

## **Philosophical Apparatus of John Goodsir**

**As Presented to the University of Edinburgh and Anatomical Museum And Compiled  
by Michael T. Tracy**

His brother, Joseph Goodsir stated that “in an almost instinctive tendency to employ his admirable hands in observing what struck him, or in constructing various mechanical and other objects according to their true principles, as he learned them, or latterly in experimenting or anatomizing.”<sup>1</sup> My kinsman, the esteemed Professor of Anatomy of the University of Edinburgh had an avid interest in philosophical apparatus throughout most of his entire life. His brothers because of his bent for making things and experimenting with chemistry, gave John the nickname “Mathematical-Chemical Jock.”<sup>2</sup> As Lonsdale, himself also wrote, “If Goodsir’s fondness for mechanics was a leading feature in his youth, and aided him in the practice of surgery, his general knowledge of physics served him a good purpose in elucidating the operations and functions of the structures which enter into the formation of joints.”<sup>3</sup> An example of Goodsir’s keen interest was revealed by Sir Alexander Russell Simpson in his farewell speech before the graduating class on 28 July 1905 when he stated, “He sometimes had me with him in a curiously constructed two-wheel carriage of his own design, something like a hansom, hung low on the axle, and turned the other way so that you entered from behind and sat looking backward.”<sup>4</sup> Goodsir also “prevailed on the Town Council to set aside a small room in the College premises provided with a circular table around which thirty students could sit. The table was equipped with trolleys bearing a microscope” and the trolleys passed the microscope around the circular table enabling each student to observe the preparation on it.<sup>5</sup> In his writings, Goodsir alluded to this in his Winter Course 1859-60 writing, “Microscopic structure is examined and demonstrated in a classroom fitted up for this purpose, and provided with simple and compound microscopes, and other necessary apparatus.”<sup>6</sup>

In August of 1857, Professor Goodsir travelled to Berlin and carried with him a specimen of *Malapterurus* for the benefit of his friend, Professor Emil du Bois-Reymond’s (1818-1896) experimental investigations, in which Goodsir also took part.<sup>7</sup> Two decades later, du Bois-Reymond wrote in the *Translations Of Foreign Biological Memoirs* that “In the summer of 1858, I received from Goodsir three.”<sup>8</sup> The specimens were kept in a trough constructed with a view of preserving a constant supply of fresh, well-aerated water of a suitable temperature,

and were fed at first on earthworms and later on strips of beef.<sup>9</sup> Goodsir used a gutta-percha case having linings of tin foil at the two extremities shown below.<sup>10</sup>

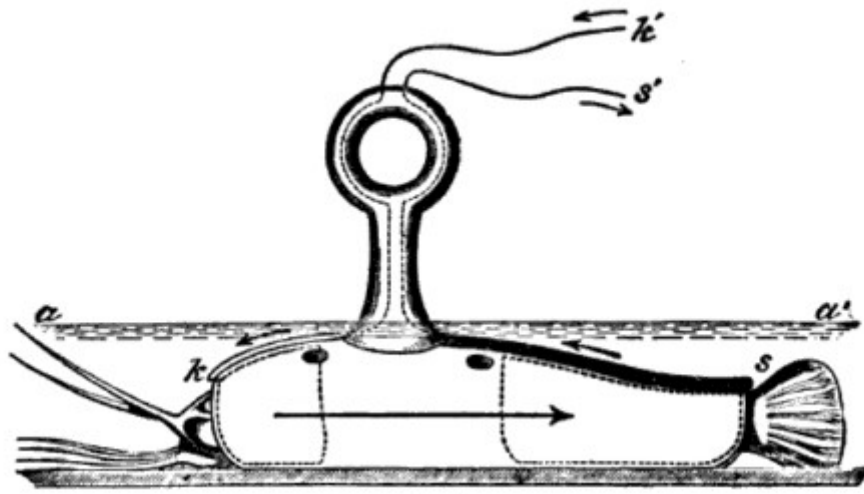


Fig.1. Gutta-percha Case Apparatus

Another ingenious and much-used apparatus that was also used by Goodsir was the “frog-alarum” and “frog interrupter” which alerted Goodsir when the fish gave a shock and by the “frog interrupter” only when one shock was allowed to pass through the galvanometer, no matter how many were given.<sup>11</sup>

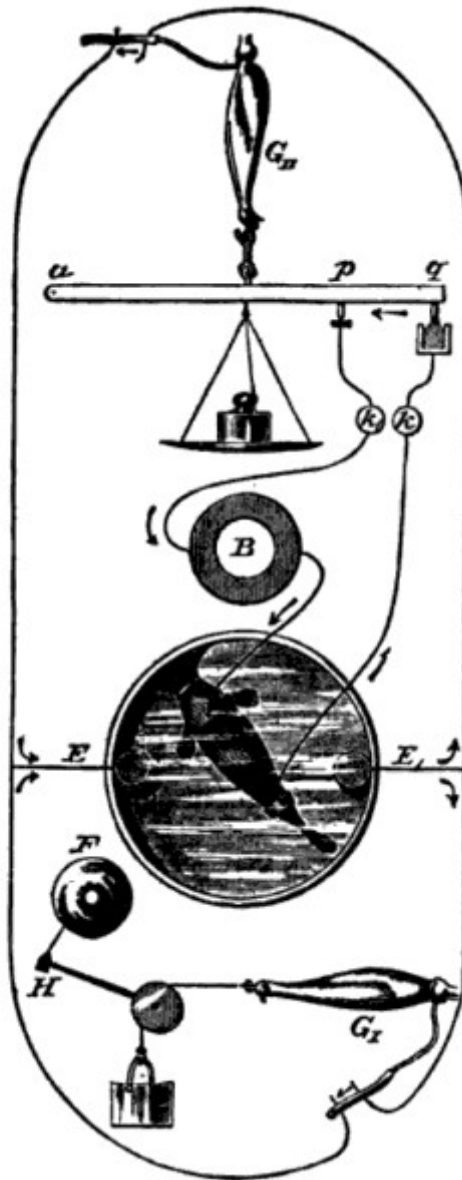


Fig.2. The “Frog-alarum” and “Frog interrupter” Apparatus

In August of 1859, John and his brother, Joseph toured Europe with stops in Paris, Berlin, Prague, and Vienna.<sup>12</sup> To continue with his anatomical and physiological research, Goodsir saw the desirability of attaining the latest instruments to work with as a necessity, and this trip would be very beneficial to him. His visit firstly to Paris was solely to obtain philosophic apparatus.<sup>13</sup> The trip enabled him to purchase a wide variety of these instruments, such as had been used by Du Bois Reymond, Karl von Vierordt,<sup>14</sup> Eduard Pfluger,<sup>15</sup> and Hermann von Helmholtz,<sup>16</sup> thus being as Henry Lonsdale wrote, “the first to introduce these very costly instruments to Scotland, and for his own private research and instruction.”<sup>17</sup> The distinguished Scottish physiologist, Professor John Gray McKendrick,<sup>18</sup> then a student of

John Hughes Bennett, recalled that Goodsir was in the habit of bringing home “new and strange physiological instruments from Germany-things called myographs, kymographs, non-polarizable electrodes, ophthalmometers, recording drums, etc.-hitherto unknown in Edinburgh or elsewhere in this country... These instruments soon made their appearance in the Anatomical rooms. Bennett expostulated with Goodsir, and Goodsir replied, ‘Well, Dr. Bennett, they are instruments *you* should have; take them over at the price I paid for them.’”<sup>19</sup> Shortly after his visit, William Mitchell Banks asked Goodsir how he had enjoyed himself, and Goodsir said he had enjoyed himself immensely: one day he had had sixteen hours with Kolliker over the microscope!”<sup>20</sup> While touring the Parisian hospitals in 1861, Goodsir’s Demonstrator, William Turner recalled seeing Goodsir working with a kymograph which was an instrument invented by Carl Ludwig<sup>21</sup> and was used for ascertaining the force and regularity of the pulse which greatly influenced the pace of cardiovascular research in future decades.<sup>22</sup>

Housed in the Royal College of Surgeons of Edinburgh’s collections is the Professor’s ophthalmoscope which either may have been acquired while on this trip or may have been given to him by Professor Joseph Ritter von Hasner<sup>23</sup> shortly after his return to Edinburgh.<sup>24</sup> Goodsir published three works on the subject<sup>25</sup> of the eye beginning in 1855 and most likely had an ophthalmoscope because of his great interest in all things scientific and cutting-edge.

Another fascinating instrument that was used by Professor Goodsir was a stereoscope.<sup>26</sup> The significance of this instrument is that John Goodsir was the first teacher to apply the stereoscope to the teaching art of medicine.<sup>27</sup> Chiene describes the instrument as being a small hand mirror in a box, made by “Alexander Macpherson, 10 Forrest Road, Edinburgh,” which will be shown at the Museum of the British Medical Association at the Sheffield meeting in July of 1908.<sup>28</sup> Additionally, Goodsir was known to have taken several stereoscopic photographs of anatomical subjects that were in the possession of Professor Chiene.<sup>29</sup>

The German physicist and physician Herman von Helmholtz (1821-1894) and his significant contributions to science cannot be overstated and his friendship with John Goodsir. His achievements in mechanics, sensory physiology, ophthalmic optics, nerve physiology, electromagnetism, and his experiments on acoustics and aesthetics are well-known and documented in his numerous works. Goodsir would have most likely seen these instruments firsthand on his trips and also by corresponding with von Helmholtz. None of these

correspondences between von Helmholtz and Goodsir survive. However, in the Physiological Institute at Heidelberg, some of the apparatus of von Helmholtz survived to 1953 that Goodsir presumably purchased through his friend, von Helmholtz. The letter was written by Professor Doctor H. Schaefer to the Rector of the University of Heidelberg and is dated 17 January 1953. The translation of this letter reads as follows viz.

“Magnificence,

The Physiological Institute has a number of highly interesting hats and which are ideally suited for the exhibition, as well as other equipment from Helmholtz’s time. (One) The cardboard model of a scissor telescope was made by the Helmholtzs with their own hands. (Two) The world's first scissor telescope was constructed on the bases of a cardboard model. (Three) Helmholtz’s pendulum for generating short bursts of electricity is relatively extensive. (Four) Helmholtz’s ophthalmometer for measuring the refracting media of the eye. The instrument was apparently built at Helmholtz’s behest, although not by his hand. (Five) A kymograph by Helmholtz, possibly made in his workshop. (Six) A tuning fork with resonance box, bearing the calibration signed by Helmholtz.”<sup>30</sup>

17.1.1953

An den  
Herrn Rektor der Universität  
Heidelberg  
=====

Magnifizenz,

das Physiologische Institut besitzt eine Reihe hochinteressanter Apparate, die Helmholtz hergestellt hat und die sich m.E. zur Ausstellung bestens eignen, ferner auch sonstige Gerätschaften aus Helmholtz's Zeit.  
Es sind:

- 1.) Das von Helmholtz mit eigener Hand angefertigte Pappmodell eines Scherenfernrohres.
- 2.) Das aufgrund des Pappmodell konstruierte erste Scherenfernrohr der Welt.
- 3.) Das Helmholtz'sche Pendel zur Erzeugung kurzer Stromstöße, relativ umfangreich.
- 4.) Das Ophthalmometer von Helmholtz zur Ausmessung der brechenden Medien des Auges. Das Instrument ist offenbar auf Veranlassung von Helmholtz gebaut, wenngleich nicht von seiner Hand.
- 5.) Ein Kymographion von Helmholtz, möglicherweise in seiner Werkstatt hergestellt.
- 6.) Eine Stimmgabel mit Resonanzkasten, welche die Eichung mit Unterschrift von Helmholtz trägt.

Die genannten Geräte werden wir gerne der Ausstellung zur Verfügung stellen.

Mit ergebener Begrüßung verbleibe ich

Ihr

(Prof. Dr. H. Schaefer).

Fig.3. Letter of Professor Doctor H. Schaefer dated 17 January 1953, Photograph Courtesy of the University of Heidelberg Archives, Call Number 214/20

In Goodsir's extensive library of books that he possessed during his lifetime, there are over twenty-two books that bear testament to his avid interest in mechanics and natural philosophy. These include such titles as Pitcarin's *Apollo Mathematicus* (1695); Buxton on *A Regulated Temperature* (1810); Lardner's *Hand-Book of Natural Philosophy* (1851); Gregory's *Mechanics* in three volumes (1806); and Sinclair's *Hydro-staticks* (1671).<sup>31</sup> I cannot emphasise enough, the importance of Goodsir's avid interest in apparatus of any kind.

There is only one reference to my kinsman's extensive collection of philosophical apparatus which was published, unfortunately, months after he died that I would like recorded at this time. The *Medical Times And Gazette* for 26 October 1867, gives us a glimpse at what his collection consisted of which stated, "The Collection of Philosophical Apparatus is one of the most complete in the possession of a private individual, and consists of the finest Instruments made by the best modern makers. It contains Twelve microscopes, including a large Binocular and Monocular by Smith and Beck, Ophthalmometer by Helmholtz, Ophthalmoscopes by Liebrich and others, Haemodynamometer, Kymographion, Galvanometer, and Rheocord by Du Bois Reymond, Magnets, Electrical Machines, Sphygmographs, very fine Balancea, Weighing Machines and Chairs, double-motion Dissecting Microscope by Oberhauser, Induction Machine, and a variety of self-invented Mechanical Contrivances of the most delicate construction, highly attractive to the student of anatomy and philosophy..."<sup>32</sup> The Notice of Sale was again published in the *Medical Times And Gazette* on 9 November 1867, No. 906.

## Sale of the very valuable Library and

COLLECTION of PHILOSOPHICAL APPARATUS which belonged to the late JOHN GOODSIR, Esq., Professor of Anatomy in the University of Edinburgh.—Mr. DONELL will SELL by AUCTION, as above, within his rooms, No. 18, George-street, Edinburgh, on THURSDAY, FRIDAY, and SATURDAY, 28th, 29th, and 30th NOVEMBER, commencing at Twelve each day. The Library embraces the Standard Works on Anatomy, Physiology, Medicine, Natural History, and relative Sciences, and the best modern Works by English and foreign Authors, Scientific and Medical Periodicals, Society Publications, valuable Pamphlets, a large number of important Anatomical Plates, and some curious and rare old Medical Works, Tracts, &c. The Collection of Philosophical Apparatus is one of the most complete in the possession of a private individual, and consists of the finest Instruments made by the best modern makers. It contains Twelve Microscopes, including a large Binocular and Monocular by Smith and Beck, Ophthalmometer by Helmholtz, Ophthalmoscopes by Liebrich and others, Hæmadynamometer, Kymographion, Galvanometer and Rheocord by Du Bois Reymond, Magnets, Electrical Machines, Sphygmographs, very fine Balances, Weighing Machines and Chairs, double-motion Dissecting Microscope by Oberhausen, Induction Machine, and a variety of self-invented Mechanical Contrivances of the most delicate construction, highly attractive to the student of anatomy and philosophy. Detailed catalogues are in preparation, and will be forwarded on application.

Edinburgh, 18, George-street, 18th October, 1867.

Fig.4. Notice of Sale of Goodsir's Philosophical Apparatus, extracted from the *Medical Times And Gazette*, No. 904, 26 October 1867



- <sup>1</sup> Turner, William (ed.) and Lonsdale, Henry (contrib.). *The Anatomical Memoirs Of John Goodsir F.R.S. Late Professor Of Anatomy In The University Of Edinburgh, Volume I* (Edinburgh: Adam and Charles Black, 1868): 15.
- <sup>2</sup> Taylor, Hugh, W.Y. "John Goodsir," *The Scottish Society of the History of Medicine Report of Proceedings Session 1955-56*, 13.
- <sup>3</sup> Turner, William (ed.) and Lonsdale, Henry (contrib.). *The Anatomical Memoirs Of John Goodsir F.R.S. Late Professor Of Anatomy In The University Of Edinburgh, Volume I* (Edinburgh: Adam and Charles Black, 1868): 151.
- <sup>4</sup> *The Scotsman Newspaper*, 7 April 1916, 4.
- <sup>5</sup> Jacyna, L.S. "A Host of Experienced Microscopists:" The Establishment of Histology in Nineteenth-Century Edinburgh." *Bulletin of the History of Medicine*, vol 75 no. 2, 2001, 225-253. *Project MUSE*, doi: 10.1353/bhm.2001.0072.
- <sup>6</sup> John Goodsir Notes on Anatomy, Winter Course 1859-60, Goodsir Papers, Gen 290, Box 1, Folder 3, Centre for Research Collections, Edinburgh University Library.
- <sup>7</sup> Turner, William (ed.) and Lonsdale, Henry (contrib.). *The Anatomical Memoirs Of John Goodsir F.R.S. Late Professor Anatomy In The University Of Edinburgh, Volume I* (Edinburgh: Adam and Charles Black, 1868): 169.
- <sup>8</sup> Burdon-Sanderson, J. *Translations Of Foreign Biological Memoirs I. Memoirs On The Physiology Of Nerve, Of Muscle, And Of The Electrical Organ* (Oxford: Clarendon Press, 1887): 372.
- <sup>9</sup> Bigelow, Horatio R. *An International System of Electro-Therapeutics For Students, General Practitioners, And Specialists* (Philadelphia: F.A. Davis Company, 1901): 71.
- <sup>10</sup> Bigelow, Horatio R. *An International System of Electro-Therapeutics For Students, General Practitioners, And Specialists* (Philadelphia: F.A. Davis Company, 1901): 71.
- <sup>11</sup> Bigelow, Horatio R. *An International System of Electro-Therapeutics For Students, General Practitioners, And Specialists* (Philadelphia: F.A. Davis Company, 1901): 72.
- <sup>12</sup> Diary of the Reverend Joseph Taylor Goodsir, August 1859, Goodsir Papers, Gen 296, Edinburgh University Library, Centre for Research Collections.
- <sup>13</sup> Turner, William (ed.) and Lonsdale, Henry (contrib.). *The Anatomical Memoirs Of John Goodsir F.R.S. Late Professor Of Anatomy In The University Of Edinburgh, Volume I* (Edinburgh: Adam and Charles Black, 1868): 172.
- <sup>14</sup> Karl von Vierordt (1818-1884) was a German physiologist credited with the construction of an early hemotachometer, an apparatus for monitoring the velocity of blood flow. In 1854, he created a device called a sphygmograph which was a device used to estimate blood pressure.
- <sup>15</sup> Eduard Pfluger (1829-1910) was a German physiologist.
- <sup>16</sup> Hermann von Helmholtz (1821-1894) was a German physicist and physician.
- <sup>17</sup> Turner, William (ed.) and Lonsdale, Henry (contrib.). *The Anatomical Memoirs Of John Goodsir F.R.S. Late Professor Of Anatomy In The University Of Edinburgh, Volume I* (Edinburgh: Adam and Charles Black, 1868): 172-173.
- <sup>18</sup> John Gray McKendrick (1841-1926) was a Scottish distinguished physiologist.
- <sup>19</sup> McKendrick, John. "Dr. Douglas Argyll Robertson," *British Medical Journal*, 1, 2508 (January 1909): 252.
- <sup>20</sup> "Literary Notes," *British Medical Journal*, 2, 2138 (December 1901): 1817.
- <sup>21</sup> Carl Friedrich Wilhelm Ludwig (1816-1895) was a German physician, physiologist and inventor of the kymograph in 1847.
- <sup>22</sup> Turner, William. "Jottings From The Parisian Hospitals – No. II," *Edinburgh Medical Journal*, 7, 10 (1 April 1862): 978-979.
- <sup>23</sup> Joseph Ritter von Hasner (1819-1892) a Czech ophthalmologist and Professor at the University of Prague.
- <sup>24</sup> According to Reverend Joseph Taylor Goodsir's diaries, they visited Prague between 16 August to 18 August 1859. (Diary of the Reverend Joseph Taylor Goodsir, 16 August – 18 August 1859, Goodsir Papers, Gen 296, Centre for Research Collections, Edinburgh University Library). Hasner invented his own model of the ophthalmoscope in 1855 which is very similar to Professor Goodsir's

which is held in the collections of the Royal College of Surgeons of Edinburgh. (Schett, A.; Keeler, C.R. *The Ophthalmoscope* (Wayenborgh: Wayenborgh Publishing, 2018), 106-107.) A note on the case reads, “Hasner’s ophthalmoscope (John Goodsir’s) 1867.” This appears to be in the handwriting of Joseph Taylor Goodsir. The value of the ophthalmoscope is in examining the retina rather than the pupil of the eye.

<sup>25</sup> These three works were: “Lecture on the retina” (1855); “On the mode in which light acts on the Ultimate Nervous Structures of the Eye, and on the relations between Simple and Compound Eyes” (1857); and “Notice respecting recent Discoveries on the Adjustment of the Eye to Distinct Vision” (1857).

<sup>26</sup> A stereoscope is a device used for viewing a stereoscopic pair of separate images, depicting left-eye and right-eye views of the same scene, as a three-dimensional image.

<sup>27</sup> Chiene, John. “Colour Photography in the Teaching of Surgery at Liverpool,” *Transactions of the Medico-Chirurgical Society of Edinburgh*, 27 (January 1908): 198.

<sup>28</sup> Chiene, John. “Colour Photography in the Teaching of Surgery at Liverpool,” *Transactions of the Medico-Chirurgical Society of Edinburgh*, 27 (January 1908): 198. Goodsir’s stereoscope was not mentioned again and its location is unknown.

<sup>29</sup> *Scottish Medical and Surgical Journal, Volume XVI* (Edinburgh: The Scottish Medical and Surgical Journal, 1905), 569. It should be noted that these stereoscopic photographs cannot be found and are not listed in *The Edinburgh Stereoscopic Atlas of Anatomy* (1905) which was edited by David Waterston.

<sup>30</sup> Letter of Professor Doctor H. Schaefer to the Rector of the University of Heidelberg, dated 17 January 1953, Archives of the University of Heidelberg, Call Number 214/20.

<sup>31</sup> *Catalogue of the very extensive and valuable library of works on anatomy, physiology, medicine, natural history, and relative sciences which belonged to the late Professor Goodsir: comprising... to be sold by auction, by Mr. Dowell, within his book rooms, 18 George Street, Edinburgh, on Thursday and Friday, 28<sup>th</sup> and 29<sup>th</sup> November, 1867: commencing at twelve o’clock each day: on view on Tuesday and Wednesday, 26<sup>th</sup> and 27<sup>th</sup> November* (Edinburgh: Lorimer and Gillies, 1867). Entry numbers: 346, 385, 426, 486, 663.

<sup>32</sup> *The Medical Times And Gazette Volume II For 1867* (London: John Churchill And Sons, 1867). No. 904, 26 October 1867.

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