

## Medical History

# James Cardinal: The Celebrated Hydrocephalic

Alun Evans

Accepted: 10th December 2020

Provenance: Internally peer reviewed

### Introduction

The Belfast Natural History and Philosophical Society has a proud and illustrious past. It played a central role in the intellectual and scientific development of Victorian Belfast, and beyond, with its close links to The Royal Belfast Academical Institution, or 'Inst', and subsequently Queen's College. It was founded on 5<sup>th</sup> June 1821 so it will celebrate its Bicentenary this year. It started life as The Belfast Natural History Society but added the 'and Philosophical' to its title in 1842 to reflect its broadening remit.<sup>1</sup> Its object was "... for the cultivation of that science in its various forms, and more particularly for the investigation of the natural history of Ireland."<sup>1</sup>

The Belfast Natural History and Philosophical Society's Centenary Volume is dedicated "To the enthusiasm of the eight youthful founders: Francis Archer, James L Drummond, James Grimshaw, George C Hyndman, James MacAdam, William M'Clure, Robert Patterson and Robert Simms."<sup>2</sup> They shared certain characteristics, especially youth (seven of them were in their early 20s, or younger, and Drummond, their leader, was aged less than 40). Drummond had been appointed to the Chair of Anatomy and Physiology at Inst in 1818.<sup>3</sup>

### The Belfast Phrenological Society

The Society's first meetings were convened at Drummond's house at 5 Chichester Street and he was elected its first President.<sup>1</sup> It was written of Drummond that: "His life was not marked by any startling incident, nor was the world enriched by any scientific discovery as the result of his individual exertions; but it may be safely asserted that by his assiduous and unremitting zeal the intellectual life of Belfast was considerably advanced during the first half of the nineteenth century."<sup>3</sup>

In January 1823, Robert Patterson read a paper to the Society entitled, 'Spurzheim's and Gall's System of Phrenology.'<sup>4</sup> Patterson, who was largely self-educated,<sup>5</sup> was probably exposed to Phrenology by Francis Archer, who in the early 1820s was studying Surgery in Edinburgh.<sup>6</sup> On 14<sup>th</sup> February 1827, Francis Archer wrote<sup>7</sup> to Robert James Tennent, a member of the prominent Belfast family,<sup>8</sup> concerning the purchase of busts for the fledgling Society. By then, Archer had qualified and was in Practice in Liverpool.<sup>6</sup> On Tennent's instructions he had been to Galletti's in Castle Street in that city, specifically to purchase phrenological busts made by O'Neil, of Edinburgh. Galletti's was one of five agencies which O'Neil had appointed to sell his busts.<sup>9</sup> Archer

reported that, "... only Nos 20 (Napolian [sic]) and 23 New Phrenological Bust is available," but that Galletti has "the complete set of Phrenological busts, five in number." The letter finishes with this charming 'PS':<sup>7</sup>

Bless your stars that you are not a Doctor. I have been obliged to go out three times since I sat down to write to you.

What this demonstrates is that the Belfast Phrenological Society was actively seeking to purchase O'Neil's series of busts. Plaster casts were a *sine qua non* for Phrenologists and represented the visible hardware of the movement. They consisted of casts of skulls, masks (of faces), and heads (or busts). These 'busts' were very often a head mounted on a square or round base (*socle*) rather than of the classical 'head and shoulders variety.'<sup>10</sup> In Phrenology the terms were used interchangeably. The range of casts in any collection represented the depth of the resource, and Phrenologists would practise on them and memorise the shapes. Hewett Watson advised the student to, "...keep a marked bust frequently before his eyes, so as to become quite familiar with the relevant position...of each organ."<sup>10</sup> Specimens which were highest in demand were those from 'the Great and the Bad' or 'the Famous and the Infamous': thus, those from celebrities, particularly with illustrious intellectual pedigrees or great moral worth (there is a Phrenological bust of James Wilson, the Belfast man who was blind from infancy, and who wrote the famous *Biography of the Blind*,<sup>11</sup> which is in the Anatomical Museum of Edinburgh University);<sup>12</sup> and from criminals, guilty of the most heinous crimes.

By the beginning of 1829, the Belfast Phrenological Society had acquired a wealth of material – as the Belfast Natural History Council minutes reveal. In 1829 the books and casts belonging to the newly fledged Phrenological Society were taken into charge by the Natural History Society. The entry in the Council Minute book for 14<sup>th</sup> January 1829 lists<sup>13</sup> as belonging to the Phrenological Society: around 15 books, 39 casts of skulls, 34 cast masks, 30 cast busts, and two pairs of steel compasses. In return the Natural History Society would have use of the material and the rent would be waived until the Phrenological Society's meetings were resumed.<sup>13</sup> The Centenary Volume states that there did not seem to be any

---

Alun Evans, Professor Emeritus  
Centre for Public Health, The Queen's University of Belfast  
Institute of Clinical Science B,  
Grosvenor Road, Belfast BT12 6BJ

**Correspondence to** Alun Evans, Professor Emeritus  
**Email:** a.evans@qub.ac.uk



UMJ is an open access publication of the Ulster Medical Society (<http://www.ums.ac.uk>).

The Ulster Medical Society grants to all users on the basis of a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Licence the right to alter or build upon the work non-commercially, as long as the author is credited and the new creation is licensed under identical terms.

record of further meetings.<sup>1</sup> What had actually happened was that the Phrenological Society had merged with the Natural History Society and was fully embraced by it.

Some weeks after receiving an honorary membership from the Royal Irish Academy, Johann Gaspar Spurzheim gave three ‘lengthy lectures’ in the Common Hall at Inst between 1<sup>st</sup> and 4<sup>th</sup> June 1830. By all accounts he was something of a showman, and his lectures were well-illustrated. *The Northern Whig*, however, was not impressed by his arguments, but in response to Spurzheim’s requirement that “...we should not be afraid of truth, and that we should submit to facts” neatly conceded: “The former we readily promise, the latter we are not at liberty to refuse.”<sup>14</sup> *The Belfast News-Letter* had a presence at the third lecture and concluded:<sup>15</sup>

Phrenology as taught by Dr Spurzheim is far from deserving the senseless ridicule that ignorance has cast upon it, whatever may be its merits or demerits as a system; and of those we do not yet profess to be qualified judges.

In 1836, the botanist Hewett Cottrell Watson published<sup>16</sup> his *Statistics of Phrenology*. This was a survey of the state of the art in the British Isles. Watson was a protégé of George Combe, a lawyer, who was the main advocate for Phrenology in these islands.<sup>17</sup> Watson was less than impressed with the response rates to his questionnaire. The first phrenological society in the British Isles was formed in Edinburgh by Combe, his brothers and a few others, in 1820. London followed its example in 1824, and the Belfast Phrenological Society was the sixth to be formed. By 1836 there were 30 phrenological societies in the British Isles.<sup>16</sup>

There is a comprehensive entry for the Belfast Phrenological Society, furnished<sup>18</sup> by the Pharmaceutical Chemist, John Grattan.<sup>19</sup> It gave the date of the Phrenological Society’s establishment as 15<sup>th</sup> January 1827. Its original membership was 44, of whom just seven were medical. From the number of doctors recorded in the membership lists of the day, almost all must have been members of both the Natural History and the Phrenological Societies. This proportion reflected the prevailing ratio of one medical to six non-medical members.

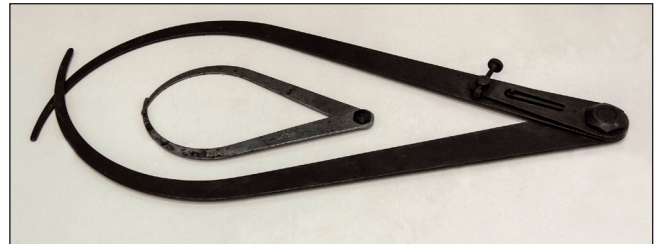
The British Phrenological Association, established in 1838, was short lived for in 1842, two London Members, John Elliotson and William Engledue, espoused an uncompromisingly materialistic view of Phrenology. This created a schism in the ranks from which, “...the institutional aspirations of phrenologists never recovered.”<sup>20</sup> By 1850, ‘Scientific’ Phrenology in the United Kingdom was in terminal decline. In Belfast there seems to have been little further interest in Phrenology among the intelligentsia after the mid-1840s.

### The Phrenological Collection

In his excellent account of the ‘Anatomy Museum of The Queen’s University of Belfast,’ David Heylings states that in 1925 the Vice-Chancellor of Queen’s reported a benefaction:<sup>21</sup>

...the University has to thank the Belfast Natural History Society for the permanent loan to the Medical Museums of a series of about 100 casts of anthropometric interest.

It is not clear how much was lost in a fire in 1938 when the Museum was housed in the old building in the quadrangle at



**Figure 1:**

The ‘two pairs of steel compasses’ (calipers), courtesy of the Centre for Biomedical Sciences/ Education, QUB

Queen’s, as, sadly, the catalogue was lost in the fire. Despite Heylings’ admirable efforts to upgrade the Museum, after his departure, constraints on space in the Medical Biology Centre, thanks to an ever-increasing intake of students, led to the remnants of the ‘100 casts of anthropometric interest’ being jettisoned in the early 1990s.<sup>22</sup> The only survivors appear to have been the ‘two pairs of steel compasses’ (see Figure 1).



**Figure 2:** The Bust of James Cardinal by Luke O’Neil & Son of Edinburgh

There was, however, one ‘Sleeper’ in the shape of a bust of James Cardinal, the celebrated hydrocephalic. In 1968 the Museum was moved to the Medical Biology Centre on the Lisburn Road.<sup>105</sup> During the move the old building was ‘ragged’ by students and Cardinal’s bust was borne off as a trophy. It had been ‘liberated’ by Art students who painted it bright purple and placed it on top of their television as a sort of totem. It was later restored, so all signs

of its brush with psychedelia were expunged. It has since resurfaced (see Figure 2) and I can vouch for the bust as coming from the old Museum because I remember it as a particularly striking exhibit during my student days. It occupied part of a glass-fronted display cabinet to the left of the entrance to the main Anatomy lecture theatre, which I attended all too infrequently.

### The Bust of James Cardinal

The bust is life-size, standing 14” high, with a head circumference of 35.5”, and was made from life (see Figure 10). In the region of the inion is a plaque impressed with the

legend: 'JAMES CARDINAL, BORN AT COGGESHALL, ESSEX, 27 YEARS OLD.' Across the forehead is a faint printed label which reads 'D 45 Cast of the head of an adult man, the subject of hydrocephalus' which almost certainly was his Queen's University of Belfast Anatomy Museum label. A considerable amount is known about James Cardinal thanks to copious clinical notes kept by the great English physician, Richard Bright, who described Non-suppurative Nephritis.<sup>23</sup>

The original notes (1827-32) and anatomical drawings and water-colours by Bright, with many drawings by Frederick Richard Say and CL Canton (1822-39), are held in the Library of The Royal College of London. Researchers may inspect them on appointment.<sup>24</sup> The earlier ones were published in 1831.<sup>25</sup> Two papers based on these documents have been published in recent years.<sup>23,26</sup> Cardinal was born on 2<sup>nd</sup> March 1795 when his head was noted to be, "... a little larger than natural, and had a pulpy feel." His head expanded rapidly until the age of five years. He began to walk unaided by the age of six years but was never very steady and used to fall. He learned to read and write not long afterwards, but reading gave him a headache because he was forced to hold his head low because of near-sightedness.<sup>26</sup>



**Figure 3:** James Cardinal in 1814, aged 19 years, source Ref<sup>31</sup>

Until his fourteenth year a candle held behind his head caused his cranium to become semi-transparent, and Bright described Cardinal's head as "... translucent with the sun shining behind him."<sup>26</sup> This has been cited as the first example of trans-illumination in clinical practice.<sup>27</sup> He was seen by Spurzheim, who in 1815 published a drawing of him when aged 19 years with an abundant head of hair

(see Figure 3),<sup>28</sup> which implies that the drawing was made in 1814. Spurzheim did not divulge Cardinal's identity in this publication but did so subsequently.<sup>29</sup> Cardinal began to suffer regular epileptic fits at the age of 23 and his health declined. In 1823 he survived an abscess over his ear which discharged for some time but resolved.

James Macartney, the great Anatomist at Trinity College Dublin, visited Cardinal in London in the summer of 1822. He recorded<sup>30</sup> in his diary that Cardinal was then aged 27 years and that "...the cast of whose head is in every museum." This may once have been true, but I have been unable to track down another example in the anatomy museums of the British Isles, apart from three in the Anatomical Museum of Edinburgh University, which plans to mount an online exhibition of Phrenology in 2021.<sup>12</sup> Macartney had also noted Cardinal's liveliness and intelligence.<sup>30</sup> This was something which Spurzheim had recorded in 1814 when Cardinal:<sup>31</sup>

...manifested all the moral sentiments and intellectual faculties: he also read and wrote tolerably well.

At the age of 29, on 1<sup>st</sup> December 1824, Cardinal was admitted to Guy's Hospital under the care of Sir Astley Cooper, the famous Surgeon and Anatomist.<sup>26</sup> There was intense competition amongst Anatomists for the most interesting bodies to dissect and Cooper must have been drooling at the prospect of dissecting Cardinal. Indeed, Anatomists went to huge lengths to beat the opposition. In 1783, John Hunter had to stoop to the outrageous subterfuge of covertly plying Irishmen with drink to acquire the body of James Byrne, the Irish Giant, who was born near the border of Counties Tyrone and Derry in 1761. His skeleton is on exhibition in the Hunterian Museum at the Royal College of Surgeons, London.<sup>32</sup> There are currently calls for Byrne's skeleton to be repatriated.<sup>33</sup>

Cardinal had lately been in St Thomas' Hospital for several months. He "remained pretty" well for a while but then developed a fever and died on 24<sup>th</sup> February 1825.<sup>26</sup> Long before the advent of shunts, the outcome of progressive hydrocephalus was invariably death. John Holter's development of the first ventricular shunt in 1956, but not in time to save his son Casey, remains one of the most inspiring stories in modern Medicine.<sup>34</sup>

Spurzheim visited a few days after Surgeons Morgan and Keys, with Cooper not in sight, performed Cardinal's post mortem.<sup>29</sup> It showed that he was 5' 7" tall, and his cranium was enormously enlarged, at 33" in circumference (unchanged since 1814<sup>28</sup>), and completely ossified. "Nine pints of water" were found between the skull and the *dura mater*.

Spurzheim was permitted to carry out some further examination of Cardinal's head. In an account written in French a year later he stated:<sup>35</sup>

I do not think that any case more remarkable than James Cardinal's has ever been the subject of observation. He had hydrocephalus to an enormous amount, and manifested the affective and intellectual faculties.



**Figure 4:** The Skull of James Cardinal, (Exhibit S28), courtesy of The Gordon Museum of Pathology, Guy's Hospital, London

He goes on to record that the brain was compressed against the base of the skull, and "between the membranes" there were five to six pints of fluid, while the ventricles also contained about a pint. Today Cardinal's skull is on display in the Gordon Medical Museum at Guy's Hospital (see Figure 4).<sup>36</sup>

There were two great, plaster cast makers working in Great Britain in the first half of the 19<sup>th</sup> century: James De Ville in





London, and Luke O’Neil in Edinburgh.<sup>10</sup> De Ville, a statuary and lamp maker of The Strand published his first marked bust in 1821. He had been befriended by Spurzheim. From 1818 he began to make masks and then casts of heads. He was to become known as the ‘arch-apostle’ of Phrenology who amassed a collection of over 5,000 casts.<sup>10</sup>

It was undoubtedly De Ville who made the original of the bust of James Cardinal. Christies sold a bust of Cardinal in 2001 which was attributed to De Ville. It had been ‘published’ in 1828 but bore an ‘A’ suffix which De Ville was known to use in 1824.<sup>37</sup> The original cast was most probably made in 1822 because it bears the same inscription as the one described above. It is not surprising that De Ville would have known about Cardinal because he had become something of a celebrity. De Ville sought specimens avidly and once attempted to purchase the skull of another Cardinal, in this case Wolsey, for 200 Guineas.<sup>38</sup>

Luke O’Neil, despite his name, was of Italian extraction and is credited with publishing (producing) the first phrenological bust in 1821 for the newly formed Edinburgh Phrenological Society.<sup>10</sup> In the Transactions of the Edinburgh Phrenological Society, the *de facto* first edition of The Phrenological Journal in 1824, O’Neil and Son published a catalogue of the casts they offered for sale.<sup>39</sup> In the preface to this it is stated that the President, Sir George MacKenzie, had made his collection of casts available to O’Neil & Son “...for the purpose of enabling them to supply collections.” Plagiarism seems to have been rife in those days so a strong suspicion<sup>40</sup> that the plaster casters copied one another’s work seems to be confirmed by the statement above.

Intriguingly, No 6 in Luke O’Neil & Son’s 1824 catalogue<sup>39</sup> is ‘James Cardinal; an Illustration of Hydrocephalus.’ It seems highly plausible that this bust was pirated from De Ville via Sir George MacKenzie’s collection. It is identical to the De Ville bust except for a round *socle*, whereas De Villes’s had a squarish one.

The clinching evidence that the bust of Cardinal under discussion is by O’Neil is that it bears a ‘6’ on the *socle*, directly below the chin. Phrenologists were not only interested in the skulls of the ‘Great and the Bad’, but also in those affected by major pathological conditions, such as hydrocephalus.

## CONCLUSION

As we have seen, Phrenology was often more avidly adopted by clergymen and lawyers, seeking to morally improve, or even to resolve criminality, than the medical profession. Even so, some of Belfast’s leading physicians were keen devotees, most notably: James Drummond and James McDonnell. When Phrenology fell out of fashion, it was conveniently dropped and ignored as a movement which had strongly influenced Belfast Medicine. Later, The Natural History and Philosophical Society and Belfast Medicine may have wished to draw a veil over its dalliance with what the proto-socialist William Godwin, husband of the proto-feminist

Mary Wollstonecroft,<sup>41</sup> dismissed as a ‘shapeless science.’<sup>42</sup>

Never-the-less, Phrenology contributed to science in some momentous ways: it correctly identified the Brain as the seat of the Mind; and, did much, no matter how serendipitously, to unshackle Science from religious superstition, and prepare it for Evolutionary Theory. Moreover, it left a legacy of human measurement and a focus on individual differences.<sup>43</sup> If nothing else, it enriched<sup>44</sup> our language with words such as ‘highbrow’ and ‘lowbrow.’ Despite all this, a popular quip of the period was that, ‘Fools and Phrenologists are terms... nearly synonymous.’<sup>45</sup> Yet, during the second quarter of the 19<sup>th</sup> century, the cream of Belfast Medicine was seduced by Phrenology, but in so doing, it was in excellent company.

## ACKNOWLEDGEMENTS

Thanks are due to: Tim Boon, The Science Museum, London; Allan Barkess, Granton Art Centre, National Galleries Scotland, Edinburgh; William Edwards, Gordon Museum of Pathology, Guy’s Hospital, London; Gordon Findlater, Anatomical Museum, University of Edinburgh; David Heylings, University of East Anglia, Norwich; Malcolm MacCallum, Anatomical Museum, University of Edinburgh; Peter Malone, Independent Scholar, England; Ernest Murray, Centre for Biomedical Sciences/Education, Queen’s University Belfast; and last, but not least, Beth Evans, for proof-reading services.

## REFERENCES

1. Deane A. The foundation and early history of the Society. In: The Belfast Natural History and Philosophical Society Centenary Volume, 1821–1921. Belfast: Erskine Mayne; 1924. p. 1-22.
2. Deane A. Dedication. In: The Belfast Natural History and Philosophical Society Centenary Volume, 1821–1921. Belfast: Erskine Mayne; 1924. p. iii.
3. Millin SS. James Lawson Drummond, MD. In: The Belfast Natural History and Philosophical Society Centenary Volume, 1821–1921. Belfast: Erskine Mayne; 1924. p. 72-3.
4. Patterson R. List of papers with author’s name. In: The Belfast Natural History and Philosophical Society Centenary Volume, 1821–1921. Belfast: Erskine Mayne; 1924. p. 146-7.
5. Patterson DC. Robert Patterson, FRS, MRJA. In: The Belfast Natural History and Philosophical Society Centenary Volume, 1821–1921. Belfast: Erskine Mayne; 1924. p. 94-5.
6. Clarke RS. A directory of Ulster doctors (who qualified before 1901). Vol 1. Belfast: Ulster Historical Foundation; 2013. p. 32-3.
7. Archer F. Letter to Tennent RJ, 14<sup>th</sup> February 1827. Located at: Belfast: Public Record Office of Northern Ireland. Ref. [D1748/G/21/8].
8. Wright JJ. The ‘natural leaders’ and their world: politics, culture and society in Belfast, c. 1801-1832. Liverpool: Liverpool University Press; c 2017.
9. Anon. Notices. *Phrenological J Miscellany*. Aug 1824 - Oct 1825; Vol II:iv.
10. Kaufman MH, Basden N. Marked phrenological heads. *J Hist Collections*. 1997; 9:139-59.
11. Wilson J. Biography of the blind or the lives of such as have distinguished themselves as poets, philosophers, artists, etc. 4<sup>th</sup> ed. Birmingham: J. W. Showell; 1838.



12. MacCallum M. Personal Communication, July 2020. The Anatomical Museum. Edinburgh: University of Edinburgh; 2020.
13. Belfast Natural History Society Minute Book (1821-1830). Located at: Belfast: Public Record Office of Northern Ireland. Ref. D/3263/AB/1.
14. Doctor Gaspar Spurzheim. *The Northern Whig*. 1830 Jun 1<sup>st</sup>.
15. Doctor Gaspar Spurzheim. *The Belfast News-letter*. 1830 Jun 4<sup>th</sup>.
16. Watson HC. General summaries. Statistics of phrenology. London: Longman, Rees, Orme, Brown, Green, and Longman; 1836. p. 218-34.
17. van Whye J. Phrenology and the origins of Victorian Scientific Naturalism. London: Ashgate Publishing; 2004. p. 52-6.
18. Grattan J. In: Watson HC, Statistics of phrenology: being a sketch of the progress and present state of that science in the British islands. London: Longman, Rees, Orme, Brown, Green, and Longman; 1836. p. 115-7.
19. Deane A. The foundation and early history of the Society. In: The Belfast Natural History and Philosophical Society Centenary Volume, 1821–1921. Belfast: Erskine Mayne; 1924. p. 79.
20. van Whye J. Phrenology and the origins of Victorian Scientific Naturalism. London: Ashgate Publishing; 2004. p. 202.
21. Heylings DJA. The Anatomy Museum at the Queen's University of Belfast. *Ulster Med J*. 1990; 59(2):194-9.
22. Murray E. Personal communication. Located at: Belfast: Centre for Biomedical Science Education, Queen's University Belfast; May 2014.
23. Goodrich JT. Richard Bright (1789-1858) and his contributions to the understanding of hydrocephalus. *Childs Nerv Syst*. 2010; 26(5):593-4.
24. Forde P. Personal Communication from the archive manager. Located at: London: Royal College of Physicians; 2012.
25. Bright R. Reports on medical cases, selected with a view of illustrating the symptoms and cure of diseases by a reference to morbid anatomy (Vol II). Richard Taylor, London 1831; viii:431-4.
26. Hydrocephalus – the remarkable case of James Cardinal: from Reports of Medical Cases, Volume II, 1831, by Richard Bright. *Surg Neurol*. 1987; 27:4-8.
27. Buck JR, Weintraub WH, Coran AG, Wyman MI, Kuhns LR. Fiberoptic transillumination: a new tool for the pediatric surgeon. *J Pediatr Surg*. 1977; 12(3):451-63.
28. Spurzheim JG. The physiognomic system of Drs. Gall and Spurzheim: founded on an anatomical and physiological examination of the nervous system in general and the brain in particular; and indicating the dispositions and manifestations of the mind. 2<sup>nd</sup> ed. London: Baldwin, Craddock, and Joy; 1815. plate V. fig 2. P. 591.
29. Spurzheim JG. Letter from Dr Spurzheim to the Editor of The Phrenological Journal (London, 15<sup>th</sup> April 1825). *Phrenological J Miscellany*. Aug 1824-Oct 1825; Vol II:408-10.
30. Macalister A. James Macartney: a memoir. London: Hodder and Stoughton; 1900. p. 141.
31. Spurzheim JG. The physiognomic system of Drs. Gall and Spurzheim: founded on an anatomical and physiological examination of the nervous system in general and the brain in particular. 2<sup>nd</sup> ed. London: Baldwin, Craddock, and Joy; 1815. p. 156.
32. Moore M. The giant's bones. In: The knife man: the extraordinary life and times of John Hunter, father of modern surgery. London: Bantam Press; 2005. p. 295-317.
33. Murphy DP. Hilary Mantel calls for skeleton of Irish 'giant' to be repatriated. *The Guardian*. 2020 Oct 15<sup>th</sup>.
34. Baru JS, Bloom DA, Muraszko K, Koop CE. John Holter's shunt. *J Am Col Surg*. 2001; 192(1):79-85.
35. Spurzheim G. The anatomy of the brain with a general view of the nervous system (translated from the unpublished French ms. by R Willis MRCS). London: S. Highley; 1836. p. 86-7.
36. Edwards B. Personal communication from Curator of The Gordon Museum. London: King's College; 2012.
37. National Portrait Gallery. British bronze sculpture founders and plaster figure makers, 1800-1980 – D: James De Ville: De Ville as a phrenologist. London: National Portrait Gallery. Available from: <https://www.npg.org.uk/research/programmes/british-bronze-founders-and-plaster-figure-makers-1800-1980-1/british-bronze-founders-and-plaster-figure-makers-1800-1980-d.php>. [Last accessed April 2021].
38. Brown C. A very disputable science – phrenology in Leicester. *Leicestershire Historian*. 2000; 36:21-4.
39. O'Neil L. Catalogue. Transactions of the Phrenological Society. Edinburgh: John Anderson; 1824. p. xvii-xxiv.
40. Boon T. Personal Communication from Head of Research and Public History. London: The Science Museum; 2012.
41. Wollstonecraft M. A vindication of the rights of women with strictures on political and moral subjects. Dublin: printed by J Stockdale, for James Moore; 1793.
42. Godwin W. On the systems of Lavater and Gall. London: The London Medical Gazette. April-Sept 1931; VIII:232-7.
43. van Whye J. Phrenology and the origins of Victorian Scientific Naturalism. London: Ashgate Publishing; 2004. p. 207
44. Dickson P. Authorisms: words wrought by writers. New York: Bloomsbury; 2014. p. 88.
45. Anti-phrenologia; a plain statement of objections against the system of Drs Gall and Spurzheim. *Blackwood's Edinburgh Magazine*. 1823; XIII(LXXII):100-108.

