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The Beginnings of Astronomical Photography at the Cape

I.S. Glass

At 5 a.m. on the morning of September 8th, 1882, William Finlay of the Royal Observatory was on his way back home after observing the reappearance of 5 Cancri from an occultation. To his surprise, he discovered a comet near the rising sun. This was to become known as the "Great Comet of 1882". Finlay was the first to make positional observations of it and report it to the astronomical world. The Director of the Observatory, David Gill, was at that time fully occupied with observations of the minor planets Victoria and Sappho, with which he hoped to obtain a better value for the distance to the sun and, on top of this, he was in the midst of preparations for a Transit of Venus due to occur on 6 December. Several of his staff members were up country at a temporary observatory at Aberdeen Road. In addition, there were foreign 'Transit of Venus' expeditions at Touwsrivier and Wellington, the latter under the leadership of Simon Newcomb of the United States Naval Observatory. In other words, everything was happening at once!

It was soon apparent that the new comet was the brightest to have been seen in the century. Reports of sightings poured in to the Royal Observatory from all parts of the country. So bright was the comet that it was actually possible on the 16th September to observe its disappearance at the sun's limb, the first time such an observation had ever been made. On the 19th, Gill informed the Astronomer Royal in Greenwich that it had been for the previous two days a brilliant naked eye object - much exceeding the brilliancy of Venus at her greatest brightness.

Perhaps the most amazing report of all was that addressed to Gill on October 4th by Mr William Simpson of the U.P. School in Aberdeen, Cape Province:

To the Astronomer Royal, South Africa,

Sir,

Allow me the honour to present you with a copy of the photograph of the Comet visible at present in our hemisphere. It was taken by me by the dry plate process on the 3rd inst. at 4.40 O'clock A.M. - just before sunrise. The plate was simply exposed and has not been retouched.

I used an ordinary portrait lens, but by a rapid view lens and extra sensitive plate a very brilliant object might be obtained.

Should you deem it advisable, I would have no objections to forward a copy to the Astronomers Royal of some other countries.

Allow me the honour to be

Yours Obed^{ly}

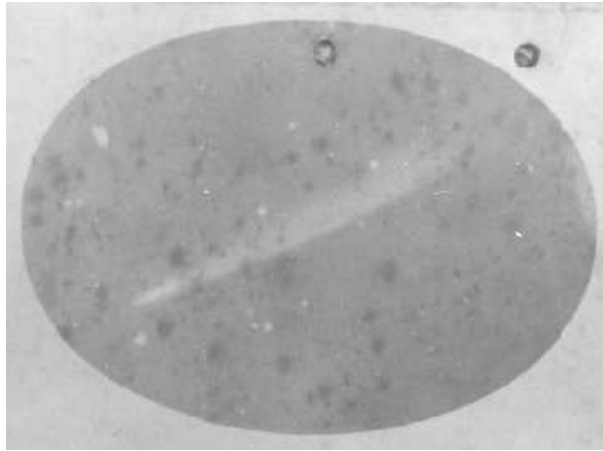


Figure 1: The photograph taken by Mr W. Simpson of the Great Comet of 1882. The background blobs are probably not stars, but the result of mildew.

W^m Simpson

Other amateurs had also succeeded in photographing the comet: Mr Shoyer of Cape Town and Mr George T. Fernyhough of Pietermaritzburg (who eventually sold over 1200 prints). Gill's reply to Simpson, only sent on October 26, was somewhat condescending:

Dear Sir

I should perhaps have acknowledged your letter of the 3rd enclosing the interesting paper copy of y^r photograph of the present comet.

It is certainly much more truthful that that published by Mr Shoyer here as the negative is still untouched. But its scientific value is much diminished by the fact that none of the neighbouring stars are shown as doubtless you had no means of following the diurnal motion of the comet during exposure ... [part no longer readable]

Gill concluded by offering to send some of the photographs taken after the 20th by Allis and himself. It is clear that the significance of the amateurs' photographs had not been lost on him and that he had realised what an important opportunity had presented itself. In his own account of events Gill later (1896) remarked:

It happened that the axis of the brighter part of the tail was nearly parallel to the direction of the diurnal motion; and, the head of the Comet being sufficiently brilliant to produce a nearly instantaneous impression, the effect of diurnal motion was to create a very



Figure 2: Photograph of the Great Comet of 1882, taken with the 2 1/2 - inch Ross lens.

elongated impression of the nucleus, nearly coincident with the axis of the tail, and sufficient to lengthen the impression of the brighter part of the tail, so that, to the popular eye, a very brilliant picture of the comet was the result. To Mr Shoyer and Mr Simpson, however, the Observatory is indebted for certain information that the Comet could be photographed. We had, at that time, no suitable lens and no experience in the development of modern dry plates. Gill accordingly called upon Mr Allis, a photographer in the neighbouring village of Mowbray, of whose skill as a photographer he had previous experience. No sooner were the objects of his visit and the conditions necessary for success explained to him that he at once volunteered all necessary aid, and entered into the work with heart and soul. The most suitable lens in his possession was a doublet by Ross (the work of the late Mr Dallmeyer, of 2 1/2 inches aperture and 11 inches focal length).

The lens, with camera, was mounted on a 6-inch equatorial acquired earlier that year and later returned to Grubb for replacement with a more substantial instrument (the present 6-inch). This hastily constructed astro-camera was situated on a structure known as the "Wind Tower", left over from the days when a magnetic observatory had been established on the observatory grounds. A new dome had been supplied by Grubb. The camera and 6-inch telescope pointed in the same direction, so that the latter could be used for guiding. A number of plates were obtained, with exposure times of 30 to 140 minutes.

On 28 November, Gill evidently decided to make as big a splash as possible, for he simultaneously sent letters to several overseas correspondents. Huggins was asked to present the comet photographs to the Council of the Royal Society, Christie to present the pictures to the Royal Astronomical Society and Admiral Mouchez, Director of the Paris Observatory, to present them to the French Academy of Sciences. Prints were circulated to individuals such as Bredichin in Moscow who thanked Gill:

I cannot find the words to express to you my gratitude for the precious consignment of the photograph of comet Finlay...

In particular, the response of Mouchez was all that could have been expected:

Paris, 2 January
1883
Paris Observatory
Office of the Director
Dear Mr Gill

I have presented to the Academy your admirable photographs of the comet and of neighbouring stars. Everyone congratulates you heartily. We have never before received at Paris such successful photographic images. Your prints on glass ought to be magnificent - can't you send us reproductions on glass?

You ought now to make for us photographs of southern stars such as the Southern Cross, the Magellanic Clouds, Centaurus etc. I am sorry that you have not given us a scale on your photographs or at least the names of those stars that are distinguishable so as to make of them an enlarged chart to compare with the catalogues.

Your note which I took to Comptes Rendus has been inserted in the 26 December issue.

We have had horrible weather for months, continual rain and skies covered by clouds etc. Impossible to make any astronomical observations.

The passage of Venus has been completely wiped out.

Your well affected E. Mouchez

In his note of 13 February 1883 thanking Admiral Mouchez for communicating the pictures to the Academy, Gill mentions that he had gone back to parallax work, but that he hoped in two or three months' time to go on with photography. Mouchez, for his part, encouraged the Henry brothers, co-workers at the Paris Observatory, with their experiments on wide-field photographic telescopes. They produced within a few years the first of the "Astrophotographic" lenses, a tribute to their considerable optical skill.

Knobel, the Secretary of the Royal Astronomical Society, asked on behalf of the Council that the original negatives of the comet pictures be presented to

the Society. This was done, and they are now in the Science Museum, South Kensington.

On April 3, Gill wrote the following curious letter to Knobel:

... I hope to send you by next mail a set of Transparencies of the comet for the lantern - for y^r own use or that of anyone you may wisy to lend them to.

About Horne and Thornthwaite. I think they should pay something for the right to publish these photographs. They might have access to the negatives after the R.A.S. has done with them, and give a sum of money for the right to publish w^h I w^d give to Mr Allis. I find that my promise to Mr Allis, made in my gratitude for his efficient assistance has been iable to misrepresentation. I am indebted to him for the loan of his camera and for the development of the plates - but all the arrangements were mine, the mode of adaptation etc etc and the insisting on the necessity for more sensitive plates - than he could make for the last three pictures. In the Cape Quarterly Journal [unreadable] I published exactly what Mr Allis did in the matter and he was so delighted at the public quisi [?] that he wrote off to the Photographic Journal a letter which a correspondent in london has just sent me. Mr Allis uses the very same phrases I employed at a meeting of the S. African Phl. Society "having secured the cooperation of Mr Allis" - he writes having secured the cooperation of the Astronomer Royal. My correspondent takes this to imply that Mr Allis originated the whole matter and that the photographs are in no sense mine. This is quite a mistake. eyond lending the camera and developing the plates and ocasionally relieving me at the telescope during the long exposure (ie occasionally working the slow motion handles), Mr Allis did nothing. The matter originated with me, its plan was arranged by me, and Mr Allis acted most ably and enthusiastically the part of assistant. I must say that not being accustomed to the development of sensitive plates, not having a suitable lens and camnera and being generally unprepared for such a contingency - the assistance of Mr Allis was necessary - in fact essential. I was correspondingly grateful, and desirous that he should have the full credit and full pecuniary benefit of his services. I was in fact so pleased that the photographs had been secured, that I cared but little who got the credit for them. But I do care very much that I should be supposed to take credit which I did not deserve and I wish therefore to put you fully in possession of the facts of the case, should anyone you know take the same view of Mr Allis' letters which my correspondent has done.

I am preparing for further experiments on the making of star maps direct from the sky - and have got a special lens from Dallmeyer



Figure 3: The “Wind Tower” at the Royal Observatory with the photographic telescope visible through the partly-open dome. The octagonal foundation in the foreground is that of the Naysmyth experimental photographic telescope described in the April 1989 issue of MNASSA (Glass, 1989). Photo by C. Ray Woods.

for the purpose of my preliminary experiment.

The lens referred to was one of Dallmeyer’s “Rapid Rectilinear” symmetrical lenses of 4 inches aperture and 33 inches focal length. It was used over the next few months for experiments, but was never put into service on a regular basis.

Meanwhile, the idea of making a photographic survey of the southern sky to complete the great visual catalogue compiled by Argelander of Bonn, and known as the Bonner Durchmusterung, had taken shape in Gill’s mind. While on leave of absence in England in 1884, he borrowed a much larger lens, a 6-inch, also a Rapid Rectilinear, from Dallmeyer. This had a focal length of 54 inches. He also applied to the Royal Society for a grant to fund the project, and was awarded £300 in the following year. Mr C. Ray Woods, an experienced astronomical photographer, was duly hired at a salary of £250 p.a. He reached the Cape on 18th February 1885.

The tube of the new photographic telescope was a wooden one, 12×12 inches square. It was mounted on a sturdy Grubb mounting owned personally by Gill and originally acquired to support a 4-inch Repsold heliometer which he had purchased from Lord Lindsay, his previous employer. An old Dollond telescope having an eyepiece micrometer with illuminated cross-wires was used for guiding. The complete instrument replaced the 6-inch on the Wind Tower. The plateholder was evidently very crude, and focussing was achieved by sliding an inner square tube within the telescope, holding it in place by push-pull screws.

This particular set-up was intended to be only a temporary one, but a replacement 6-inch Rapid Rectilinear Lens which Dallmeyer had figured specially for stellar photography turned out to be less satisfactory than the one Gill had started out with. The original lens was therefore re-polished by Dallmeyer and in April was put back into service, mounted once again in the Wind Tower, but on the stand of the present 6-inch telescope. The complete Cape Photographic Durchmusterung was thus taken with the original Dallmeyer 6-inch lens.

Acknowledgment

I wish to thank Mr J.D. Laing for reproducing the photographs which accompany this article.

References

- Gill, D., *Cape Photographic Durchmusterung*, Vol. 1.
Glass, I.S., 1989. *MNASSA*, **48**, 29.
The quoted correspondence may be found in the volume *R5 to 15 1879-1890*, section on the Great Comet of 1882, SAAO Archives.

South African Astronomical Observatory,
PO Box 9,
Observatory

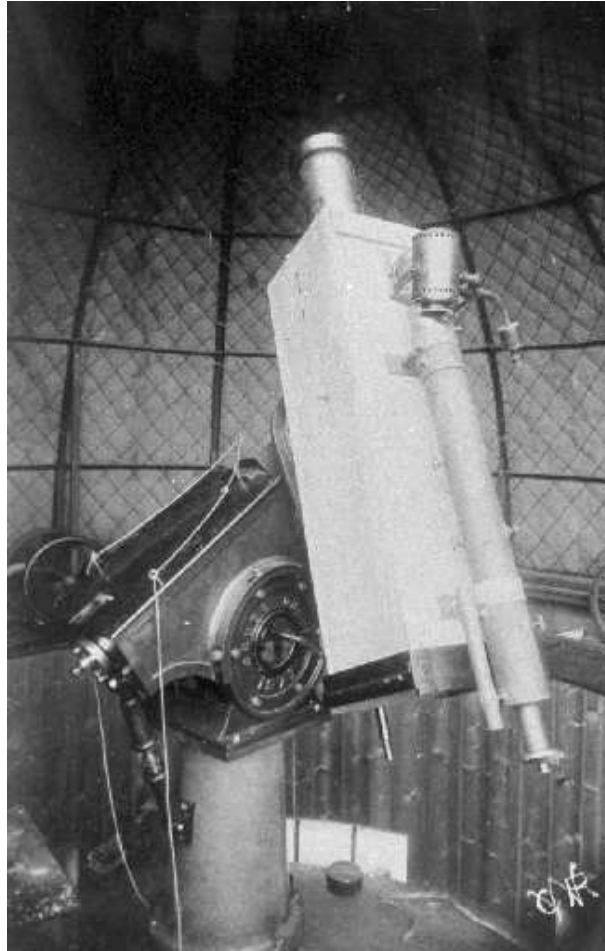


Figure 4: The CPD telescope. Originally on front cover of December 1989 MNASSA.