

DAVID GILL AND CELESTIAL PHOTOGRAPHY

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In this centenary commemoration of the Paris Astrographic Congress it is appropriate that we should recall the very significant role played by David Gill, Her Majesty's Astronomer at the Cape of Good Hope, in pioneering the application of photography to mapping the sky, and in the planning of the great Carte du Ciel project itself.

Gill's involvement in celestial photography has been well documented. The purpose of this paper is not so much to present new material, but to illustrate this particular episode in the development of astronomy by means of extracts from Gill's correspondence, which is now in the archives of the Royal Greenwich Observatory.

In his monumental *History and description of the Cape Observatory* Gill (1913) traces the idea of applying photography to the construction of star maps and catalogues to the first experiments in photographing the great comet of 1882. Photographs of this remarkable object had been obtained by several amateur photographers, but Gill recognised the importance of securing properly guided exposures taken with a camera on an equatorial mounting. With the assistance of a local amateur, Mr Allis, not only were excellent images of the comet obtained, but also those of a large number of stars. Gill immediately recognised the significance of this, and copies of the photographs were distributed to various astronomers including Admiral Mouchez, Director of the Paris Observatory; it was these photographs which led Mouchez to encourage the Henry brothers to design and construct astrographic lenses.

Gill obtained a 4-inch lens from Dallmeyer in 1883 with which to carry out further experiments, and, early in 1884, Dallmeyer supplied a 6-inch f/9 lens. In December 1884 Gill wrote to Mouchez asking for an estimate for a new lens from the Henry brothers but lack of funds prevented him from following this up. In April 1885 he began the systematic photography of the southern sky with the Dallmeyer lens; this was to become the Cape Photographic Durchmusterung. In order to

finance a photographic assistant to carry out the work, he obtained a grant of £300 from the Government Grant Fund of the Royal Society in January 1885, which was renewed for the year 1886.

From mid-1884, Gill had been engaged in a regular correspondence with J C Kapteyn of Groningen on several topics, among which were the measurement of latitude by the Talcott method, and determination of trigonometric parallax from differences of RA between a target star and a comparison star observed with a transit circle. In a letter of 1885 April 3 to Kapteyn, Gill writes:- *Meanwhile I send you some of our first attempts at producing a Photographic Durchmusterung of the Southern Heavens. I hope to improve very greatly on this first attempt. If you have any suggestions to give me on the best plan of measurement I shall be glad and grateful to have them....* In the postscript to a subsequent letter (1885 Oct 15) he asks Kapteyn for ideas on how best to derive the stellar coordinates from the plates. In this letter, Gill gives a survey of the multifarious activities in which he is engaged, for which he says *I am obliged to crave help where I can get it.* Kapteyn replied in two letters of 1885 Dec 16 and 23, extracts from which are reproduced in Gill's *History*. The first of these describes in some detail Kapteyn's proposal for a measuring device from which the RA and Dec could be read off directly, and ends with the generous offer *...I would gladly devote some years of my life to this work... by which I would gain the honour of associating my name with one of the grandest undertakings of our time.* In the second letter, Kapteyn outlines his plan to obtain support so that he can undertake the measurement and reduction of the plates, and discusses some of the technical problems of the project. Gill's gratitude for this offer is expressed in his letter to Kapteyn of 1886 Jan 9, and thus began one of the great international collaborations in astronomy.

In March 1886 Gill wrote to Mouchez expressing his view that star charting by photography required careful planning and cooperation, that it would be essential to have a Conference, and concluding *I should be glad to attend such a conference in Paris in March or April 1887.* He played a leading role in the Congress and was to remain a member of the Comite Permanent coordinating the Carte du Ciel until his death in 1914. His contribution may best be summed up by the following passage from Kapteyn's (1914) obituary of him in *The Astrophysical Journal*:-

*The initiative for this great undertaking is due to the joint action of Gill and Admiral Mouchez, the director of the Paris Observatory, aided by the brothers Henry. What the whole undertaking, not only at starting, but during the whole of its progress, owes to Gill's untiring energy, all will know who attended the meetings of the Comite Permanent. Up to the last his was the great driving force....*

Meanwhile, although observations for the CPD were proceeding, Gill

was running into trouble over financing the project. When the Royal Society grant came up for renewal in 1887, a faction, headed by the Astronomer Royal, William Christie, opposed it on the grounds that the Carte du Ciel would render Gill's CPD redundant. Gill gives a graphic account of the controversy in a letter to his friend Kapteyn, dated 1887 June 5; this letter is not in the RGO archives but an extract is quoted by Gill's biographer, George Forbes (1916), and is worth repeating here: -

*Last Friday evening I delivered a lecture at the Royal Institution on the subject of the Applications of Photography in Astronomy - and laid down my views of the Paris Congress and of the relations of the Durchmusterung to the work of that Congress.*

*It was an abominably wet night but the room was crowded, and after the lecture who should come up to me but Prof. J C Adams of Cambridge. 'I have come up from Cambridge to hear your lecture,' he said, 'and I am delighted to have done so - good night'.*

*That was all he said.*

*But yesterday was the Visitation of the Greenwich Observatory, and I went there like all the rest of the world. The Board of Visitors as you know sit down about 3 o'clock, and are generally done with their work at half-past four. But 5 o'clock came, half past five, six o'clock, and still the Board sat. About 5.30 Pritchard came out looking very angry. I said to him, 'What is the matter?' - 'Oh it's Adams. He doesn't understand photography and he has been making no end of trouble;' and off he went in a hurry.*

*At about half-past six, the Members of the Board came out and adjourned to dinner. I was seated beside Adams. He then said, 'They have been talking all sorts of nonsense in that Board. I had to set them right. They said yr Durchmusterung was a rival scheme to the Paris one and should be stopped. I told them I had heard your lecture last night, that it was not a rival scheme but a necessary preliminary. They thought that photography was to supersede meridian instruments. I told them they were talking nonsense - that they should have come to hear your lecture and they would have been better and wiser men.'*

*You may imagine what a bombshell this was amongst them.*

*Then Adams had also come down with Stokes and told Stokes about my lecture and how surprised he had been at my being refused the Govt grant. Then Stokes told Adams that both he and Lord Rayleigh thought that Gill was right, but they were overruled by the astronomical members of the Committee.....*

A resolution at the Paris Congress in favour of the CPD, put forward by Auwers and Struve, had to be withdrawn in face of a threat by

Christie to withdraw his official support for the Carte du Ciel. Auwers himself was an enthusiastic supporter of Gill, and, in a letter of 1887 May 9, he asks anxiously about the renewal of the Royal Society grant and argues strongly in favour of Gill's photographic *durchmusterung* as a complement to the Carte du Ciel. Gill replied from London on May 19 with the news that the grant had been stopped. Auwers responded in two letters, dated May 21 and 28, in which he offered financial assistance from the Berlin Academy. In his reply dated May 30 Gill wrote

*I find that there may, and probably would be official objections to my receiving a grant from the Berlin Academy....I should probably receive a reprimand and be ordered to stop the work....I have since consulted one or two people who know how these matters are regarded in official circles & they are unanimous in their advice - viz. find the money in some unofficial way, say nothing about the matter & do the work....*

(We note in passing the efficiency of the postal service between London and Berlin a hundred years ago!).

In the end, supported by his wife, Gill resolved to pay for the continuation of the CPD out of his own pocket. This is a fine example of a man who is prepared to make personal sacrifice for his professional principles in the face of opposition from an establishment who ought to have known better. He had a noble vision of astronomy as a science which transcends national boundaries.

Thus the CPD was brought to fruition through the combined efforts of Gill and Kapteyn, thereby laying the foundations of a tradition of celestial photography at the Cape Observatory which was to last for nearly a century.

#### Acknowledgments

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#### References

- Forbes G 1916 *David Gill: Man and Astronomer* London, John Murray
- Gill Sir D 1913 *History and Description of the Cape Observatory*  
London, HMSO
- Kapteyn J C 1914 *Astrophys J* 40, 161

if the result proves as I expect  
 and eventually I would gladly devote  
 some years of my life to this work  
 which would serve besides You a little  
 as I hope and by which I would  
 gain the honour of associating  
 my name to one of the grandest  
 undertakings of our time  
 Yours very sincerely  
 J. C. Kapteyn

Extract from letter from Kapteyn to Gill, 1885 Dec 16, in which he offers assistance with the Cape Photographic Durchmusterung.

Dear Sir  
 Such a letter as yours of Dec 16 requires an  
 immediate answer. I refer of course to its concluding  
 portion in which you offer some years of your life to cooperate  
 with me in <sup>completing</sup> the photographic Durchmusterung of  
 the Southern heavens.  
 It is not easy to tell you what I feel at receiving such a  
 proposal. I recognize in it the true brotherhood of science  
 and in you a true brother.  
 I do feel that I have in hand a number of my best work in the

read 1886  
1885 Jan 9

Extract from Gill's reply.

Berlin 1887 May 21  
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My dear Gill,

X I have just received your letter of May 19 (I had the other ones days ago duly received). Mr. Christie made a good piece of diplomacy indeed, but his treatment of the matter cannot by any means be considered as collegial, or even fair in a more general sense; that he is wrong as to the scientific merits of the case, will be pretty unanimously conceded amongst astronomers. It is a pity that your esteemed Royal manager scientific affairs is not a warmer as in this case and in the question of unobserved time; but at least it is good to know that he does so and will continue to do so.

Now, as I told you before, the withdrawal of the grant of the R.S. should not interfere with the completion of the "Fundamental Catalogue". I request that you will continue the work with all energy, and accept

Extract from letter from Auwers to Gill in which he offers financial assistance for completion of the CPD following withdrawal of the Royal Society grant.