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THE ORIGINS OF THE DOMINION OBSERVATORY, OTTAWA

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There are many reasons for the establishment of observatories: for private study, recreation, pure research, education or practical necessity, or some combination of these. National observatories, because they are financed with public monies, are presumably built and maintained because they perform some important function, such as timekeeping or geographical work. But the case of the Dominion Observatory, which opened officially in Ottawa in 1905, demonstrates another factor: national prestige. In the following sketch, I wish to show that the scale and equipment of the Dominion Observatory that was actually erected and staffed was far beyond what the country required *scientifically* at the time, but consonant with the political self-image that was emerging in Canada at the turn of the century.

Although Canada had been settled for as long as the neighbouring United States, it was slower to develop its astronomical institutions.[1] There were two chief reasons for this: first, Canada's population never exceeded 10% of its neighbour, and, although the provinces of British North America became increasingly self-governing colonies of the United Kingdom after 1840, the Imperial government maintained a limited scientific foothold in the country, and the provinces were separate entities until 1867, so that strong, central institutions were less likely to appear before the late nineteenth century.[2] A small network of observatories, including the Toronto Magnetic Observatory and observatories in Quebec City, Montreal and Kingston, was created under the control of the Canadian Meteorological Service in the early 1870s.[3]

Although a project for an astronomical observatory for Upper Canada was mooted in the early 1830s, and the instruments from the St Helena Observatory were actually packed by the Greenwich staff for shipment to Canada, nothing concrete resulted.[4] The Toronto Observatory, created in 1840 as part of the Imperial network of geomagnetic observatories directed by Edward Sabine, contributed substantial data in its early years, but not in astronomy. When British support was withdrawn in 1853, the Canadian government assumed financial responsibility, but with the intention of concentrating upon meteorological observations.[5] The Quebec Observatory, a joint Imperial-local initiative, was erected in 1850 and equipped with a time-ball soon afterwards to provide time to the shipping. For a short period in the late 1860s and early 1870s, its director, Cmdr Edward Ashe, R.N., undertook pioneering solar photography with the observatory's 8-inch refractor, but the work lapsed with his retirement. The Montreal and Kingston observatories were founded as a private and a municipal institution, respectively, and both undertook limited timekeeping, latitude and longitude work. By the late 1850s, both received small annual grants from the Canadian provincial government.[6] A few colleges and universit-

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ies possessed modest observatories, but nothing on the scale of American institutions such as the Harvard College Observatory; in fact, the largest university, in Toronto, had no observatory at all until the opening of the David Dunlap Observatory in 1935.

Hydrographic survey work had been an Imperial responsibility, undertaken by Royal Navy personnel. Some, like Henry Wolsey Bayfield and the Owens brothers, spent several years in Canada, and contributed to astronomy, but their directives and salaries came from the United Kingdom. There was no Canadian navy at all until the twentieth century, and geodetic work of any extent dates from just before the First World War. Therefore, nothing akin to the American Coast and Geodetic Survey or the Naval Observatory emerged during the nineteenth century. International boundary surveys, such as the Maine–New Brunswick survey of the 1840s and the 48th parallel surveys from late 1850s to the mid-1870s, although they included Canadian staff members, were directed and funded by Britain.

The only candidate for a national observatory during the second half of the nineteenth century was the Quebec Observatory under Ashe's direction. Indeed, during the 1860s, Ashe lobbied several politicians to expand his small establishment — he had one assistant and an annual budget of $2000 — but, apart from obtaining a moderate-size Clark refractor, his appeals fell on deaf ears, as the politicians were grappling with Confederation of the British North American provinces and with economic difficulties. Fiscal restraint was the hallmark of the new federal regime during the ensuing decade and after Ashe retired in 1882, his observatory, under less energetic successors, became just another post in the growing meteorological network.

By the 1880s, within the network organized by the Meteorological Service under the Department of Marine and Fisheries, astronomy was limited to observing star transits to correct clocks. The Toronto Observatory possessed a transit instrument and a 6-inch equatorial refractor, purchased to observe the transit of Venus in 1882. Although it was the central meteorological and magnetic observatory, the Toronto establishment did not fulfil the role of a national astronomical observatory, nor was there any expectation that it should.

The origin of the Dominion Observatory was rooted in practical needs connected with surveying. The early land surveys in Upper and Lower Canada were fixed to a few astronomically-determined points, but these points were not based upon a standard Canadian meridian. The surveyors-general of the two Canadas, and their successor for the united province after 1840, had no observatories to act as a reference point. The legislation creating the Geological Survey of Canada in 1842 gave it the responsibility for determining geographical locations; naturally, the geologists had no time, expertise or equipment to undertake such a programme, and Ashe agreed to determine the longitudes of Canadian towns relative to Quebec, which he did in 1856–57. First, however, he had to fix the location of his observatory relative to Cambridge, Massachusetts, through telegraphic connection with Harvard College Observatory.[7] This

rankled a number of Canadians who felt they should establish their own meridian.

The men who would create the Dominion Observatory, William Frederick King (1854–1916) and Otto Julius Klotz (1852–1923), began their scientific careers as surveyors for the Department of the Interior in the large-scale western surveys of the 1870s. Surveyors on the prairies employed traditional methods, but along the mountainous route of the Canadian Pacific Railway, across southern British Columbia, astronomical observations had to be made for latitude and longitude at many points. In 1885, the Department of the Interior organized a special group, later the Astronomical Branch, with Klotz as astronomer in charge, to carry out this work.[8] In that year, King had moved up the hierarchy, and from the field to Ottawa, to become Chief Inspector of the Surveys when Edouard-Gaston-Daniel Deville, who had had his astronomical training in France, was appointed Surveyor-General. King was in charge of the astronomical work, with Klotz and the field staff all hired on an annual contractual basis. Because the department continued to employ most of its staff as "outside" workers by the turn of the century, only King and Klotz held permanent, salaried posts as astronomers.

Although the headquarters for survey work was in Ottawa, no observatory existed there. King must have made his desires known to his superior, for in February 1887, Deville approached his minister with a plan to erect a modest observatory to store and test equipment, rate chronometers and to act as meridian for further longitude work.[9] The minister approved and King and Klotz were despatched to Boston and to Washington to look over new transit instruments for the observatory. At this point, inter-departmental rivalry surfaced: the Director of the Canadian Meteorological Service, Charles Carpmael, caught wind of the plan and objected strenuously, on the grounds that his observatories already provided those services. Whilst marking time, King erected a temporary observatory in his Ottawa garden. By late October, however, the Minister of the Interior told King that he had been opposed in cabinet and the observatory project would have to be dropped.[10] We may assume that the opposition came from the Minister of Marine and Fisheries, Carpmael's superior, presumably at the latter's instigation. King alluded to the cabinet discussion (no minutes survive) later:

> A suggestion was made to erect a small transit house in Ottawa ..., but owing to premature publication in an exaggerated form, wherein the intended building was represented to be an observatory of considerable pretensions, the proposal met with opposition on the grounds that the money to be expended could be applied to the wants of existing observatories. This argument was surely most fallacious, nevertheless it prevailed and the project was defeated.[11]

Of course, it is almost certain that plans for an observatory "of considerable pretensions" were King's own, as neither the minister nor Klotz had any interest in a large institution.

Rather than just give up, King and Klotz continued to order new equipment and wrote a long memorandum on the observatory to their chief, Deville, who, in turn, approached the deputy minister. He was favourable and another run at the Minister of the Interior was planned, but just then the minister died.

The group persevered and in 1890, with the new minister, Edgar Dewdney, won over, the department successfully lobbied the cabinet to name King Chief Astronomer and to obtain funds to erect a temporary wooden observatory west of the Parliament buildings.[12] The Cliff Street observatory was hemmed in by buildings, lacked a clear horizon and only possessed transit instruments and timekeepers. But a 6-inch reflector was useful for public relations and visiting MPs could be entertained while being lobbied. This observatory was clearly not what King and Klotz had hoped for, but the next few years were unpropitious; the long-time prime minister, Sir John A. Macdonald, died in 1891 and was succeeded by several short-lived ministries. Only when the Liberals under Wilfrid Laurier swept into power in 1896 did the astronomers' fortunes look up. The key was a sympathetic new Minister of the Interior, Clifford Sifton (1861–1929), a wealthy and influential western politician. Another factor was Charles Carpmael's death in 1894, which removed their main opponent. King and Sifton discussed the possibilities of a new national observatory and in the autumn of 1898, Sifton invited King to send him a memorandum on the subject. This memorandum[13] outlined King's ambitions. The major argument was that the country required a central institution for longitude and latitude work, but added that provision for a 10-inch equatorial refractor would be necessary to bring Canadian science into the modern era. The temporary observatory was in a very poor location and something more permanent was required. He noted, too, that eighty-five observatories existed in the United States, implying that Canada could do more than it had. Besides the expansion into astrophysics, King briefly alluded to the possibility of creating a coast and geodetic survey.

A few days later the minister asked him how many telescopes existed in Canada and King replied that only two, both 6-inch refractors, existed, which was quite wrong, and King must have known so.[14] Sifton was keen to proceed. By the spring of 1899, the minister ensured that the Public Works Department had earmarked $10,000 in its 1900 estimates for an observatory, but the Chief Architect, with grand plans in mind, increased the amount to $16,000. Over Klotz's objections, the plans kept growing. When Klotz saw the elevation drawings, he remarked to the sub-architect in charge that the $16,000 voted by Parliament could not possibly be sufficient; the reply was "there'll be no trouble about the money".[15] Indeed, there was not. No serious parliamentary debate took place at all on the increasing costs.

Only a few questions arose when the House of Commons studied the supply estimates. Sifton read King's memorandum and one Conservative member, T. S. Sproule, was surprised to hear than an observatory even existed in Ottawa (it lay about a block west of the Parliament buildings!), to which the minister replied:

> I would like my hon. friend to go and see it. One might be here a long time

> without knowing anything about it. Taking it altogether, I think it is probably the most disgraceful thing in connection with the public affairs of Canada. It is a little building down near the Supreme Court. It is nothing but a packing box — a little bigger than that table. The instruments in it are fairly good and the work done is good, but the idea of having men undertake scientific work in such a place is simply laughable.[16]

Sproule, although an opposition member, had no qualms about building a new observatory and his views underscore the bipartisan nature of the support for the proposal, inasmuch as any member of Parliament understood what an observatory's role was. The only thing bothering Sproule was the size of the proposed telescope:

> If an observatory is to be built, it ought to be a fairly good one, because being in the capital, a great many people will visit it. I must say that I think a ten-inch lens telescope would not be suitable. When attending the University of Michigan as a student, we used there an instrument with a 17 or 18-inch lens, if I recollect aright .... Without wishing to interfere with Toronto, I have always thought that the observatory ought to be here rather than there. This being the capital and Parliament meeting here, the work of the observatory could be made of use to more people throughout the country, than it can be if located in any other city.[17]

The introduction of a vote for an observatory did not seem to cause a ripple anywhere else. The Ottawa *Morning citizen* mentioned it without comment; perhaps another government building for the city was not news.

King visited Warner & Swasey in Cleveland in February 1900 to enquire about the telescope. We do not know whether Sproule's comment had any bearing on King's plans, but in the following year he persuaded Sifton to fund a 15-inch refractor,[18] which was duly agreed. By now, the estimated cost of the telescope and dome alone had reached $20,000. When Sifton introduced the new estimate into the Commons, Sproule argued again for a larger aperture, but Sifton was vague on what King had in mind. Sproule was seconded by William Roche, the Conservative member from Halifax, who suggested that

> I do not think it will be of any practical value at the present time to have a lens of less than twelve inches; and a first-class optician ought to be consulted, so as to get the latest results of science. I would suggest that the government might confer with the firm of Alvin Clark, in New York, or Grubb & Son, in Dublin, who would be able to supply the most approved glasses.[19]

The establishment of the observatory had been so quietly done to this point that even the Toronto Astronomical Society was unaware of it, despite the fact that King had been a corresponding member since at least 1892. Once the contract was settled, King and John Brashear, who had contracted to undertake the optical work, both wrote to the society.[20]

After a number of delays, construction of the beautiful sandstone building

began in late 1902, but the costs escalated and the Minister of Public Works was grilled in committee the following spring. The discussion shows that the few members with any interest (including Sproule) had little grasp of the purpose of the institution or of King's ability; in fact, several members assumed that the Toronto Meteorological Observatory was to be closed and moved to Ottawa.[21] Later that summer, King required another $5000 for equipment, and Sifton dutifully introduced the estimate, but not without comment:

> MR. SPROULE. What is the diameter of your lens and the power of your instrument?
>
> THE MINISTER OF THE INTERIOR. My impression is that it is a 12-inch lens.
>
> MR. SPROULE. That would be very small.
>
> THE MINISTER OF THE INTERIOR. I relied upon the chief astronomer.
>
> MR. SPROULE. It could not be very strong with only a 12-inch lens. It is not the height of wisdom to put up some commonplace telescope, because it must remain there a credit to the government or otherwise; and before you could change it, you would have to remodel the building.
>
> THE MINISTER OF THE INTERIOR. I told the chief astronomer that I thought it would be false economy to buy an instrument which would have to be changed, and impressed upon him the selection of an instrument which would not be required to be changed.[22]

Naturally, the members worried about further requests, especially since the cost had now risen to nearly $100,000, and pressed Sifton to state that no more would be wanted. But Sifton, although he knew little about science, was characteristically honest in his reply:

> I only made the remark that when a scientific man has a laboratory or observatory he can always find something more that he wants for its equipment, therefore, I would not say that the observatory would be completely equipped with this amount.[23]

The building was scheduled for a 1904 completion, but the staff did not move in until April 1905. The finished observatory (Figure 1) possessed a single dome for the fully-equipped 15-inch telescope, a transit room for the meridian telescope (on order), provision for geophysical work, full equipment for a time service, library, shop, the beginnings of a solar telescope and a photometric refractor to come.[24] The permanent staff had increased from two to fourteen. The final cost had reached more than $100,000, a huge sum for a Canadian scientific institution at the time.

In retrospect, the creation of a national observatory of such magnitude was based as much upon political as scientific considerations. At the turn of the century, Canada's population numbered less than six million. There was no astronomy programme in any university, no practising astrophysicists and no practical needs beyond longitude and latitude work. Time signals were already provided by the Meteorological Service's observatories in Toronto and Montreal. When, in the late 1890s, McGill University's Professor C. H. McLeod outlined the need for a geodetic survey, he did not envisage a new institution in

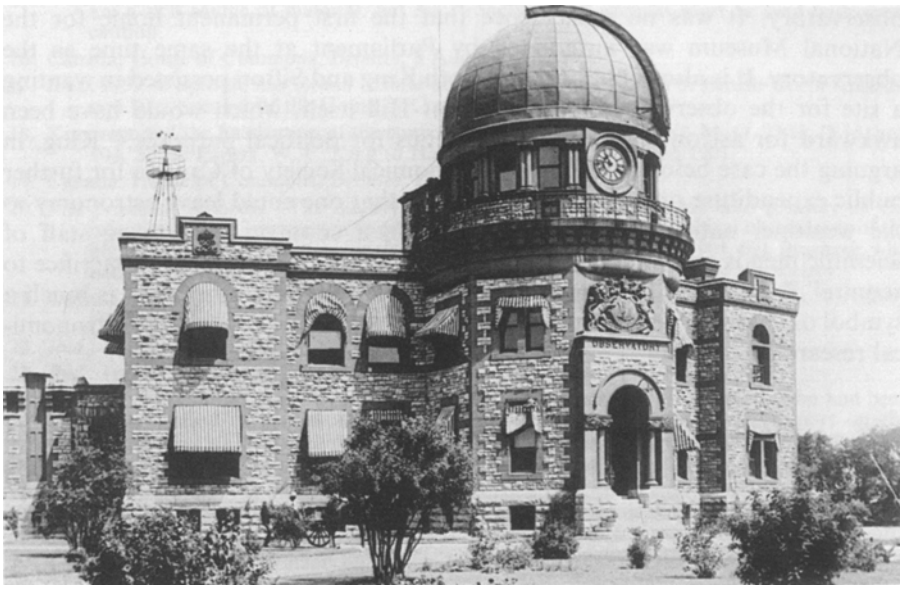

FIG. 1. The Dominion Observatory, Ottawa, *c.* 1910 (National Archives of Canada, PA 10296).

Ottawa.[25] King's original plan for a 10-inch refractor for astrophysics was scoffed at by Klotz, because neither of them had ever used, or knew how to use, such an instrument. In fact, it could be questioned how much use even a 15-inch telescope could be, which was soon demonstrated by J. S. Plaskett and his staff who essentially exhausted its potential for binary star work by 1910.

There is no doubt that William King was ambitious, not only for himself, but for Canadian science. He was fortunate to have Clifford Sifton as his minister. Although Sifton had little interest in science, he adopted the observatory project with alacrity and it is clear that his influence smoothed the way for its rapid evolution into a significant scientific institution. We must recall that when the Laurier government took office in 1896, the country had come through a long period of economic stagnation and depression, but soon immigration was increasing rapidly and the foundations of the western wheat boom were laid. In that decade, Canadians participated enthusiastically in the Boer War. In a wide variety of ways, Canada began to see itself as a distinct country, not merely as a colony.[26]

In any practical sense, the Dominion Observatory in its final form was not required. But in a political sense, it was the kind of national institution that made Canadians feel that they were a self-sufficient member of the community of nations. This was Canada's answer to the Greenwich, Paris or U. S. Naval observatories. Although state-supported scientific work had a long history in Canada, the work of the Geological Survey or of the Department of Agriculture could not be represented to the politician and public like a monumental

observatory. It was no coincidence that the first permanent home for the National Museum was authorized by Parliament at the same time as the observatory. It is also significant that both King and Sifton persisted in wanting a site for the observatory on Parliament Hill itself, which would have been awkward for astronomy, but advantageous for political purposes.[27] King, in arguing the case before the Royal Astronomical Society of Canada for further public expenditure on astronomy, admitted that one could leave astronomy to the wealthier nations, but "the presence in a country of a strong staff of scientific men is an important national asset which it is worth some sacrifice to acquire".[28] Thus, the Dominion Observatory, in its final form, was as much a symbol of vigorous young nationhood as it was a practical centre of astronomical research.

REFERENCES

1. See R. A. Jarrell, *The cold light of dawn: A history of Canadian astronomy* (Toronto, 1988), for general background. The most detailed account of the Dominion Observatory is John H. Hodgson, *The heavens above and the earth beneath: A history of the Dominion observatories* (Ottawa, 1989).
2. A broad sketch of this period may be found in the introduction to T. H. Levere and R. A. Jarrell, *A curious field-book: Science and society in Canadian history* (Toronto, 1974); the connections between political ideals and scientific institutions in the early Victorian period are explored by Suzanne Zeller, *Inventing Canada: Early Victorian science and the idea of a transcontinental nation* (Toronto, 1987).
3. Morley Thomas, "Professor Kingston's scheme: Founding the meteorological service", *Chinook*, viii/3 (summer 1986), 51–55; see, also, R. A. Jarrell, "Origins of Canadian government astronomy", *Journal of the Royal Astronomical Society of Canada*, lxix (1975), 77–85.
4. See A. Vibert Douglas, "The St Helena Observatory and Canadian astronomy", *Queen's quarterly*, lxxviii (1971), 592–601; the obvious explanation for the failure of the project was upheaval in the wake of the Rebellion of 1837.
5. Gregory Good, "Between two empires: The Toronto magnetic observatory and American science before Confederation", *Scientia Canadensis*, x (1986), 34–52.
6. Dr Charles Smallwood, a physician, built the former west of Montreal, but undertook no systematic observations; the directors of the latter did hire an observer for recording star transits, but soon transferred the observatory to Queen's University. Its director, Prof. James Williamson, concentrated upon meteorology.
7. See Jarrell, "Origins of Canadian government astronomy".
8. The work is described by Otto Klotz in successive volumes of the *Annual report of the Department of the Interior*.
9. National Archives of Canada (NAC), R. J. Hayward, "Inventory of the Records of the Dominion Observatory, Record Group 48".
10. This information was provided some years later by Otto Klotz when he became Dominion Astronomer: "The Dominion Astronomical Observatory at Ottawa", *Journal of the Royal Astronomical Society of Canada*, xiii (1919), 1–15.
11. W. F. King, "The Dominion Observatory at Ottawa", *Transactions of the Royal Astronomical Society of Canada*, 1905, 27–34, p. 29.
12. NAC, R.G. 88, vol. 474, Thomson Papers, Hon. Edgar Dewdney to Privy Council, 23 June 1890. King was appointed Chief Astronomer by order-in-council of 30 June.
13. NAC, R.G. 11, vol. 1264, file 200124, Memorandum, W. F. King to Hon. Clifford Sifton, 7 November 1898. The memorandum is reprinted in full in Hodgson, *op. cit.* (ref. 1), 10–12.
14. NAC, M.G. 27 II, D 15, vol. 45, Sifton Papers, W. F. King to Hon. Clifford Sifton, 15 November 1898. This was, in part, clarified by Otto Klotz in two articles on "Observatories in Canada", *Journal of the Royal Astronomical Society of Canada*, xii (1918), 217–24, and xiii (1919), 322–32.
15. NAC, M.G. 30, C 1, Otto Klotz Papers, "Diary", 13 January 1900. Klotz's unpublished diaries

are a rich source of material, but his strongly biased account must be read with some caution.

16. Canada, House of Commons, *Debates*, 8 August 1899, 9953.
17. *Ibid.*, 9953–4. Sproule was Grand Master of the Orange Association of British North America and later Speaker of the House of Commons.
18. King reported the finalization of the contract a month later: see NAC, M. G. 27 II, D 15, vol. 103, Sifton Papers, W. F. King to Hon. Clifford Sifton, 14 June 1901.
19. Canada, House of Commons, *Debates*, 21 May 1901, 5784.
20. The president reported "The Society has learned with much interest and pleasure of the intention of the Government to establish at the Capital an astronomical observatory of the highest order" (*Transactions of the Toronto Astronomical Society*, 1901, 69). Brashear, who had a summer cottage north of Toronto, was an Honorary Fellow of the society.
21. Canada, House of Commons, *Debates*, 23 March 1903, 342–4. The meteorological observatory was under the Minister of Marine and Fisheries, not of the Interior.
22. *Ibid.*, 16 July 1903, 6792.
23. *Ibid.*, 16 July 1903, 6794.
24. A full description of the equipment, with plates, was written by J. S. Plaskett, who had been initially hired as the mechanical superintendent of the observatory: "Report on the observatory building and instrumental equipment", Department of the Interior, *Report of the Chief Astronomer*, i (1905), 199–211.
25. C. H. McLeod, "A trigonometrical survey for Canada", *Transactions of the Royal Society of Canada*, 1899, section iii, 3–7. In 1893, McLeod had organized a telegraphic and observer exchange with Greenwich, giving Montreal the best determined longitude in North America. It would have been natural to base any geodetic survey on and in Montreal.
26. The period is described well in R. C. Brown and R. Cook, *Canada 1896–1921: A nation transformed* (Toronto, 1974).
27. Klotz was appalled by the choice of site and strenuously objected; he eventually persuaded Sifton and King to accept a site in the Central Experimental Farm on the edge of the city. The main building, abandoned when the Dominion Observatory was closed in 1970, still stands. The 15-inch refractor is now located at the National Museum of Science and Technology, which also possesses some of the early instruments.
28. Cited in W. F. King's article, "Astronomy in Canada", *Royal Astronomical Society of Canada: Selected papers and proceedings*, 1902–3, 52–60, p. 57.