

# Hubert Airy, contemporary men of science and the migraine aura

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**ABSTRACT** Although there had been occasional references to the visual aura of migraine even in ancient medicine, little attention was given to the phenomenon until the first half of the nineteenth century when French authors began to describe it. In the medicine of English-speaking countries, apart from a few descriptions, it went largely unnoticed until the British Astronomer Royal, Sir George Airy, described his own experience of the visual aura in 1865. Five years later his son, Hubert Airy, also described his experience of it and that of a number of eminent contemporary men of science. The topic of the migraine aura was almost immediately taken up by two of the younger Airy's contemporaries and fellow Cambridge medical graduates, Peter Wallrock Latham and Edward Liveing, in their monographs. Subsequently, migraine with aura quickly became a well-recognised clinical entity in British medicine.

**KEYWORDS** Hubert Airy, aura, headache, Peter Wallrock Latham, Edward Liveing, migraine, teichopsia

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The diagnosis of migraine is common today, and made reasonably easily if the headache follows a temporary illusory visual disturbance known as the aura. It is therefore surprising to realise that, as recently as a century and a half ago, migraine was not commonly diagnosed in British medicine. The relevant clinical phenomena were known, and had been recognised in medical literature from quite ancient times. However, different classifications of headache were used in the past, and what is now regarded as migraine was slow to be perceived as a distinct clinical entity. Moreover, the disorder was more slowly recognised in British and German medicine than in French medicine. The present paper deals with events in England around 1870 that led to migraine with aura being accepted as an important clinical entity.

## HISTORICAL BACKGROUND

While there may have been earlier references to manifestations of the disorder,<sup>1</sup> there is a reasonably convincing description of migraine with aura in the Hippocratic corpus, although this account went largely unnoticed until Critchley<sup>2</sup> drew attention to it in 1967. This particular description is usually attributed to some later member of the Hippocratic school rather than to Hippocrates himself, and is not included in Francis Adams's translation, *The Genuine Works of Hippocrates*.<sup>3</sup> The material of interest appears in largely similar wording at two separate places in the Hippocratic writings on Epidemics (5. 83 and 7. 88).<sup>4</sup> The latter account reads as follows, in Wesley Smith's translation:

Phoenix's problem: he seemed to see flashes like lightning in his eye, mostly the right. And when he

had suffered that a short time, a terrible pain developed toward his right temple and then around his whole head and on to the part of the neck where the head is attached behind the vertebrae. And there was tension and hardening around the tendons. If he tried to move his head or opened his teeth, he could not, as being violently stretched. Vomits, whenever they occurred, averted the pains I have described, or made them gentler.<sup>4</sup>

Further descriptions of probable migraine headache, either occurring alone or in association with visual disturbance, continued to appear over the subsequent centuries,<sup>5–7</sup> and the term 'meagrim' was occasionally used, as for instance by Thomas Willis's translator, Samuel Pordage.<sup>8</sup> However, the significance of any illusory visual disturbance that immediately preceded the headache did not seem to be recognised until the latter part of the eighteenth century. Then, Samuel Tissot, in his *Traité des Nerfs*,<sup>9</sup> described when writing of migraine (or hemicrania) an instance of visual clouding followed by hemisensory and speech disturbance before the onset of a headache in a 32-year-old male and another instance of hemisensory disturbance before the onset of a headache in a 12-year-old girl. More or less simultaneously, in 1784, John Fothergill of Manchester described his own migraine:

It begins with a singular kind of glimmering in the sight; objects swiftly change their apparent position, surrounded with luminous angles, like that of a fortification. Giddiness comes on, head-ach and sickness.<sup>10</sup>

Tissot's attempt to educate the French-speaking medical profession of his day about various neurological matters

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appeared to yield dividends and *la migraine* fairly quickly became a recognised nosological entity in the French literature. Some quite detailed descriptions appeared, such as that of Louis-Florentin Calmeil.<sup>11</sup> In Paris in 1835 Pierre-Adolphe Piorry published an account of a particular variety of migraine, ophthalmic migraine, which was tantamount to migraine with a visual aura.<sup>12</sup> After this, the French literature increasingly referred to visual disturbances immediately preceding migraine headache.<sup>13,14</sup> Yet there is no clear mention of any visual aura preceding migraine headache in Elizabeth Garrett Anderson's Paris MD thesis on migraine, submitted in 1870.<sup>15</sup>

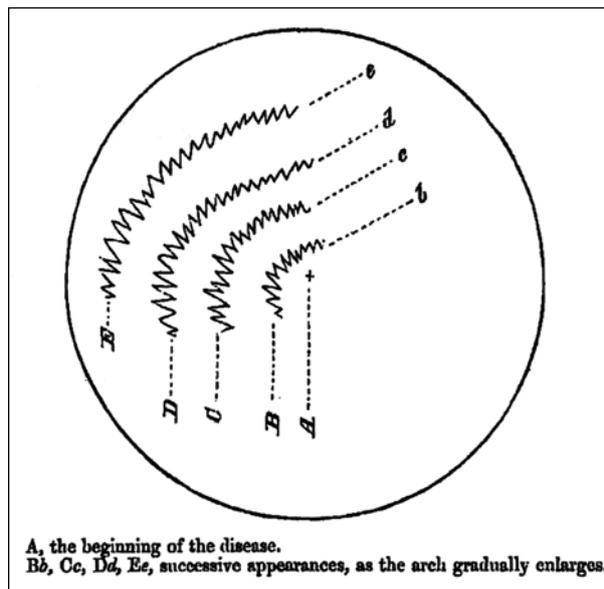
In contrast to the situation in France, the entity of migraine with a visual aura was slow to find its way into the German<sup>16</sup> or English-language medical literature. However, in 1825 Caleb Parry of Bristol had described the occurrence of the visual phenomena of the migraine aura,<sup>17</sup> but without any subsequent headache, while in 1828 John Abercrombie had described the familial incidence of migraine with aura.<sup>18</sup> During the first two-thirds of the nineteenth century most British medical authors employed classifications of headache that included what would now be considered as migraine under designations such as sick headache, bilious headache and nervous headache. If they used the word 'migraine' at all they employed it only for episodic hemicrania.<sup>19-21</sup> If any associated visual disturbance was mentioned<sup>22</sup> it was not made clear that the disturbance immediately preceded the headache rather than simply accompanied it. Nonetheless, in 1855, at a relatively early stage in his distinguished career, John Russell Reynolds<sup>23</sup> recognised that a preliminary visual disturbance was an important diagnostic point in categorising headache as migraine.

The situation changed in the years between 1865 and 1873, when several publications appeared which made the British medical profession well aware of the entity of migraine with aura. The most significant of these publications were those of the British Astronomer Royal, Sir George Biddell Airy, and of his son, Hubert.

## THE AIRYS AND THE MIGRAINE AURA

### George Airy's aura

On 5 June 1865 George Airy wrote a letter to the editors of the *Philosophical Magazine* which subsequently appeared in print under the title 'The Astronomer Royal on Hemiopsy'.<sup>24</sup> The letter was in response to a recent paper, 'On Hemianopsy', in the same journal by Sir David Brewster, Principal of the University of Edinburgh.<sup>25</sup> In his letter, Airy intimated that he had experienced at least 20 episodes which began with the appearance of an indistinct mist at the central point of his vision. This was followed by the appearance of short lines which changed direction and place. There then developed a progressively expanding arch comprising trembling zigzags with slight scarlet edges which tended to occupy one upper



**FIGURE 1** Sir George Airy's illustration of his own illusory visual disturbance.<sup>24</sup>

quadrant of his visual field, with the centre of his vision becoming clear as the zigzags expanded. The whole episode could last 20 to 30 minutes. Airy illustrated his visual disturbance in a drawing (Figure 1) and stated that he could not decide whether individual attacks involved only one eye. The apparent side of the visual disturbance varied from one episode to another. Airy mentioned two friends who were similarly afflicted. In each, the visual disturbance was followed by headache, whereas Airy himself was not otherwise inconvenienced by the visual change except that, on one occasion, he found that he 'had not the usual command of speech' and feared he 'might be talking incoherently'. Airy thought that his disorder must arise from a brain disturbance.

It is unlikely that the *Philosophical Magazine*, with its emphasis on physical and mathematical sciences, would have been widely read by the Victorian medical profession. There seems little evidence that, even though it contained what may be the first published illustration of the pattern of the visual disturbance of the migraine aura, Sir George Airy's letter attracted any widespread medical attention at the time.

### George Airy's career

The numerous details of Airy's long and very distinguished scientific career are recorded in several places, for example in Allan Chapman's account in the *Oxford Dictionary of National Biography*<sup>26</sup> and in Edward Routh's obituary notice for the Royal Society.<sup>27</sup> Airy was born at Alnwick, Northumberland, in 1801 and educated mainly at Colchester, in Essex, before going to Trinity College, Cambridge, in 1819. In 1823 he graduated as Senior Wrangler (the highest scoring candidate in the university's mathematical tripos) and first Smith's Prizeman and in the following year became a Fellow of Trinity, having

already proposed marriage, after two days' acquaintance, to Richarda Smith, daughter of a Derbyshire clergyman. It was almost six years before the marriage took place, when Airy's career had advanced far enough to persuade his future father-in-law that Airy would be able to maintain a wife. In the interval, late in 1826, Airy had been elected Lucasian Professor of Mathematics at Cambridge. In February 1828, after occupying the Lucasian chair for a little more than a year, he became Plumian Professor of Astronomy and Director of the Cambridge Astronomical Observatory. In June 1835 he moved to Greenwich as Astronomer Royal, holding that position for the next 46 years. He died in January 1892, a little more than a decade after retiring. George and Richarda Airy had at least nine children. Of these, the oldest three died in childhood. Hubert (1838–1903), with whom the present paper is also concerned, was the couple's second oldest surviving child.

### Hubert Airy's migraine

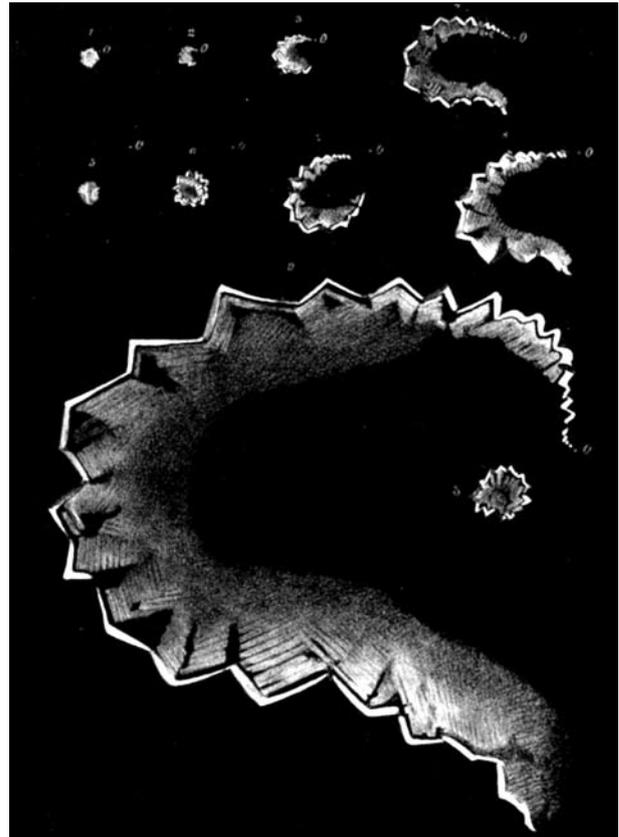
In the 1870 *Philosophical Transactions of the Royal Society* appeared the paper 'On a distinct form of transient hemiopia', written by Hubert Airy MA, MD and communicated to the society on 17 February 1870 by the Astronomer Royal himself.<sup>28</sup> The paper began with the sentence:

It is certainly [a] matter of surprise that a morbid affection of the eyesight, so striking as to engage the attention of Wollaston, Arago, Brewster, Herschel and the present Astronomer Royal, should have received but little notice from the profession to whose province it exclusively belongs.

The paper's author, Hubert Airy, then aged 31, stated that over the past 15 years he had experienced perhaps 100 episodes of scintillating scotoma of a pattern and duration similar to that which his father had described in 1865. He described the phenomena in exquisite detail and provided a coloured drawing of their appearances, which was subsequently reproduced in the medical literature (Figure 2). In contrast to his father, Hubert Airy's visual disturbance was followed by the gradual onset of diffuse headache and slight nausea.

In his paper, Hubert Airy reviewed the available literature, though he seemed unaware of the accounts of Tissot and Piorry. He also recorded the testimony of several eminent contemporary British men of science concerning their auras, probably obtained through his father's contacts in the Royal Society. He concluded that two patterns of visual disturbance had been described under the designation 'hemiopia' or 'hemiopsia'.

One pattern, experienced by William Hyde Wollaston,<sup>29</sup> François Arago<sup>30</sup> and Brewster,<sup>25</sup> comprised brief episodes of fully reversible partial or complete hemianopic impairment of vision without associated illusory visual



**FIGURE 2** Hubert Airy's illustration of the progression of his visual aura.<sup>28</sup>

phenomena. The other pattern was that of the illusory visual disturbance described above. It was experienced by the mathematician and astronomer Sir John Herschel (whose account was reproduced in Airy's paper), the British physicist Sir Charles Wheatstone, the Astronomer Royal himself and the Lausanne physicist Professor Louis Dufour, whose account of his own episodes (in French) in a letter to the Astronomer Royal dated 24 April 1868 was also reproduced in Airy's paper.

Hubert Airy, himself something of a classical scholar, was dissatisfied with the terms 'hemiopia' and 'hemiopsia' that had been used to describe the phenomena in question. He remembered Fothergill's statement<sup>10</sup> that the appearance resembled that of a fortification, and coined for it the term 'teichopsia' (town-wall vision) which remains in use today.

Airy's paper was largely descriptive in its content, but in it he raised three pertinent issues:

- Was the visual disturbance due to a 'temporary suspension of function, propagated by continuity, among the nerve cells of the visual sensorium (wherever that may be)?'
- Did the subsequent headache 'tell of further propagation of the nervous disturbance into parts of the brain where disturbance is aching?'

- Did the occasionally noticed detriment of speech and hearing imply further extension of the disturbance into 'the regions of brain-substance appropriate to those functions'?

Enunciated in the same year (1870) as the publications of the investigations of John Hughlings Jackson<sup>31</sup> and Gustav Fritsch and Eduard Hitzig,<sup>32</sup> which began to provide evidence of the localisation of function in the cerebral cortex, Airy's questions were prescient and have not been answered completely satisfactorily, even today.

## FURTHER DEVELOPMENTS

Hubert Airy did not publish his observations on the migraine aura in the medical press, but they were taken up almost immediately by two fellow Cambridge men, Peter Wallrock Latham and Edward Liveing, who were already interested in migraine. Their writings made Airy's paper, containing the testimony of eminent contemporary scientists, well known in the English medical literature. Latham, who was then Assistant to the Dowling Professor of Medicine at Cambridge and who subsequently became the Dowling Professor, in 1872 published in the *British Medical Journal* a two-part 'Clinical lecture on nervous or sick headaches',<sup>33</sup> which he subsequently expanded into a small monograph.<sup>34</sup> In it he quoted at some length from Airy's paper and, based on it, developed what became the vascular hypothesis of migraine pathogenesis. Latham attributed the aura to cerebral arterial spasm and the subsequent headache to cranial arterial dilatation.

A fortnight after the first part of Latham's paper had been published, Liveing, then practising in London where he later became the long-serving Registrar of the Royal College of Physicians of London, published his 'Observations on megrim or sick-headache' in the *British Medical Journal*.<sup>35</sup> This paper was based on the content of his MD thesis submitted to the University of Cambridge two years earlier, work which he subsequently expanded into his 1873 monograph *On megrim, sick-headache and some allied disorders*.<sup>36</sup> In contrast to Latham, Liveing interpreted migraine as primarily a neural rather than a vascular disorder. In his monograph Liveing stated that he had been present when Hubert Airy's paper had been read to the Royal Society. At a time when statistical data were relatively infrequent in the medical literature, Liveing reported that a visual aura was present in 37 of his 60 cases of migraine, and indicated that the phenomenon was 'a tolerably frequent one in the more severe forms of migraine'.

This set of publications, appearing in 1870–73, made English-language medicine aware of the frequency and importance of migraine and its visual aura. The older categorisations of headache then in use soon came to accommodate the entity of migraine. At least in regard to its clinical features, accounts of migraine such as that

of William Richard Gowers<sup>37</sup> quickly became very similar to present-day ones. It seems that the main catalyst for this change in awareness of the disorder was Airy's paper of 1870. It also seems that this paper was Airy's sole original contribution to neurological knowledge.

## Hubert Airy's career

Unlike his father, information about Hubert Airy's career is rather difficult to obtain. However, a certain amount can be deduced from the contents of later nineteenth-century medical and scientific literature, from English census returns and from the internet.

Hubert Airy was educated at Blackheath Proprietary School in Kent, and entered Trinity College, Cambridge, in October 1856. He gained a first-class BA in the classics tripos in 1861, and proceeded to MA three years later. In 1869 he received the Cambridge MB degree and, according to the account of Cambridge University Alumni, 1261–1900,<sup>38</sup> its MD in 1872 (although in his paper in the *Philosophical Transactions* he is shown as possessing this doctorate in 1870).

I have been unable to trace where Airy received his clinical training or to construct a chronological account of his medical career. For much of it he seems to have worked as an examiner in Sanitary Science and a medical inspector to the English Local Government Board. Between 1878 and 1883 he authored a number of reports to the Board (e.g. on diphtheria in the Bath registration district, on the sanitary state in Burton-upon-Trent, on the water supply in areas of Warwickshire and on enteric fever at Chichester). There is evidence that he worked as a medical officer at Hull in 1882, where he was concerned with the health of Scandinavian immigrants. In 1881 he published a paper on the spread of diphtheria in the *Transactions of the International Medical Congress*.<sup>39</sup> As deduced from British census returns, he retired between 1891 and 1901.

There appears to have been a considerable non-medical side to Hubert Airy's intellectual life. He was an amateur naturalist who published a number of papers in *Nature* dealing with matters such as pendulum autographs,<sup>40</sup> Blackburn's double pendulum,<sup>41</sup> leaf arrangements,<sup>42</sup> the microscopy of air,<sup>43</sup> optical phenomena<sup>44</sup> and birds.<sup>45–48</sup> In 1876 he had a paper on leaf arrangements communicated on his behalf to the Royal Society by none other than Charles Darwin.<sup>49</sup> It would seem that Airy and Darwin were in contact for some time and that Darwin was prepared to propose Airy for Fellowship of the Society, although nothing seems to have come of this.

In 1873 or a little earlier Hubert Airy married Susan Langton. The various census records show that the couple had three children; two daughters and a son, Arthur, who died on the battlefields of the Western front in France. The Airy family seems to have lived in

modest comfort, first at Eastbourne and then at Woodbridge in Suffolk, for the census records show that the household contained either three or four domestic servants during the decades between 1881 and 1901. Airy himself died at Woodbridge in 1903.

## DISCUSSION

Hubert Airy's one original neurological publication resulted in migraine with a visual aura becoming transformed from an occasional and relatively unimportant curiosity into a significant clinical entity in the medicine of English-speaking countries. This happened largely because of a fortuitous constellation of circumstances, viz. that a small number of Cambridge medical graduates around 1870 became interested in migraine, that the disorder was often inherited and that the father of one of the

Cambridge men, himself a Cambridge man, had close contacts with a number of the leading figures in contemporary British science. It may be said that Hubert Airy was lucky in several ways, but he did make good use of his opportunity, made meticulous observations and formulated appropriate questions for others to attempt to answer while he moved on to other intellectual matters that took his interest from time to time.

Leaving aside infectious disease, Airy's curiosity did not seem to have remained focused on any particular area of knowledge over a long period. In this regard he differed from his father, and he never achieved the measure of fame that came to Sir George. As far as one can judge, Hubert Airy lived out his life as a Victorian gentleman scientist and amateur naturalist who had the good fortune to make one significant contribution to medical knowledge.

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