with the unconventional sources of records such as stone inscriptions, which produced very interesting results. She also scrutinises travelogues, temple architecture, art works and literary works for astronomical records. She has been working on

unpublished manuscripts of medieval texts and the process of editing and compilation has resulted in an extensive catalogue of over 100 stars with Indian names. She has published more than 300 popular articles and 121 papers in refereed books and journals. In addition, she has authored or co-authored 15 books, including a book with popup pages on the medieval period observatories of Jai Singh.

Dr Shylaja has served on many text book committees, Olympiad training programmes, Boards of Studies of universities and for encyclopaedias. She is a member of IAU Commissions C3 (History of Astronomy) and C4 (World Heritage and Astronomy) of the IAU, and is Chairperson of the C3 Project Group on Indian and Southeast Asian Astronomical Stone Inscriptions. She is keen to expand her work in this field into Southeast Asia through the History & Heritage Working Group of SEAAN.