Photography and photomicrography in 19th century Madras

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The science of light microscopy, which works using light from either the sun or an artificial source (e.g. incandescent light, mercury lamp), has today expanded substantially involving a range of versatile tools and techniques, such as phase contrast, polarized light, fluorescence, interference contrast, dark field, confocal, deconvolution and fluorescent-semiconductor nanocrystals (quantum dots). Photomicrography that runs with light microscopy too has diversified extensively and grown impressionably. In spite of the meteoric growth in sophistication in instruments used in modern science, which can measure quantities of materials and compounds precisely, medical pathology is one specialty that relies greatly on microscopic observations to reach diagnoses. Especially in the context of cancer, preparation of quality photographs of smears and sectioned tissues is vital. Treatment strategies rely on the pathologist's comments on the aetiology of the disease. A photomicrograph is a highly valuable technical document in science and industry. A quality photomicrograph is also an object of beauty that evokes an appreciative excitement in the viewer. Whereas macrophotography evolved much earlier, photography of microscopic objects (then referred to as 'microphotography', which literally means 'production of minute photographs') developed in the 1830s. Thomas Wedgwood (Staffordshire, England, 1771–1805) in his article 'An account of a method of copying paintings upon glass, and of making profiles, by the agency of light upon nitrate of silver' published in the *Journal of the Royal Institution* (1802–?) predicted the possibility of making photomicrographs[1]:

> '…, *I have found that the image of small objects, produced by means of the solar microscope, may be copied without difficulty on prepared paper. This will probably be a useful application of the method; that it may be employed successfully, however, it is necessary that the paper be placed at but a small distance from the lens.*'

John Benjamin Dancer (1812–1887), a professional optician in London perfected the technique of photographing small objects mounted on the platform of a light microscope in 1839. In 1840, for the first time he displayed the photomicrograph of a flea in Liverpool[2]. Dancer's efforts were based on calotype-(also known as the 'talbototype') and daguerreotype-imprinting techniques. The calotype and daguerreotype techniques were developed independently: the former by William Henry Fox Talbot (1800–1877) in London, and the latter by Louis Jacques Mandé Daguerre (1787–1851) in Île de France. Both Talbot and Daguerre independently trialled salts of Ag (serendipity?). To fix images permanently Talbot used $AgNO_3$ in combination with gallic acid, whereas Daguerre used AgI and NaCl solution. Daguerre's technique of using AgI was based on a refined technique developed by Joseph Nicéphore Niépce, his work partner, who used $AgNO_3$ usually and AgCl occasionally.

Talbot attempted making photomicrographs at magnifications less than 20×. In the book *Die Fotographie als Hilfsmittel Mikroskopischer Forschung* (Verlag von Wilhelm Engelmann, Leipzig, Germany, 1863), Joseph von Gerlach refers to one Christian Joseph Berres (1796–1844), professor of anatomy in Vienna, as the pioneer photomicrographer, who used a vertical-solar microscope designed by von Gerlach in 1839. Berres seems to have fixed the micrographs using daguerreotype technique. Berres wrote *Anatomie der mikroskopischen Gebilde des menschlichen Körpers* (*Anatomia microscopica corporis humani*: Latin) published by Carl Gerold, Vienna in 1837. I could not see the original text, but references to this book in classic-book catalogues indicate that this is a finely illustrated medical volume. Berres photographed 'cells'. Nonetheless, still being influenced by the 'fibre theory' in organism construction, Berres saw them as 'bubbles' and did not recognize them as cells[3].

Several European names sparkle in the history of photomicrography[4]. Refer to Overney and Overney article[4] to see illustrations of the photomicroscopes of the 19th century and early 20th century. The present note is an effort to bring to light the earliest photomicrographic attempt made in India by Jesse Mitchell in Madras in the 1850s.

Linnaeus Tripe and Frederick Fiebig – master photographers

Although the purpose of this note is to recall Mitchell's photomicrographic effort in Madras, I consider a brief reference to contributions of Linnæus Tripe and Frederick Fiebig, who made striking landscape- and macrophotographs in India in the 1850s would provide a context. The web page of the Photographic Society of Madras[5], established by Alexander Hunter in 1857, refers to a few other key names in macrophotography in colonial Madras.

Linnaeus Tripe (1822–1902), a captain in Madras Native Infantry (Madras Army), is to be mentioned first. Tripe was appointed the first official photographer of the Government of Madras in 1856, after a short stint in Burma[6]. Tripe's task was to photographically document historic structures of Madras Presidency, enabling the government to launch conservation efforts. His panoramic photos of the Great Temple of Tanjavur (Figure 1 *a*) and wall inscriptions therein are archived at the Canadian Centre for Architecture (CCA) (Montréal, Quebéc, Canada). CCA's acquisitions of these images are from the personal collections of James Bruce – the eighth Lord Elgin – who received them in 1860, while being the Viceroy of India, a position Lord Elgin held after being the Governor General of Canada (1846–1854). Tripe made calotype photographs (contact prints, 15 × 12″ size, used AgI to print images), and also stereoscopic photographs using a stereo-binocular camera. Given that photography was in its infancy then, the stand taken by the Government of Madras to appoint Tripe as the official government photographer and pressing him into action is noteworthy.

Frederick Fiebig is the second key person. Fiebig lived in Calcutta in 1840–1850s. The *Bengal and Agra Directory & Annual Register* (1849–1850) refers to Fiebig as a piano teacher. In the 1840s, while at Calcutta, he took to photography. He made several topographic

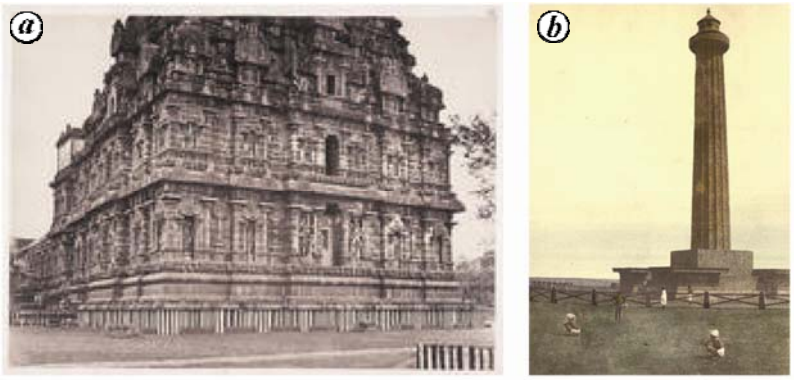

Figure 1. ***a***, A Linnaeus Tripe photograph of a part of the Brihadisvara temple, Ŧanjavur (1858); an albumen-silver print, from Tripe's *Photographic Views of Tanjore and Trivady*. Source: http://www.cca.qc.ca/en/. ***b***, A Frederick Fiebig photograph of Madras light house (1851). Source: picasaweb.google.com/Indian.Satheesh/MADRAS.

Table 1. Negatives of the photomicrographs submitted by Jesse Mitchell to the Madras Photographic Society Exhibition held in Madras in May 1859*

i.	proboscis of blow fly [484 x]
ii.	parasite of tame goose [484 x]
iii.	parasite of fowl, an *Acarus* (currently valid name; erected by Linnaeus 1758; Astigmata: Acaridae) [3.969 x]
iv.	a butterfly's scale, *Thecla* (currently valid name; erected by Linnaeus 1758; Lepidoptera: Lycanidae) [276.676 x]
v.	ditto of item (iv) [672.400 x]
vi.	a butterfly's scale, *Polyommatus* (currently valid name; erected by Linnaeus 1763; Lepidoptera: Nymphalidae) [276.676 x]
vii.	parasite of pig [484 x]
viii.	proboscis of blow fly [1.600 x]
ix.	house flea [484 x] (a siphonapteran)
x.	trophi of a wasp [484 x]
xi.	wing of mosquito [484 x]
xii.	mouth of larva of ant lion [484 x]
xiii.	scale of *Morpho menelaus* (currently valid name; erected by Linnaeus 1768; Lepidoptera: Lycanidae) (Note: Is this a correct determination? Species of *Morpho* are not known in India) [72.900 x]
xiv.	Arnee muslin at Rs 12½ per yard [2.500 x] ['Arnee muslin' is the cotton fabric produced in the town *Ārni* (12°67′N; 79°28′E) in Tiruannamalai District, near Madras]
xv.	*Coccus lacca* from mango tree [2.500 x] (current valid name: *Kerria lacca* (Kerr 1792); Hemiptera: Coccoidea: Kerridae)
xvi.	exuvia of bed bug showing lancets [484 x] (Hemiptera: Cimicidae)
xvii.	tarsus of a grasshopper [484 x] (Orthoptera)
xviii.	exuvia of a spider showing the jaws [484 x]

*Text is presented as it is in the original; magnifications supplied in the original file are indicated in square brackets. Wherever appropriate, I have supplemented comments and remarks ('Times' typeface) 'translating' the 1850 data to the current time.

photographs of Calcutta. He too used the then state-of-the-art photo-printing technique, viz. calotyping. While travelling to Colombo (Ceylon) from Calcutta, en route, he touched Madras and took photos of the place[7] (e.g. Figure 1 *b*). The only reference to his photographs made of and in Madras occurs in 'Photography in Madras' published in the *Illustrated Indian Journal of Arts* (Part 4, February 1832, p. 32), which refers to his Madras visit in 1852. No other biographic details are traceable; that he was a German by birth and from lithography he took to photography remain unverified.

Photomicrography in Madras and negatives made by Jesse Mitchell

The April–September 1859 issue of the *Madras Journal of Literature and Science* (*MJLS*)[8] (p. 174) under the section *Proceedings of Scientific Societies* (*Proceedings of the Photographic Society* [sic. '*of Madras*']) includes the following notation:

> 'Arrangements made for the approaching Exhibition, proposed to open on the first Thursday of next month (*sic*. "May 1859").'

In the report of the Committee appointed to adjudicate the Photographic Society's medals dated 12 May 1859 (p. 175), besides references to the medals awarded to landscape photographs of entries that had come from throughout India, the photomicrographs made by Jesse Mitchell, winning the silver medal caught my attention.

Mitchell submitted 18 negatives made in an achromatic compound microscope (Table 1) with the following declaration:

> 'The Negatives were taken by the Collodion process and are untouched. The proofs were toned by Hardwick's new Alkaline Chloride of Gold process.' (ref. 8, pp. 195–196)

No details on the photomicroscopic unit, which Mitchell used in Madras to create the prize-winning photos are traceable. In high likelihood, he may have used a 'custom-made' camera adapting it to the achromatic compound microscope that he had. Alternatively, Mitchell may also have used either the 1839 model of the von Gerlach photomicroscope (similar to the one used by Christian Berres in Vienna), or the 1852 model F. Meyer

(also referred as 'F. Mayer' in literature) photomicroscope. The Meyer photomicroscope was a vertical set-up, which had a stable base – a key necessity to achieve sharp photos. Joseph von Gerlach developed an easy-to-work-with system, which was simpler than the Meyer photomicroscope, but that occurred in 1863. Lack of a stable base was a weak point in the 1863 von Gerlach system, which was rectified subsequently[9].

From the details I could gather, it appears that Mitchell was an avid photographer. He has published an article on plain or waxed paper process in photography[10]. Little biographical details of Mitchell are available. Most of the report referring to the prize-winning entries in *MJLS*[8] indicates Mitchell was a Lieutenant in the Native Veteran Battalion, Madras Army. A casual reference indicates him a Captain and he succeeded Edward Green Balfour as 'part-time' superintendent of the Madras Museum. In this reference Mitchell is acknowledged for securing several Amrãvati sculptures to the Madras Museum. However, the Madras Museum History website[11], which I would consider authentic, refers to Mitchell as its superintendent from 1859 to 1872 with the following remark: 'A public library commenced functioning, as a part of Madras Museum in June 1862, although the formal building was opened on 16 March 1876. … …Captain Mitchell, the superintendent, strengthened the library, which grew into the Connemara Public Library.'

Conclusion

The pioneering effort made by Mitchell looking for a greater level of details in biological objects through a microscope and attempting to immortalize those views by photographing, in colonial Madras, is striking. Although landscape photography and macrophotography were popular, thanks to Tripe and Fiebig, and a few others, Mitchell's efforts to create photographs using a microscope are indeed worthy of recall. This remark needs to be read in the context described in the following paragraph.

Charles Donovan (1863–1951) is remembered in Madras science for his discovery of the protozoan *Leishmania donovani*, the agent that causes leishmaniasis (kala azar) in India. While working as the professor of physiology at the Madras Medical College (1898–1909) and Superintendent (1910–1919) of the fledgling Royapettah infirmary[12] ('Royapettah Hospital' today), Donovan's glass-slide preparations of human-blood smears to study the biology of the protozoan, made nearly five decades later to Mitchell's prize-winning efforts in Madras, were not photographed; reasons unknown. However, we know that much of Donovan's microbiological research was meticulously recorded as 'water colours' by Amy Anna Caroline Skelland, a nurse matron at the Royapettah infirmary[13]. Donovan sent smears on glass slides and explanatory colour-pencil sketches (made by himself?) to Ronold Ross (T. Sriramulu, pers. commun., e-mail on 15 June 2011), who named the protozoan *L. donovoni*[14].

Arthropods seem to have been attractive subjects in early photomicrographic efforts. Dancer photographed a flea through a microscope in 1840; however, in chronicling the evolution of photomicrography, the most significant effort was that made by Christian Berres to photograph human tissues in a microscope. Mitchell, in high likelihood, was unaware of Christian Berres's efforts made in German-speaking Vienna and was only aware of Dancer's efforts made in English-speaking London, and he may have followed Dancer in examining entomological curios through a microscope. Strange that one of the entries which won the silver medal in the 1859 Madras Photographic Exhibition was the negative that pertained to cotton fibres (Ãrni muslin; item xiv, Table 1). Although minor issues exist with Mitchell's determinations of arthropods (see my remark, item xiii, Table 1, refer to *Morpho menelaus* Linnaeus 1768; Lepidoptera: Lycanidae), his other determinations are spot on. No records indicate that Mitchell was a trained biologist. He photographed mostly those arthropods that were of value in a human context – either aesthetically (e.g. butterflies) or economically (e.g. lac insect that produces lac, blow flies that live on livestock and arthropods that infest domesticated birds).

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