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The Argyleshire Fencibles Develop Egyptian Ophthalmia: Arthur Edmondston and Proof of Contagion

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Abstract

Egyptian Ophthalmia, an eye disease characterised by severe pain, redness, swelling of periocular tissues, causing significant sight loss, affected both British and French troops involved in the Egyptian campaign (1800-02). It was thought to result from local conditions in Egypt, principally the strong sunlight or the dampness at night.

A regiment serving in Gibraltar contracted a very similar condition during and after their return to Britain, despite never having visited Egypt. The regimental surgeon Arthur Edmondston (c1776-1841) recorded this episode and suggested that it provided evidence that the condition was in fact contagious. He subsequently published a treatise which further explored the arguments given in his original account, along with the history of the concept of 'contagion', noting how its meaning had changed over the centuries.

Keywords

Egypt, Ophthalmia, Arthur Edmondston, Gibraltar, Contagion, Argyleshire Fencibles

Introduction

In 1798 Napoleon Bonaparte (1769-1821) sent his troops into Egypt not, as it was claimed, an invading force, but rather as an attempt at cultural exchange. Along with 50,000 soldiers there were 300 Savants, that is learned persons or scholars, whose objective was to study the customs of Egypt and to introduce French culture and political organisation into that country. The British, fearing that Napolean was trying to interfere with their land route to India, launched an invasion in 1801 to expel the French and return power to the native rulers.

The first wave of British troops, under the command of General Abercrombie (1706-81), landed at Aboukir Bay, near Alexandria in the north of Egypt in March

1801 and then progressed southwards towards Cairo. A second force, under the command of General Baird (1757-1829), came from India and landed at Kosseir on the Red Sea coast. By the time this landing was made, Abercrombie's force had advanced rapidly and had taken Cairo, so that this second front was not really required.

However, both British and French armies had another enemy in common, namely Egyptian Ophthalmia. This was an affection of the eyes, causing severe pain, redness and marked swelling of the lids. On close inspection the conjunctiva was noted to have a granular appearance, as well as the redness and swelling. The disease led to significant visual loss, due to scarring of the cornea. The corneal inflammation could be so severe that rupture of the globe occurred, leading to loss of one or both eyes. See Figure 1.

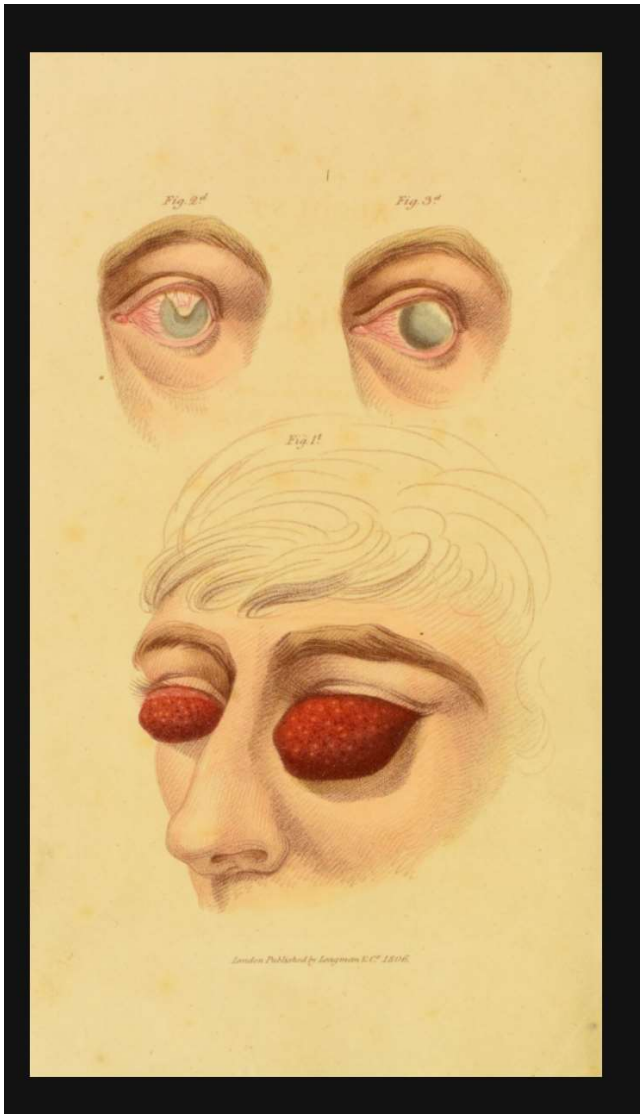

Figure 1. Illustration of Egyptian Ophthalmia. Source: Vetch J. *An account of the ophthalmia which has appeared in England since the return of the British Army from Egypt.* London: Printed for Longman, Hurst, Rees and Orme; 1807. Frontispiece.

James McGrigor (1771-1858), chief medical officer to General Baird's force from India, recorded in his journal: 'The other endemic, and next to the plague in importance, is the ophthalmia of Egypt; which though less fatal, is a more distressing malady'.[1]

Baron Dominique Jean Larrey (1766-1842), who was Napoleon's Inspector-General of the medical departments of the French Armies, wrote a description of the various manifestations of 'The Endemic Ophthalmia of Egypt' in his *Memoirs of Military Surgery*:

> The eyes, having been all at once struck by the ardent light of the sun, whether directly or reflected from the white ground of Egypt, were the organs that first suffered from the sudden check of perspiration of the skin: the consequence of which has been an obstinate ophthalmia, and in a great many cases, total blindness.[2]

In expressing this opinion as to the cause of the problem, Larrey was echoing a view expressed over five centuries before. In 1266, King Louis IX (1214-70) had founded a blind asylum in Paris, the Quinze Vingts, for 300 returning crusaders who had been 'afflicted by the burning plains of Egypt and Syria' and had lost their sight.[3]

Larrey also noted that the right eye was affected more frequently and more severely than the left eye. This he attributed to the general habit of sleeping on the right-hand side, thus exposing the right eye to dampness from the ground. A reduction in incidence of ophthalmia after the provision of great coats and other suitable clothing for the cold nights appeared to confirm this impression of the cause of this condition.[4]

Larrey, like his opposite number in the British army, McGrigor, was certain that the condition was not contagious. 'Several gentlemen' he wrote, 'thought that this disease, in Egypt was contagious. So singular an opinion I would hesitate to offer on slender grounds'.[5] Given that this was almost a century before the germ theory was expounded, perhaps these opinions are understandable.

The endemic nature of the disease, and its high incidence in the local Egyptian population, was also confirmed by the statement by Rene-Nicolas Dufriche, Baron Desgenettes (1762-1837), the chief medical officer of the French expedition that 'The most common affliction of all, affecting a third of the population [at Cairo], is some form of disease of the eye; no other town contains so many sightless'.[6]

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[1] McGrigor J. *Medical Sketches of the Expedition to Egypt from India*. London: Printed for John Murray; 1804. p.146.

[2] Larrey DJ. *Memoirs of Military Surgery*: *containing the practice of the French military surgeons during the principal campaigns of the late war*; abridged and translated from the French by John Waller. Edinburgh: Adam Black; 1815.

[3] Marmion VJ. The origin of eye hospitals. *British Journal of Ophthalmology.* 2005; 89(11): 1396–97.

[4] Larrey. *Memoirs*, 1815 (Note 2). p.15.

[5] McGrigor. *Medical Sketches,* 1804 (Note 1). p.148.

[6] Russell TG, Russell TM. Medicine in Egypt at the time of Napoleon Bonaparte. *British Medical Journal*. 2003; 327: 1461-64.

Effect on fighting efficiency

Irrespective of its cause, the ophthalmia was acknowledged to have a devastating effect on fighting efficiency of the troops. Dr Paolo Assalini (1759-1840), one of the senior surgeons of the French Consular Guards, reported on the effects of an outbreak of 'ophthalmy' which started at the beginning of 1798 and continued until November 1799: 'More than two thirds of the army were attacked; almost at the same time, which made the duty of the garrisons very severe'.[7]

However, many of the soldiers afflicted by ophthalmia recovered, but not all. The French sent around 1,000 blind men home and the British army also sent home a very considerable number.[8]

Just how desperate the situation became is well illustrated by a report by Sergeant Francois (dates unknown) on the use of blind soldiers to defend a position at the battle of Salehieh (1798). The blind men were positioned by their sighted colleagues with their backs to a wall, with their rifles loaded and pointed at chest height towards the invading troops. These blind soldiers were ordered to wait to fire until the enemy approached.[9]

The Argyleshire Fencibles story

Fencible regiments were raised to provide back-up for regular Army regiments. They were not expected to serve overseas nor fight the enemy unless Britain was invaded, their main function being to undertake garrison duties in order to allow the regular units to be deployed to battle zones. In a rare overseas deployment, the Second Regiment of the Argyleshire Fencibles was stationed in Gibraltar from 1800 to 1802, to allow the garrison already there to be deployed to fight the French in Egypt.

Arthur Edmondston (c1776-1841) was a medical officer in the Argyleshire Fencibles. He was a native of Shetland, the son of the only medical practitioner on the islands and followed his father in his profession, joining the Army as a surgeon. On leaving the service Edmondston studied medicine in Edinburgh, graduating MD in 1805.[10] He subsequently returned to Shetland as a general practitioner.[11] See Figure 2.

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[7] Assalini P. *Observations on the Disease called Plague, on the Dysentery, the Ophthalmy of Egypt, and on the means of prevention.* Translated from the French by Adam Neale, MRCSE. New York: Printed and sold by T. & F. Swords, printers to the Faculty of Physic of Columbia college; 1806. p.115.

[8] McGrigor. *Medical Sketches*, 1804 (Note 3). p.147.

[9] Wagemans M, Van Busterveld OP. The French Egyptian campaign and its effects on ophthalmology. *Documenta Ophthalmologica.* 1988; 68: 135-144.

[10] Anon. Graduations at Edinburgh, 12th September. *Edinburgh Medical and Surgical Journal*. 1805; 1(4): 510.

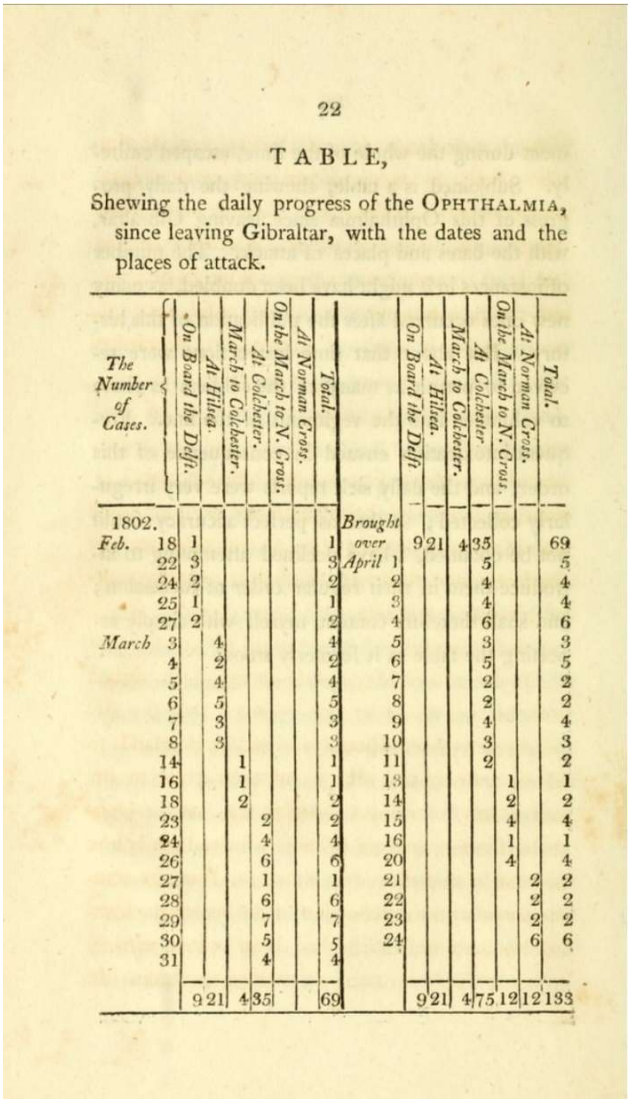
[11] Edmondston, Arthur. *Dictionary of National Biography*, *Vol. 16*. New York: Macmillan; 1888. p.396. https://en.wikisource.org/wiki/Dictionary_of_National_Biography,_1885-1900/Edmondston,_Arthur (accessed 12 March 2024).

Figure 2. Arthur Edmondston, Esq., MD. Oil painting by John Irvine, 1873. Courtesy of Shetland Museum and Archives, Lerwick, UK.

Edmondston noted that members of the regiment had had no eye problems either before they embarked for Gibraltar, nor during their time there. On the journey home, however, and also following repatriation to Britain, cases of ophthalmia, identical to those described in Egypt ('Egyptian Ophthalmia') developed. Edmondston recorded these cases, and in 1802 published his report which included his thoughts on the likely cause of the outbreaks.[12] As well as this *Account*, after gaining his medical qualification, he published a treatise on wider aspects of Ophthalmia, and expanded his views on likely causes.[13]

[12] Edmondston A. *An Account of an Opthalmia, which appeared in the Second Regiment of Argyleshire Fencibles, in the months of February, March, & April, 1802: with some observations on the Egyptian Opthalmia.* London: Printed for J. Callow; 1802.
[13] Edmondston A. *A Treatise on the Varieties and Consequences of Ophthalmia: with a Preliminary Inquiry into its Contagious Nature.* Edinburgh: Blackwood; 1806.

Edmondston recounts the voyage home, listing the presentation of cases of ophthalmia, both during and following disembarkation at Portsmouth, where the troops lived in Hilsea Barracks. He went on to record cases on the subsequent marches towards Colchester and on to Norman Cross, Stilton, in Huntingdonshire. One case occurred ten days before, and six other cases seven days before disembarkation, with another twenty-one new cases occurring over the next 10 days while in camp or on route march. He lists all the cases in a tabulated form in his *Account*, 'shewing the daily progress of the Ophthalmia, since leaving Gibraltar, with the dates and the places of attack'.[14] See Figure 3.



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TABLE,

Shewing the daily progress of the OPHTHALMIA, since leaving Gibraltar, with the dates and the places of attack.

The Number of Cases.	On Board the Delft.	At Hilsea.	March to Colchester.	At Colchester.	On the March to N. Cross.	At Norman Cross.	Total.
1802.							
Feb. 18	1						1
22	3						3
24	2						2
25	1						1
27	2						2
March 3		4					4
4		2					2
5		4					4
6		5					5
7		3					3
8		3					3
14			1				1
16			1				1
18			2				2
23				2			2
24				4			4
26				6			6
27				1			1
28				6			6
29				7			7
30				5			5
31				4			4
	9	21	4	35			69

	On Board the Delft.	At Hilsea.	March to Colchester.	At Colchester	On the March to N. Cross.	At Norman Cross.	Total.
Brought over	9	21	4	35			69
April 1				5			5
2				4			4
3				4			4
4				6			6
5				3			3
6				5			5
7				2			2
8				2			2
9				4			4
10				3			3
11				2			2
13					1		1
14					2		2
15					4		4
16					1		1
20					4		4
21						2	2
22						2	2
23						2	2
24						6	6
	9	21	4	75	12	12	133

Figure 3. Tabulated record of cases of Ophthalmia. Source: Edmondston. *Treatise*, 1806 (Note 13). p.22.

[14] Edmondston, *Account*, 1802 (Note 12), p.7; Edmondston. *Treatise,* 1806 (Note 13). p.22.

Edmondston's proposed cause of the ophthalmia

Edmondston marshalled his arguments to support his view on the contagious nature of the ophthalmia:

> Reflecting on these circumstances, I was led to suppose, that the present opthalmia [sic] might be occasioned by contagion imported from Egypt, and several collateral facts have confirmed me in this opinion.[15]

His main point was that the Fencibles, had not suffered any problems on the outward journey, nor while in Gibraltar and were healthy on embarkation for Britain in 1802.

He then enumerates the 'usual suspects' as causes of ophthalmia and dismisses them, on the basis that they were present on the outward journey, or during the time in Gibraltar. These suspects included dampness, overcrowding, tobacco or gunpowder smoke, which were all present on the outward journey as well as on the return voyage, and therefore could be excluded as causative factors. The regiment had spent two years in Gibraltar, with a lot of strong sunshine, which had had no ill effect on their eyes and there was no evidence of ophthalmia during that time.

However, Edmondston had identified a possible culprit. The ship which carried the Fencibles back to Britain from Gibraltar, the *Delft*, was the likely source of the outbreak. The *Delft,* a troopship which had arrived in Gibraltar from Egypt was regarded as an 'unhealthy ship'. It had been transporting a Guards regiment who had been or were currently suffering from fever and ophthalmia. In view of this history of disease, possibly related more to the former than the latter, the ship was fumigated on several occasions. In addition, although the bed linen used by the Guards was replaced with fresh issue, the hammocks on which the troops slept were not replaced. Possibly of most significance, a lieutenant on the ship from Egypt had lost one eye from ophthalmia and still had active disease in the other eye.[16]

Following this description of the spread of cases, Edmondston discussed possible causation in more detail. In his *Account,* the language though is somewhat cautious. Having dismissed the 'usual suspects' as causes for the outbreak and demonstrated a possible link between the disease in Egypt and subsequent cases developing in Britain where it had previously been unknown, he tentatively suggests contagion as a causative factor.

> Almost every disease must have been originally produced by external causes; but when once it exists, there seems no impropriety in supposing it to possess the power of propagating itself. And although it be granted that opthalmia [sic] is endemic in Egypt, yet it may be contagious with respect to the inhabitants of other countries; and perhaps one reason why opthalmia [sic] has not appeared directly contagious in Britain, is that its exciting causes are not sufficiently general and permanent to produce a range of disease adequate to the effect.[17]

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[15] Edmondston, *Account*, 1802 (Note 12). p.24.
[16] Edmondston, *Account*, 1802 (Note 12). p.24 & 25.
[17] Edmondston. *Account,* 1802 (Note 12). p.25.

Further clinical details and thoughts on 'contagion'

In his *Treatise*, Edmondston gives further epidemiological details about the continuing spread of the outbreak after returning to the United Kingdom.[18] Having summarised the journey to Norman Cross, he went on:

> New cases occurred daily, but the inflammation was in general less violent in its commencement … it still however seemed to extend itself. The forty-ninth Regiment of Foot lay at Norman Cross a part time that the Argyleshire was there; and some soldiers of the latter, labouring under Ophthalmia inlisted [sic] into it; and I had opportunity of seeing several individuals of the forty-ninth regiment affected in a similar manner, before it left Norman Cross.[19]

Four months after publication of the *Account* Edmondston returned to Gibraltar where he had the opportunity of studying the Ophthalmia cases, as the disease was still present, although of varying intensity, both in numbers and severity of symptoms. Other battalions who had never been to Egypt also developed the condition after mixing in Gibraltar with those who had been in Egypt.[20]

It also spread to the local inhabitants, and there was, according to local medical practitioners, a marked increase in the incidence of eye infections in the civilian population compared to the incidence before the Egyptian Campaign.[21] There is also a hint here of his offering an explanation for a less virulent form of the disease, with relatively confined spread to the general population within the United Kingdom as local factors there, such as climate and disease incidence, are obviously different to those found in Egypt.

Edmondston also makes specific reference to fomite spread as an explanation for the outbreak he described, suggesting that the unwashed hammocks used by the Guards and then the Fencibles had carried the disease. Later in his *Treatise* he also mentions the crowded conditions:

> Contagion, like every other material substance, is susceptible of partial accumulation and diminution, and in general produces its effects according to the degree of concentration in which it exists. Every circumstance which prevents its free diffusion in the atmosphere, such as the crowded state of ships and jails, favour its accumulation and aids its operation.[22]

Despite his conviction that the disease was contagious, he was aware that such a view would not be easily accepted:

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[18] Edmondston. *Treatise*, 1806 (Note 13). p.23.
[19] Edmondston. *Treatise*, 1806 (Note 13). p.23.
[20] Edmondston. *Treatise*, 1806 (Note 13). p.38.
[21] Edmondston. *Treatise*, 1806 (Note 13). p.38.
[22] Edmondston. *Treatise*, 1806 (Note 13). p.28.

> In scarcely no instance has it [Ophthalmia] been supposed of propagating itself, when once produced; and few anomalous instances of this kind which have been noticed have been referred to the influence of imagination or imitation.[23]

He cites several classical writers in support of his view:

> Plutarch, in his *Symposium,* expresses himself to the following effect:- As we observe in other diseases, so in sore eyes, by which a great many are affected at the same time: so irresistible is the force of mutually affecting one another.[24]

He also quotes Aristotle who observed in his *Problems* that some diseases, including sore eyes, were contagious:

> … those who approach individuals labouring under consumption, sore eyes, and cuticular eruptions, are themselves afflicted in a similar manner … In the case of sore eyes, … when one person gazes on the eye of another labouring under ophthalmia, the former is also seized with it. Such a case, however, becomes a source of contagion, since it corrupts the air, and renders it pestilential.[25]

The word 'contagion' when used by ancient writers does not however always have the meaning it had in the nineteenth century, even less today. Edmondston cautions:

> In this paragraph the words themselves express a firm belief in the contagious nature of Ophthalmia. But the ancients frequently employ the word contagion as synonymous with sympathy or imagination; and from a comparison with contemporary authors, I find the latter to be the more general acceptation. In the medical discussions of modern times contagion has a much more restricted meaning.[26]

Later on, Edmondston bemoans the fact that the word 'contagion' has been frequently 'looked upon as an expression of ignorance'. Yet he asserts that although

> … chemistry has never yet been able to unfold to us its constituent principles, or render it expressly an object of our senses, its agency on the human frame is sufficiently well ascertained to admit of its being a principle in the production of disease.[27]

Then he gives his definition of what he means by the term:

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[23] Edmondston. *Treatise*, 1806 (Note 13). p.22.
[24] Edmondston. *Treatise*, 1806 (Note 13). p.4.
[25] Edmondston. *Treatise*, 1806 (Note 13). p.3.
[26] Edmondston. *Treatise*, 1806 (Note 13). p.6.
[27] Edmondston. *Treatise*, 1806 (Note 13). p.44.

> Diseases contracted in this way are said to be contagious; and contagion may therefore be defined, the emission from the body to body of a peculiar matter, generated within the system itself, which has the property of producing the same disease in a healthy body, if brought within the sphere of its action, as exists in one from which this matter is evolved.[28]

With hindsight, and the benefit of awareness of both the existence of bacteria and the germ theory, the tabulated results in Figure 3 readily demonstrate the contagious nature of the condition. It is to Edmondston's credit that he realised this, despite the prevalent orthodoxy, espoused not only by senior medical officers, but by the medical profession in general. However, McGrigor did change his view and was generous enough to give Edmondston credit. After his remark about ophthalmia's contagious nature 'so singular an opinion I would hesitate to offer' he mused:

> However, the remarkable prevalence of the disease in particular regiments ... while the same general causes prevailed everywhere, will not be easily accounted for, without admitting something of the kind.

He also adds an asterisk which leads to an addendum at the bottom of the page:

> *Since my arrival in England I see that the contagious nature of the Egyptian ophthalmia has been noticed by two gentlemen of the English army, Mr Edmonstone [sic] and Mr Powers.[29]

A modern view

From a contemporary standpoint the likely explanation of the symptoms described in Egyptian Ophthalmia would be trachoma, a highly contagious ocular surface disease causing a granular conjunctivitis, with secondary corneal damage. This can then lead to severe visual loss and, along with gonococcal infection occurring separately or super-imposed, would explain the acute corneal damage with globe perforation that occurred in some patients.

Trachoma is caused by the micro-organism *Chlamydia trachomatis* and is known to be highly contagious, being spread by both contact of eye or nasal discharges of infected persons, and also via fomites. It is a chronic condition, leading to scarring of the conjunctiva, which subsequently leads to in-turning of the eyelashes, which leads to corneal damage and conjunctival scarring. Today trachoma is the leading infectious cause of blindness in the world and is treatable with appropriate resources.

It should be noted that gonococcal conjunctivitis is not necessarily a sexually transmitted disease in Egypt, presumably because the warmth and humidity allow the organisms to survive outside the body.[30] Gonococcal conjunctivitis could cause

[28] Edmondston. *Treatise*, 1806 (Note 13). p.44.
[29] McGrigor. *Medical Sketches*, 1804 (Note 1). p.148
[30] Meyerhof M. A Short History of Ophthalmia during the Egyptian Campaigns of 1798-1807. *British Journal of Ophthalmology*. 1932; 16(3): 129-152.

symptoms either as a primary infection, or super-added infection to eyes already affected by trachoma. Conjunctivitis caused by the Koch-Weeks bacillus, *Hemophilus aegyptius,* which was originally isolated in Egypt, albeit eight decades later, may also explain some of the outbreaks of milder cases.[31]

Given that Dr Edmondston would have no knowledge of modern microbiology, his observations and deliberations on the probability of contagion caused by microorganisms, come close to our modern understanding of pathology, and are thus truly remarkable.

[31] Pittman M, Davis DJ. Identification of the Koch-Weeks bacillus (Hemophilus aegyptius). *Journal of Bacteriology*. 1950: 59(3): 413-426.

Biographical details

Graham Kyle is a retired eye surgeon. He has developed an interest in history since retirement, obtaining the Diploma in History of Medicine of the Society of Apothecaries, and a Master of Letters in Scottish Heritage from the University of Aberdeen.

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