

A History of Scientific Instruments at Stonyhurst College, Lancashire, England

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Introduction

Jesuit expertise in education and science has long been respected across Europe and beyond since the founding of this Catholic religious order in the sixteenth century. Grounds for this respect derive, in part, from the high repute of Jesuit colleges and universities where science received unambiguous attention as dictated by the Jesuit *Ratio Studiorum*, or official plan of study, first approved in 1599.¹ In addition to this prescribed ambition to teach science, many Jesuit institutions embraced scientific instruments as essential tools in this pedagogical work, which fostered future Jesuit contributions in astronomy, physics, and other scientific fields.²

However, when it comes to science, histories about these institutions are not always satisfying, especially where it concerns scientific instruments. Thus it is my objective to look at a specific Jesuit institution, Stonyhurst College in Lancashire, England, as a small step toward rectifying this want. This college claims a long history going back to 1593 to an institution first started in St. Omer, then part of the Low Countries under Spain, that functioned as a place where English Catholics could take up higher studies free from the harsh religious persecution present in their home country.³ Run by the Jesuits, its fortunes reflected those of this order. Tempered by the reality that just a handful of instruments and associated documents survive these early times at Stonyhurst, what follows represents my best effort to do justice to the history of this institution per science and instruments since its move to England two centuries ago.

The Move to England

In August 1794, a dozen young pupils, four ecclesiastical students, and a trio of priests arrived at Stonyhurst, England, the tired and spare remnants of the college begun in St. Omer two centuries earlier. Compelled to leave St. Omer (now a part of France) owing to anti-Jesuit tension with the French government in 1762, the college reestablished itself in Habsburg-controlled Bruges. With the suppression of the Jesuits by the Pope in 1773, the college needed to relocate once more, this time to Liège where it flourished again until war erupted between France and Austria in the early 1790s. When an offer by a landed English Catholic family headed by a former student at Bruges came to let the Jesuits have a large hall and unused set of buildings at Stonyhurst (Fig.



Fig. 1 Front view of Stonyhurst today which would be recognizable to the 1794 Jesuits.

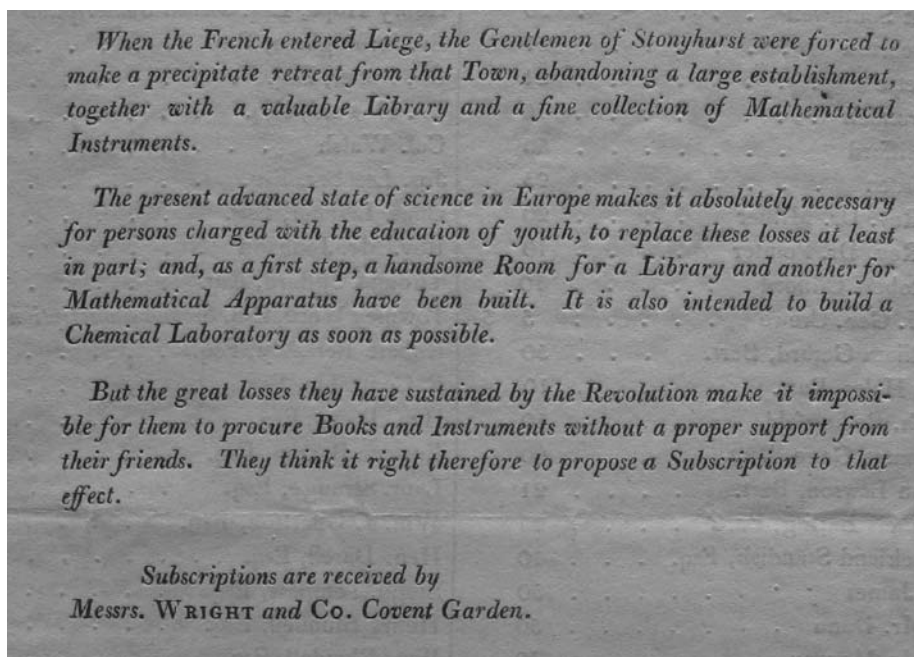


Fig. 2 Printed first page of Wright's subscription campaign document, ca. 1808. Notice the language used - 'the Gentlemen of Stonyhurst' - as the term 'Jesuit' would have been awkward given Papal suppression of this religious order at the time.

1), the decision to leave behind these continental troubles and move all over again with just their barest possessions was an easy one.

But before teaching could recommence at their new English accommodations, the Jesuits needed to solve a pair of pressing

problems. First, while their new home looked impressive, it required a considerable amount of work on repairs from decades of disuse and in arranging the many rooms into the proper layout for teaching, sleeping, and worship. With money in short supply, this work took years. Second, the Jesuit's hasty exodus from Liège resulted



Fig. 3a Convex burning glass bought by Wright from Cary of London in 1808, remounted, diameter: c. 26 cm. and b Detail of label.

in their abandonment of a large library and collection of scientific instruments, losses that deprived the Jesuits of critical tools for instruction. A circular from this period emphasized that Stonyhurst students would be taught 'all the branches of classical education', but made no references about science or instruments, maybe a tacit, and honest, admission of this problem?⁴ Nevertheless, in spite of these troubles, teaching did resume in 1794 as best it could from where it left off in Liège.

Scientific instruments rematerialized in 1804, at least on paper, when Professor of Philosophy Fr. Anthony Simpson presided over a *Theses Philosophicae* defense by two students which included the topic *De motu pendulorum* and mentioned the *barometro* under *De aere et atmosphaera*.⁵ By 1808, a small cabinet of instruments existed using the funds obtained by a subscription campaign headed by Stonyhurst's procurator, Fr. Charles Wright (Fig. 2), who mentioned the college's 'precipitate retreat' from Liège and the abandonment of 'a fine collection of Mathematical Instruments'. An extract dated 26 May 1808 lists several newly acquired instruments, including a barometer, small microscope, engine model, and chemical objects. A letter from Simpson in June 1808 inventories further planned purchases: an Atwood machine, whirling table, and a large air pump costing £25, £35, and £50 respectively. Later that summer, Wright himself purchased a pair of very expensive instruments while in London, 'of Cary a large Telescope & large Lens

or burning glass', costing £100. Of all these instruments, only the large burning glass remains (Fig. 3a and b), remounted at some point in a wooden table stand and labelled 'EX DONO CAROLI WRIGHT 1808'.⁶

In addition to the procurement of replacement scientific apparatus, Fr. Wright implemented plans to equip Stonyhurst with a chemical laboratory (Fig. 4). This new space, measuring 25 x 18 ft., was built next to an existing lecture room and library,

rooms that also held the college's growing apparatus and mineralogical collections. Beyond these investments in materials, the college ensured that its professor of chemistry, Fr. Charles Brooke, remained current in this field by granting him time in London for study. In a June 1809 letter from Simpson, he indicated that Brooke was following a 'regular course of chemistry in order to learn the practical part of that new science', and to listen to 'different public lectures

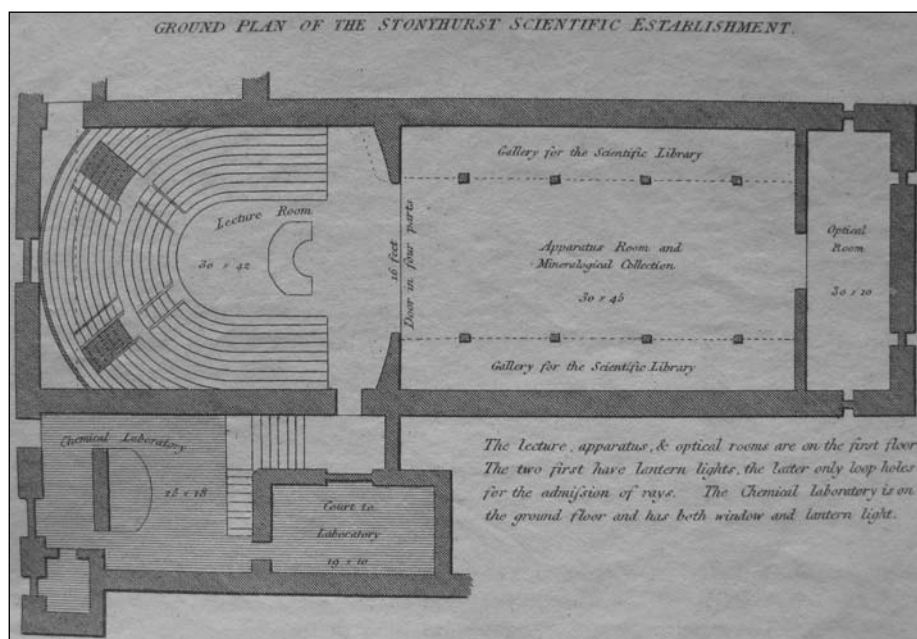


Fig. 4 From Fr. Wright's 1808 subscription campaign document, the layout of the proposed chemistry laboratory next to existing adjacent lecture and library rooms. Note comments about this new ground floor laboratory having 'both window and lantern light'.

that are delivered on various sciences at the Royal Institution and other places.' Student enthusiasm for chemistry appeared equally strong based on the comment in a January 1809 letter from Fr. Joseph Dunn, Pastor of the Catholic Church in nearby Preston, who wrote 'I am told that the young men are chemistry mad at Stonyhurst.'⁷ The fruits of these investments came into public view in 1812 when two Stonyhurst students performed a series of exercises under the direction of Fr. Brooke involving heat along with a 'Chemical Examination of Various Substances.'⁸ Nothing mad about this, merely determined teaching in science.

Other small, but noteworthy, adjustments illustrate how Stonyhurst worked to fit in at their new English location. One, Fr. Simpson anglicized his former French name of Sionest, a change that would have lessened apprehensions over Stonyhurst's previous history. Two, a June 1808 letter penned by Fr. Simpson indicated that 'with regard to natural philosophy...it has been decided to teach it in English', a swap of Latin for English that would have let Simpson and his colleagues avail themselves of more easily obtained English language science texts as replacements for the library left behind in France.⁹ Also, little doubt that this switch would have made the Stonyhurst curriculum, and science in particular, more appealing to students as well as parents.

Within two decades of their moving to England, the 'Gentlemen of Stonyhurst' had surmounted their immediate difficulties. They had created a new institutional home for themselves and their students and reequipped it with those instruments of science considered indispensable for the era. In addition to this evidence of an unsuppressed scientific spirit, a few advantages came from this move to Stonyhurst. First, the college bought new instruments from makers in London, Cary for example, which forged useful contacts among these knowledgeable individuals. Next, the choice of English for teaching natural philosophy probably gave the Stonyhurst professors of science an improved awareness of new, more English, ideas about science which then could be passed on to their students. Last, one Stonyhurst science professor, Fr. Brooke, attended chemistry lectures at the Royal Institution in London, and perhaps in other places, thus making him and Stonyhurst visible to a circle of potential new associates and supporters. All of these factors should be seen as signs of Stonyhurst wanting to cultivate connections, putting down permanent roots, of not being isolated from events outside of Lancashire. What's more, it fit very nicely with Fr. Simpson's

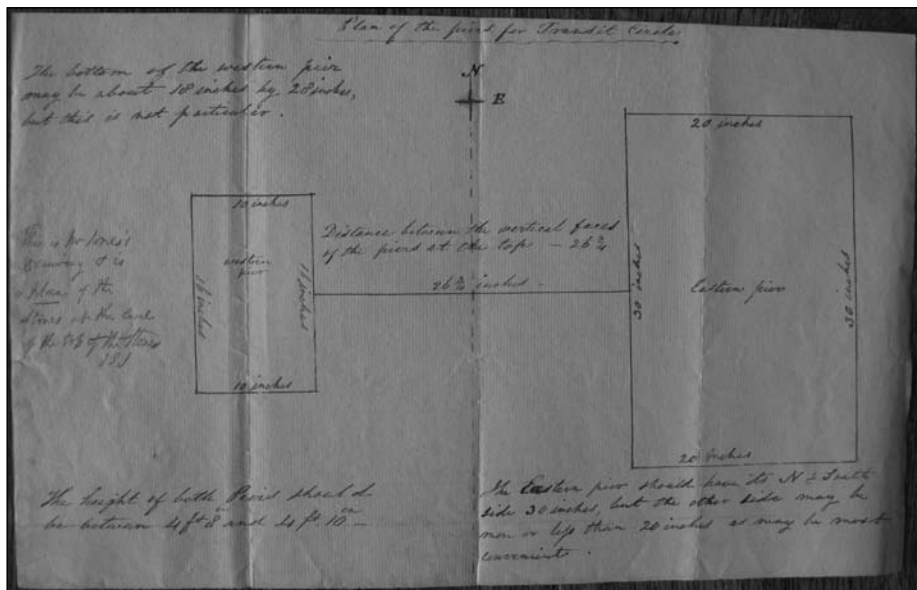


Fig. 5a 'Plan of the piers for Transit Circle' an undated drawing showing the dimensions of the stone piers for the transit circle by 'Mr. Jones' according to the note on the left edge with the initials JJS. b The building as it appears today.

comment in his June 1808 communication where he wrote: 'It is really time that the Catholics should have a place where the immense improvements made in science may be imparted to them.' Stonyhurst became this place.

A Nineteenth-Century Place of Science

Over the next few decades, Stonyhurst continued to augment its instrument collection in support of its science teaching objectives. Largely demonstration apparatus, they would lend themselves well to the task of acquainting students with the major principles of natural philosophy and other subjects. A description of the collection printed in 1824 in *The Yorkshire Gazette and Blackburn Mail* spoke highly

of the college's comprehensive cabinet of science:

'two large, handsome glass cases, one of which is stocked with instruments illustrative of the Mechanical, Hydrostatic, Hydraulic, and Pneumatic Principles; the other is fitted up with those appertaining to Astronomical and Optical Purposes. Besides these, there is a fine Newtonian telescope, a beautiful and highly polished transit instrument, a good astronomical circle, telescope, timepiece, electrical machines, an air pump, large and handsome globes, etc., etc.'¹⁰

Regrettably, none of these early instruments survive - only hints remain to reveal their existence, such as a brief entry in an account ledger pertaining to the purchase of an additional air pump for £23,15 in 1834 (sans details about its type or maker).¹¹ Ex-

penditures of this sort were supported, in part, through a five guinea fee on students in philosophy 'to defray the extraordinary expences necessarily attending lectures on experimental philosophy'.¹² Although the customary format of these lectures meant that students would have had limited contact with these instruments, this did not stop them from taking in the requisite scientific understanding.

In due course a compilation of examination questions developed that would be utilized in testing students on their acquired learning concerning dynamics, mechanics, hydrodynamics, astronomy, practical astronomy, and optics, but only a few dealt directly with instruments. For example, one question asked the student to defend the idea that 'the construction of thermometers' depends on the notion that 'all bodies... are expanded by heat or caloric, but not all in the same proportion'.¹³ In 1840, when Stonyhurst became affiliated with the London Matriculation Examination System and touted itself as 'connected with the University of London by Royal Warrant', students could travel beyond the walls of Stonyhurst to London to exhibit their knowledge of natural philosophy and other subjects and, on occasion, acquire a degree from that University as well.¹⁴ In this way, the Jesuits cultivated high expectations from their charges as they did for themselves.

In 1835, Stonyhurst initiated construction of an observatory for astronomical and meteorological work. Designed by J.J. Scoles, a noted architect of Catholic churches from London, the building comprised a central octagon with transepts attached at each cardinal compass point, a design that placed an equatorial telescope in the centre of the building under a revolving roof, a transit circle in the west transept, and a meridian circle in the east transept. Thomas Cole of London provided two of these instruments: the achromatic equatorial with a four inch aperture and 5 ft. 6 in. focal length and the meridian circle 30 inches in diameter with an attached scope of three inch aperture and 3 ft. 6 in. focal length. For the transit, Cole's involvement was limited to providing the plans for its mounting. On 19 September 1838, college records noted that 'Mr. Jones the astronomical instrument maker...arrived with the instruments for the observatory', but not until the mid-1840s were these instruments installed and put into use (Fig. 5a and b). However, this did not prevent Stonyhurst from advertising in 1839 its new 'Astronomical Observatory' over and above its 'extensive apparatus for Experimental Philosophy' and substantial 'Chemical Laboratory'.¹⁵

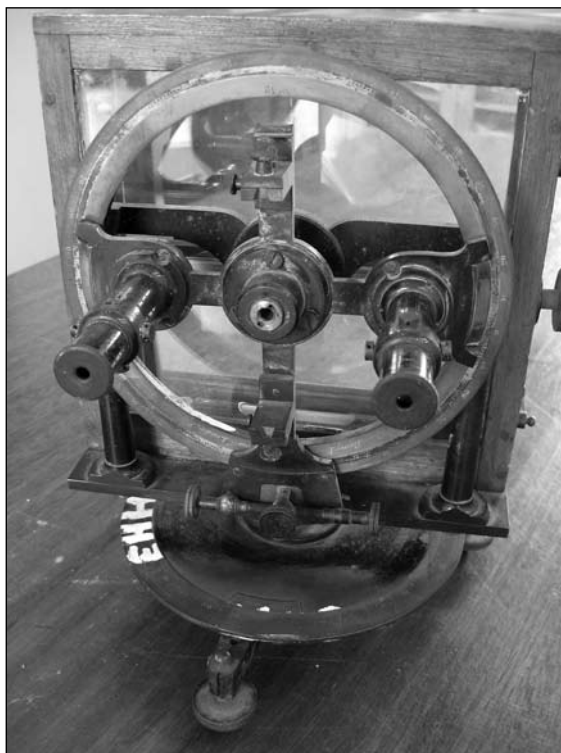


Fig. 6a Dip circle made by Henry Barrow & Co. 26 Oxendon St. London. Height 32 cm; wood frame 17.8 cm square; scale diameter 15 cm; needle length 9 cm. b Detail of serial no. '32'.

The new observatory remained scientifically inconspicuous for virtually a decade, its instruments little used despite Stonyhurst natural philosophy and mathematics Professor Rev. Henry McCann being listed in 1842 as the director. In contrast, significant scientific activity began to take place when former Stonyhurst student and London University graduate Fr. Alfred Weld took charge of the observatory in 1848. Weld began serious efforts not only in astronomy, but meteorology and magnetism as well, pursuits that would continue for decades and make the college well-known to the English public in addition to scientists around the world.¹⁶

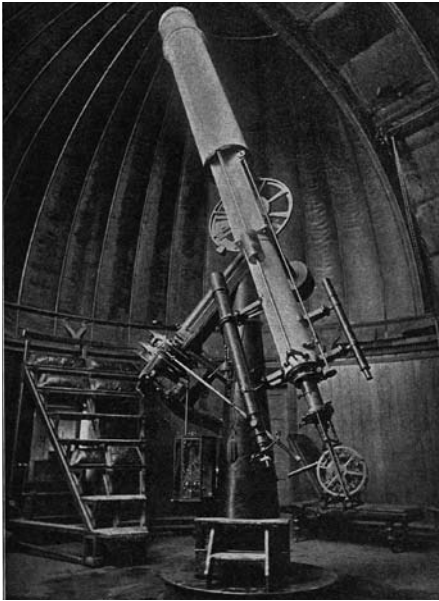
For example, Weld submitted a short note to the *Philosophical Magazine* in 1848 in

which, after he used 'our equatorial' to observe sunspots, a number of detailed measurements were provided. Subsequent work saw Weld putting the Stonyhurst astronomical instruments on a precise footing by establishing carefully the observatory's longitude (9° 52.68" west of Greenwich) and ensuring the repeated accuracy of the transit circle by meridian marks placed 'between four and five miles distant from the observatory'. Weld's efforts in astronomy were not without impact or notice for he is given credit for arousing in Angelo Secchi (then a recently ordained Italian Jesuit staying at Stonyhurst for six months in 1848 who later became the director of the observatory at the Roman College) an enduring interest in astronomy, then Weld's election, in January 1849, as a Fellow of the Royal Astronomical Society.¹⁷

In the late 1840s, Weld started to report meteorological observations to local newspapers using a set of unidentified instruments that, based on the kinds of data listed in the *Liverpool Mercury* in March 1849, consisted of a thermometer with high/low registers, a barometer, a hygrometer, and a rain gauge. Given the timing of this reporting, some of these instruments may have been those provided to Stonyhurst by the Royal Observatory at Greenwich, specifically 'a set of barometers and thermometers of the most approved construction and duly adjusted' which were being given out under an arrangement

devised by James Glaisher, chief assistant to the Astronomer Royal, to setup a system of weather observation stations across England. Stonyhurst proved itself a reliable source of weather data such that, in 1867, the Board of Trade selected the college as one of seven sites that would be provided with a complete set of self-recording weather instruments, including a Casella's Thermograph and Adie's Barograph, to help improve weather forecasting in Britain.¹⁸

Besides guiding the growth of Stonyhurst's astronomical and meteorological facilities, Weld also labored to establish a new magnetical observatory with the help of Francis Ronalds of the British Association. In 1849 Ronalds, honorary superintendent



these and the other new instruments in the Stonyhurst observatory, Weld, in a little over a decade, had positioned the college close to the vanguard of research in three vibrant scientific fields.¹⁹

In 1860, Weld stepped down as the observatory director, to be replaced by Rev. Stephen J. Perry, S.J., who not only maintained Weld's level of enthusiasm for science and instruments, but added to it at Stonyhurst and overseas. He improved the astronomical capability of the college when, in 1867, a used eight inch equatorial having an object glass by Troughton and Simms was procured. Due to worries that the mass of its iron pier would disturb existing magnetical instruments, a new circular observatory 24 feet in diameter with a revolving dome was built about 75 yards from the existing facility to house this large telescope. Along with

the new self-registering meteorological instruments provided by the Board of Trade and new self-recording magnetographs furnished via an 1866 grant from the Royal Society, the Stonyhurst observatory now stood very complete. For work abroad, Perry sometimes took college instruments with him, such as his magnetic survey of France in 1868-9. He participated on many astronomical expeditions, including Transit of Venus observations in 1874 and 1882 in Kerguelen and Madagascar respectively, and three solar eclipse trips during the 1880s. Regrettably, his eclipse journey in 1889 to the Îles du Salut (near present-day French Guiana) was his last as he died enroute home. In response, and out of great respect to Perry, funds were raised to upgrade the eight inch equatorial with a first-rate fifteen inch lens by Howard Grubb from Dublin. In November 1893, Grubb fitted the new objective lens on what is now called the Perry Telescope (Fig. 7a and b), an instrument still used for teaching today (but only after it took a few interesting turns, a story to be told in the next section).²⁰

While an 1880s Stonyhurst Prospectus proclaimed that the 'observatories are open to the use of students', little evidence exists to suggest the frequent presence of students in these facilities. In March 1857, one student, Sir Rowland Blennerhassett, tackled the question 'Description and use of the Transit Instrument' at a Stonyhurst monthly student questioning, or *menstruum*. But as he went on to a life in politics and not

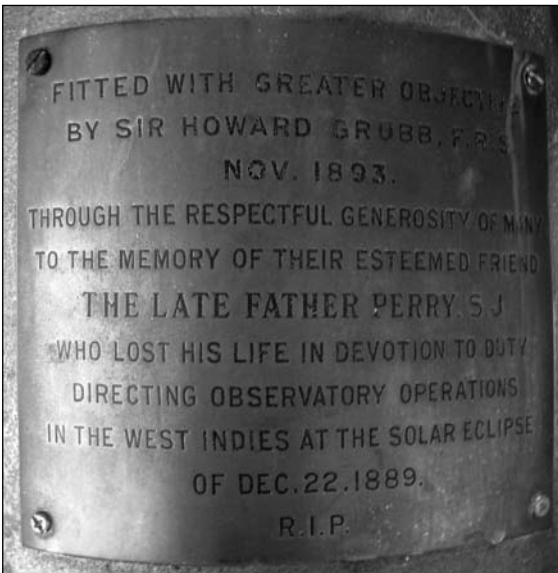


Fig. 7a Perry Telescope at the time of Stonyhurst's 1894 Centennial (from Gerald, p. 286).b Commemorative plaque honouring Perry.

of the Kew Observatory, reported that he had been in correspondence with Weld 'respecting the establishment of a self-registering electric and magnetic observatory at Stonyhurst', but was unable to proceed due to the lack of a 'suitable building at that locality'. By 1858, this difficulty had been eliminated when the Kew Committee report at the British Association meeting in Leeds indicated that apparatus for Stonyhurst was 'in course of preparation, and Mr. Weld has received instructions in the use of the magnetical instrument's. Based on an 1871 Royal Society report, these instruments arrived in 1858 and consisted of 'a Jones unifilar [magnetometer] and a dip-circle by Barrow (Fig. 6a and b), both tested at Kew', of which the latter instrument, serial number 32, survives. By means of

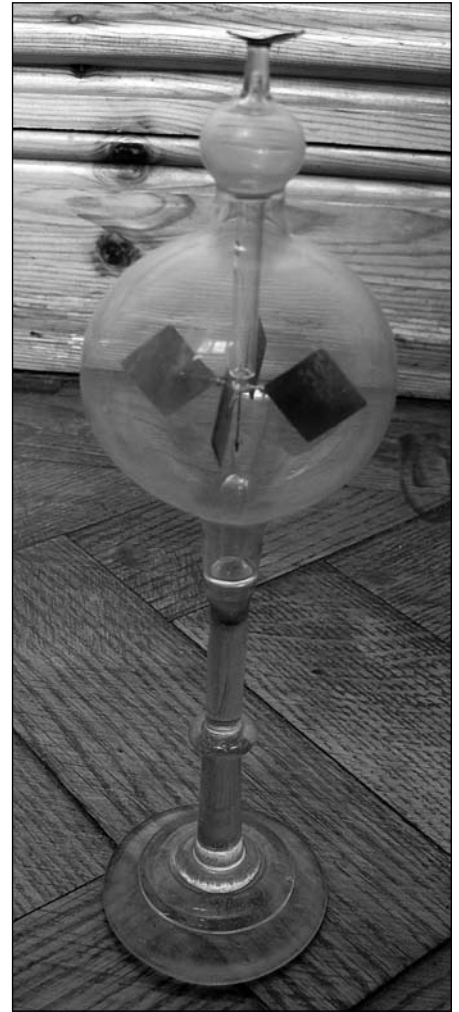


Fig. 8 Crookes Radiometer; height 22 cm.



Fig. 9 Late 19th-century Atwood Machine with signs of use, repairs and improvements, being admired by retired science instructor Patrick Gavin (L) and architect Jan Graffius (R).



Fig. 10 Spectroscope by 'John Browning 63 Strand London' sans central prism assembly.



Fig. 14 Earth Inductor by W.G. Pye & Co., Cambridge, England, c. 1910.

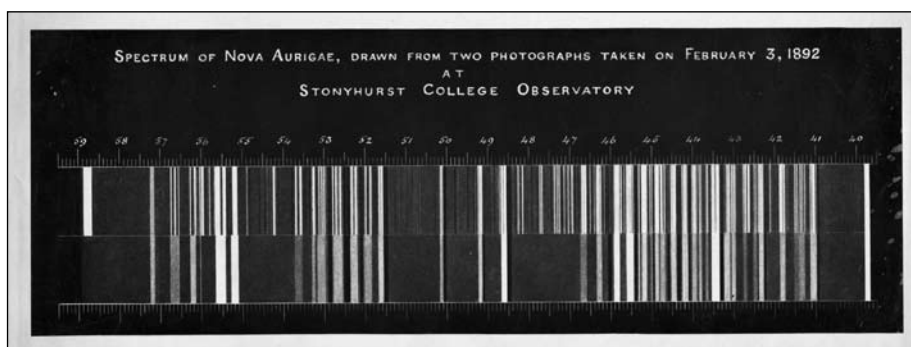


Fig. 11 Photograph of the stellar spectrum of Nova Aurigae made by Fr. Walter Sidgreaves. (Image courtesy of the Museum of the History of Science, Oxford; Inv. no. 11859).

science, whatever his time in the observatory appears to have been perfunctory with little durable impact. In 1894, when a student journalist for the *Stonyhurst Magazine* reported that he saw 'learned persons constantly crossing the playground on their way to and from their labours [in the observatory]' and wrote 'the observatory was to us a mysterious place', one gains the impression that the 'us' (or students) stood far removed from the endeavours now occurring in this place of science. Yet, with the sophisticated astronomical, magnetical, and meteorological apparatus then installed in the Stonyhurst observatory, it would be reasonable for most students to deem them mysterious and unapproachable.²¹

However, students did encounter instruments in the classroom, complemented by 'practical work in the laboratory', and, based on surviving instruments from this time, physics garnered generous attention. From questions raised by a spinning Crookes Radiometer (Fig. 8) to answers from an Atwood machine (Fig. 9), science per the demands of the Jesuit classical curriculum would have engaged students with a sincere vitality. When new fields of science developed, like spectroscopy, the college kept pace by acquiring suitable teaching

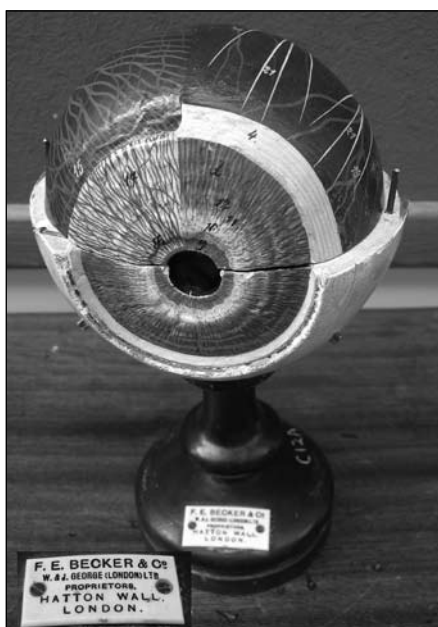
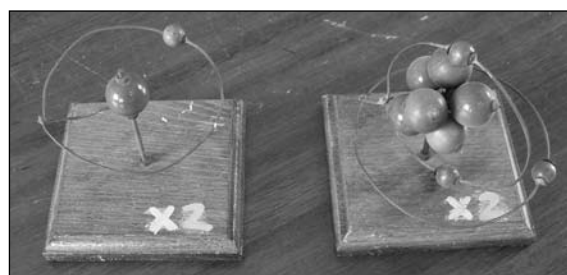


Fig. 12 Ceramic eye model (partially disassembled) by F.E. Becker and Co. of London. Height 24.2 cm, diameter 14 cm.

Fig. 13 Chemistry models, date and maker unknown, wood base c. 8 x 8 cm.



apparatus (Fig. 10) for its students. However, while science might have been fostered in the classroom, when it came to 'Academy Day' awards distributed to graduating students, science found itself demoted when the Stonyhurst Association rewarded 'debating' with a £5 first prize compared to a £2 first prize presented for 'natural philosophy'. Thus, when it came to science, while an expected area of study, students may have observed other priorities.²²

At the end of the nineteenth century, Stonyhurst could claim a well-earned reputation for science. Through the notable instruments installed in its observatory, the college had become well-known locally and abroad for its work in astronomy, meteorology, and magnetical studies. Their stature was cause enough for visits ranging from delegates from the 1883 British Association meeting in close by Southport to American astrophysicist George Ellery Hale who, in 1893, made 'a careful inspection of the work of the observatory', especially Father Walter Sidgreaves activity in stellar and solar spectroscopy (Fig. 11) with a Hilger spectrometer. In the classroom, instruments contributed to a more modest level of success where Stonyhurst students, exposed consistently to the workings of science via classroom and laboratory apparatus, found



ments, but now with a new and specific prominence on giving 'such training to those students who are to enter Oxford or Cambridge' or for being 'prepared for the Higher Certificates of the Oxford and Cambridge School Examination Board' respectively. As the ban that kept Catholics from attending these universities had been lifted in 1895, Stonhurst could nudge its curriculum away from the Jesuit *Ratio* and toward teaching its students material dictated by Oxbridge admission requirements and government educational standards. Teaching science remained crucial as did instru-

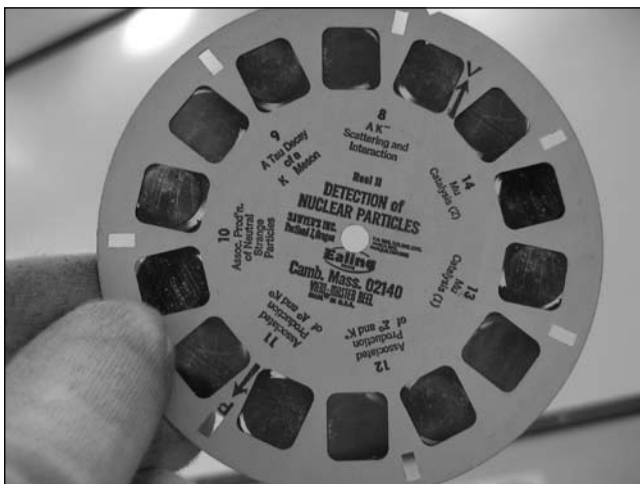


Fig. 15a Wilson Cloud Chamber by Griffin and George, Ltd. Diameter 12 cm.; b detail of signature. c View-Master disk with stereo views that illustrate 'Detection of Nuclear Particles' by Sawyer's Inc., Portland, Oregon, c. 1964.

themselves competitive with the graduates from other British colleges on exams for the University of London, Cambridge, and Oxford. But moving into the twentieth century, the demands of higher education and science began to change, causing Stonhurst to change as well, except for its ardor for scientific instruments.²³

Into the Twentieth Century

In 1900, Stonhurst can be seen promoting the teaching of science as part of its 'higher studies' and 'school course' depart-

ments, but classes became more foundational with greater emphasis on student experiments along with coverage of new topics.²⁴

For example, a new biology course (Fig. 12), one intended to prepare students for medical diplomas, took shape under the guidance of Edinburgh-trained physician Reginald Horsley. Horsley, one of the first lay instructors at Stonhurst, lectured and directed practical laboratory work where students performed dissections and like tasks. 'Furnished with half a dozen microscopes and all the usual apparatus', students had access to 'a very respectable laboratory' that also fulfilled the demands of the Conjoint Board of the Royal Colleges of Physicians and Surgeons regarding course credit. A few microscopes survive from this time, all made in London by C. Baker, R&J Beck, or Ross, in addition to a handful of anatomical models.²⁵

Stonhurst remained 'chemistry mad' into the twentieth century where records show the college provided ample teach-



Fig. 16 Cockcroft-Walton high voltage generator using modern semiconductor technology, made in nearby Blackburn, England, by UNILAB. Height, including sphere, 25.5 cm.

ing resources on this topic (Fig. 13). Physics flourished as well, a fact confirmed by the many surviving instruments from this period dealing with electricity, magnetism, mechanics, and optics. Consistent with the changing nature of instrument making, most of these instruments came from makers like W.G. Pye of Cambridge (Fig. 14) who prospered serving the needs of educational institutions wanting to stay current in teaching modern physics. As the century progressed, even advanced teaching tools like cloud chambers (Fig. 15a, b and c) and Cockcroft-Walton generators (Fig. 16) became available, a state of affairs underscoring that success in science teaching depended more on having suitable facilities and qualified instructors and less on the availability of teaching instruments. Quite the opposite of the situation that faced Stonhurst when the college moved to England in 1794.

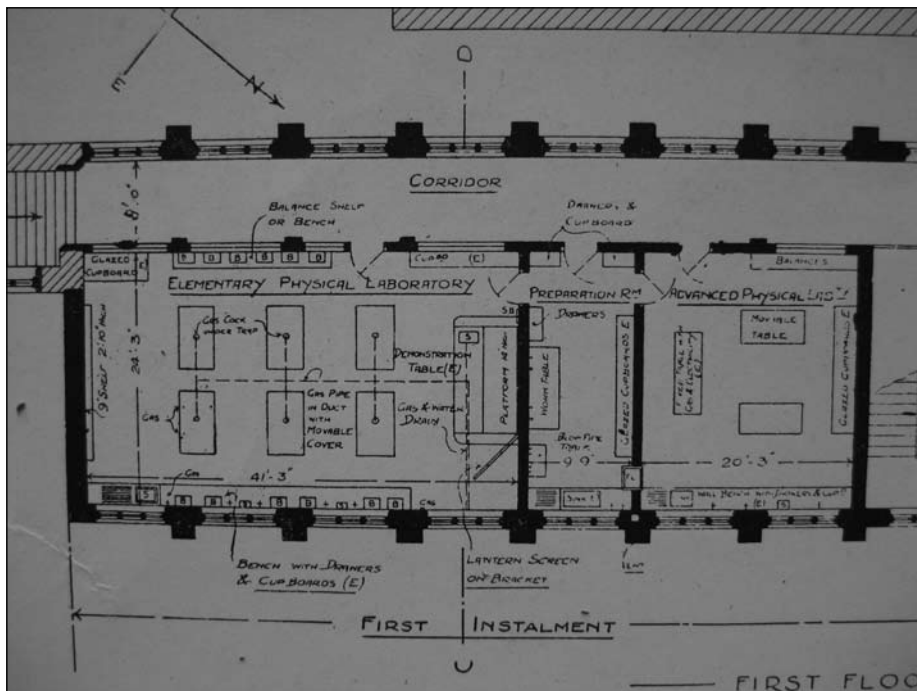


Fig. 17a Detail from plan dated 1921 by Liverpool architects Edmund Kirby & Sons showing the new college physics laboratories. b (left) Classroom projector with maker label: 'Stroud & Rendell's Science Lantern, Sole Makers Reynolds & Branson Ltd., Commercial St. Leeds.'

els of this science. The larger elementary laboratory provided a front demonstration table and lantern screen for the instructor while giving students their own benches with individual gas outlets (Fig. 17a and b). A smaller advanced laboratory offered several work tables with no instructors platform, suggesting a more collaborative relationship between student and teacher at this level of teaching. Electrical power was available at locations along the side walls in both rooms in addition to a central room utilized for preparation and storage. In the 1960s, Stonyhurst upgraded their science classrooms and for physics installed larger student benches having both electricity and gas connectors while no changes were made to the instructor's demonstration table (Fig. 18). What stands out here and in 1923 is Stonyhurst's enthusiasm for improving student facilities so that classroom experiments and the associated use of instruments remained pedagogically current and effective.²⁶

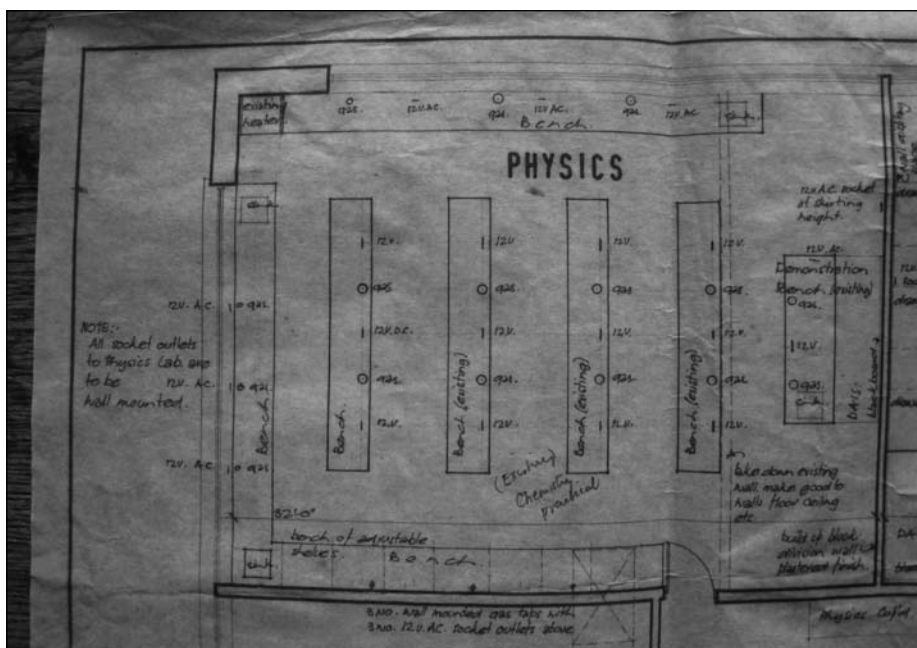
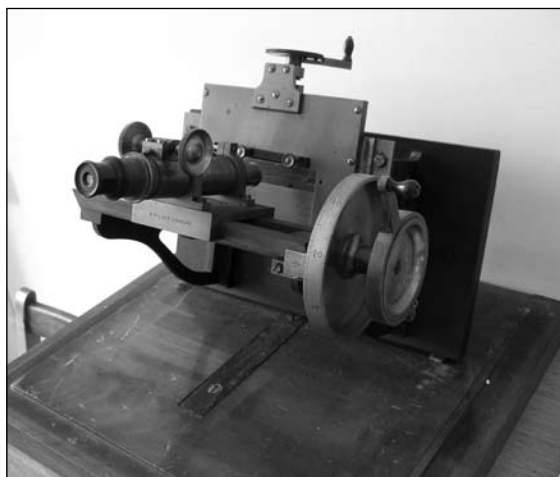


Fig. 18 Physics room in remodelled science building (plan dated November 1965).



Added evidence of Stonyhurst's attention to science emerges from the plans of classrooms built during this century. In 1923, new laboratories for elementary and advanced physics opened that afforded a gradation of facilities appropriate to the efficient teaching of students for all lev-

Fig. 19 Photomeasuring micrometer by Adam Hilger of London, c. 1920s, for determining the distance between spectrum lines to one micron via a vernier.

Apart from the classroom, the Stonyhurst observatory continued its astronomy, meteorology, and magnetics activities under the care of Fr. Sidgreaves. Although a Milne seismograph was added in 1909 that expanded the scientific scope of the facility, along with ancillary instruments such as a Hilger photomeasuring micrometer (Fig. 19), the observatory's configuration remained relatively static. In 1913, the Meteorological Office in South Kensington ceased to provide annual funding to the college in exchange for systematic meteorological reports, which created concerns in the college (and the Jesuit Province) about keeping up its reputation 'as a first-class meteorological station'. After some conversations, it was determined that Stonyhurst could keep the weather instruments first lent back in 1868,

thus preserving its reputation besides the uninterrupted record of weather data going back to Fr. Weld's time.²⁷

What proved more difficult for the observatory was staying relevant as research science outpaced the capabilities of its staff and instruments. A Jesuit always held the director's post in addition to some college teaching duties, but with fewer Jesuits available for assignment as teachers together with instruments no longer in step with the needs of modern research, the observatory was closed in 1947 when then director Fr. James Rowland, S.J., retired. Standing essentially idle, the fifteen inch Perry Telescope would be sold in 1966. An attempt to revive the observatory began in 1979 by a group of local astronomers which led to the facility's reopening on 1 June 1980 with a new telescope built using various surviving spare parts, including a 7 inch Alvan Clark lens. When the college learned in 1990 that the Perry Telescope had come up for sale, it bid to try and regain this piece of lost Stonyhurst heritage - and was successful. Now, by means of this distinguished instrument (Fig. 20a and b), students can once more gaze at the stars in which 'The Heavens Declare the Glory of God.'²⁸

Conclusion

For over two hundred years, Stonyhurst College employed scientific instruments in its mission to teach science. Beyond being essential tools in this pedagogical work, these instruments became a springboard for a handful of Stonyhurst Jesuits who made many useful scientific contributions in astronomy, meteorology, magnetics, and other fields. Thus, it seems appropriate to conclude that Catholics had found a place where the immense improvements made in science may be imparted to them, just as Fr. Simpson had hoped Stonyhurst would become in 1808. Last of all, how many colleges have a scientific instrument (Fig. 21) named after them?

Notes and References

1. See the 'Rules for the Professor of Philosophy' in Claude Pavur, S.J., *The Ratio Studiorum: The Official Plan for Jesuit Education* (The Institute of Jesuit Sources, 2005), p. 99.

2. About astronomy, see Agustín Udías, *Searching the Heavens and the Earth: The History of Jesuit Observatories* (Kluwer Academic Publishers, 2003) where Angelo Secchi, S.J., and others receive good attention; about physics and the Jesuits during the 17th and 18th centuries, see Marcus Hellyer, *Catholic Physics* (University of Notre Dame Press, 2005).



Fig. 20a *The observatory dome today which houses the re-installed Perry Telescope, and b the telescope shown under the guiding band of Classics and Astronomy teacher Fintan O'Reilly.*



3. T. E. Muir, *Stonyhurst* (St. Omers Press, 2006) offers a good overall history of this Jesuit institution. An earlier reference work is Rev. John Gerard, S.J., *Stonyhurst College: Its Life Beyond the Seas, 1592-1794, and on English Soil, 1794-1894* (London: Marcus Ward & Co., 1894). Helpful details about early science at Stonyhurst during the 19th century are available in an unpublished M.A. dissertation: *The Influence of External Examinations on Science Teaching in a Nineteenth Century Public School* by Michael J. Larkin (University of Manchester, 1980). For more details about the Jesuits pre-Stonyhurst, see 'A Prolific Nursery of Piety and Learning': *Educational Development and Corporate Identity at the Académie Anglaise, Liège, and at Stonyhurst, 1773-1803* by Maurice Whitehead, in 'Promising Hope': *Essays on the Suppression and Restoration of the English Province of the Society of Jesus*, edited by Thomas M. McCoog, S.J. (Rome: Institutum Historicum Societatis Iesu, 2003),

pp. 127-149.

4. *Academy or College of Stonyhurst under the direction of a Society of Catholic Clergymen*, from the late 1790s, Stonyhurst Archives F/II/7/7.

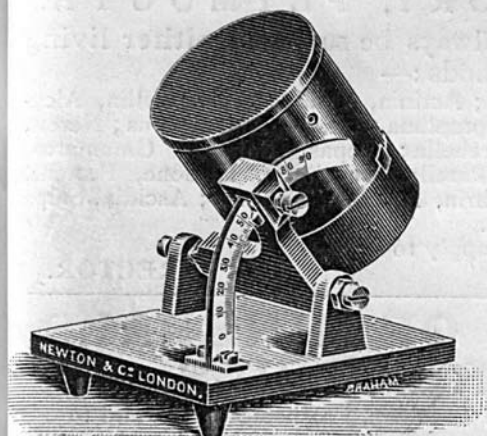
5. *Theses Philosophicæ quas, In Collegio Saxo-Sylvensi, vulgo Stonyhurst...*, 1804, Stonyhurst Archives F/1/2/4.

6. Subscription campaign document, Stonyhurst Archives F/1/2/4. Instrument extract and list, Stonyhurst Archives MS. C.IV.1, *Bruges-Liège-Stonyhurst Letters 1808-1820*, no.6. A short article in *The Stonyhurst Magazine* dated October 1964 claims that the 1808 burning glass 'was found to be by Dolland of London', but not how this detail was determined (p. 571). This claim is worrying to accept given that Wright clearly mentioned Cary, not Dolland, in his 1808 note.

7. Letter dated June 25, 1809 from Simpson to Rev. (Thomas) Glover in Palermo, Sicily.

THE "STONYHURST" SIMPLEX SUNSHINE RECORDER.

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Fig. 21 Advertisement in *Nature* for 'The Stonyhurst' recorder by Newton & Co, 1895.

Letter dated January 9, 1809, from Fr. Joseph Dunn to Hon. Robert Clifford in London. Stonyhurst Archives F/5/19/7.

8. Leaflet titled *Chemical Exercises to be performed at Stonyhurst College on Monday, August 10th, 1812, at nine o'clock in the forenoon, by Messrs. J. Connor, and J.W. Searle, under the direction of The Rev. C. Brooke, Prof. Chem.* Stonyhurst Archives F/1/2/4.

9. Simpson, a.k.a. Sionest, would return to France following the restoration of Louis XVIII; see Gerard, p. 168. His comment about teaching natural philosophy in English comes from a letter to the Hon. Robert Clifford of London, dated June 10, 1808, Stonyhurst Archives MS. C.IV.1, *Bruges-Liège-Stonyhurst Letters 1808-1820*, no. 10.

10. Quoted from the article: 'The March of Science', *The Stonyhurst Magazine*, October 1958, pp. 211-217; p. 213.

11. Stonyhurst Misc. Accounts 1834-1836 ledger, entry dated Dec. 31, 1834. Stonyhurst Archives MS. C.1.8.

12. *College of Stonyhurst under the direction of a Society of Catholic Clergymen, c.*

1808-1814, Stonyhurst Archives F/II/7/7a.

13. 'Select Propositions of Natural Philosophy to be explained and demonstrated, Stonyhurst College, July 28, 1818', question 41 under Hydrodynamics. Stonyhurst Archives F/1/2/4, no. 7.

14. College prospectus dated February 18, 1840, Stonyhurst Archives F/2/7/7a. The University of London was also instrument friendly, for example see *A Discourse on the Advantages of Natural Philosophy and Astronomy*, lecture by Dionysius Lardner, University of London, October 1828, whose second lecture was 'devoted to the exhibition of the splendid apparatus which has been provided for this class'. Of the four Stonyhurst students to take the exams at the University of London in 1840, three passed the matriculation exam with two going on to earn their B.A. degrees. It should be noted that the one student who failed this exam did pass the subject-specific exam in chemistry.

15. This start year comes from a handwritten note dated 10 Sept 1835 from John Watson to Rev. Jos. Newsham about a 72 shillings fee for the labor involved in covering the observatory roof with lead. Stonyhurst

Archives F/1/2/4. The note also references J.J. Scoles: 'according to the plans prepared by J.J. Scoles Esq. of London'. About Scoles, see Kenneth Allinson, *Architects and Architecture of London* (Oxford: Elsevier Ltd., 2008), p. 178. Observatory details from the 'Proceedings of Various Observatories' in *Monthly Notices of the Royal Astronomical Society*, 30, No.4, (February 11, 1870), pp. 89-98, p. 94, and from Udías, *Searching the Heavens and the Earth*, p. 68. Jones arrival date mentioned in the *Stonyhurst Minister's Journal 1817-1848*. Stonyhurst quickly touted their new observatory in *The Catholic Directory and Annual Registry for the Year 1839* (London, 1839), p. 91. A January 1837 newspaper article reaffirms that the Stonyhurst philosophical apparatus 'merit all the praise bestowed them' and mentions that the observatory remains under construction at that time; see the *Preston Chronicle*, January 21, 1837.

16. About Weld, see his obituary in the *Monthly Notices of the Royal Astronomical Society*, 51, No.4 (February 13, 1891), pp. 198-9, along with details in 'The Stonyhurst Observatory' in *The Stonyhurst Magazine*, April 1948, pp. 145-7.

17. 'Extract of a letter from Mr. Alfred Weld, Director of the Observatory at Stonyhurst College' in the *Philosophical Magazine*, 33, No. 224, 3rd series, (December 1848), p. 480.; 'On the Longitude of the Observatory at Stonyhurst College, by the Rev. A. Weld', *Monthly Notices of the Royal Astronomical Society*, 11, No. 2 (December 13, 1850), pp. 44-45; 'An Account of placing Meridian Marks for the Stonyhurst Transit Circle', by the Rev. A. Weld, F.R.A.S., from the *Monthly Notices of the Royal Astronomical Society*, 11, No. 8 (June 13, 1851), pp. 225-7; 'Stonyhurst and Angelo Secchi', *The Stonyhurst Magazine*, 51, No. 495, (1999), pp. 28-34.

18. 'Stonyhurst Observatory; Meteorological Observations taken during the week ending Saturday, March 3, 1849', from the *Liverpool Mercury*, March 6, 1849. Stonyhurst's inclusion as one of Glaisher's observation stations noted in 'Meteorology - The British Meteorological Society' from the *Mechanic's Magazine*, No. 1398 (Saturday, May 25), 1850, pp. 425-431, 427. Instrument details taken from 'Comparison of the Meteorological Results Obtained from the two set of Instruments at present in use at the Stonyhurst Observatory', *Stonyhurst College Observatory Results Meteorological and Magnetical Observations* (Preston: J. Robinson, Printer, 1871), pp. 34-36.

19. 'Report concerning the Observatory of the British Association at Kew, from Aug. 9, 1848 to Sept. 12, 1849', by Francis Ronalds

in *Report of the Nineteenth Meeting of the British Association for the Advancement of Science held at Birmingham in September 1849* (London: John Murray, 1850), pp. 80-87, p. 86; 'Report of the Kew Committee of the British Association for the Advancement of Science, for 1857-1858' in *Report of the Twenty-Eight Meeting of the British Association for the Advancement of Science held at Leeds in September 1858* (London: John Murray, 1859), xxxiii-xxxiv, p. xxxiv; 'Results of Seven Year's Observations of the Dip and Horizontal Force at Stonyhurst College Observatory, from April 1863 to March 1870' by Rev. S.J. Perry, S.J., in *Proceedings of the Royal Society of London*, **19** (1870-1871), pp. 368-370, p. 368. Barrow dip circle serial number '32 was made for the Rev. Alfred Weld of Stonyhurst College, and is now in the Observatory of that College', from 'On the Secular Change in the Magnetic Dip in London, between the years 1821 and 1860' by Edward Sabine in *Proceedings of the Royal Society of London*, **11** (1860-1862), pp. 144-162, p. 147.

20. Perry's January 6, 1890, *London Times* obituary describes briefly his overseas work. Further details about the observatory during the Perry era found in the 'Proceedings of Various Observatories' in *Monthly Notices of the Royal Astronomical Society*, pp. 89-98, pp 95-98 and (with many illustrations) Gerard, *Stonyhurst College: Its Life Beyond the Seas, 1592-1794, and on English Soil, 1794-1894*, pp. 265-292 (Chapter XI, The Observatory). A news article about raising a memorial to Perry, including the suggestion 'to procure a 15-inch objective for the great telescope at Stonyhurst Observatory', appeared in the *Liverpool Mercury* newspaper on July 24, 1890.

21. Stonyhurst College Prospectus dated as from the 1880s based on its details, Stonyhurst Archives F 2/7/7a. Menstruum of March 23, 1857, Academy Bills and Prize Lists, Stonyhurst Archives MS E/1/7. Student reporter quotes from article 'The Stonyhurst Observatory' published in *The Stonyhurst Magazine*, February 1894, 235-7.

22. In a Stonyhurst College Prospectus ca. 1880s, laboratory work gets mentioned in conjunction with physics as well as biology and chemistry, Stonyhurst Archives F 2/7/7a. 'Stonyhurst College Academy Day' from the *Preston Chronicle and Lancashire Advertiser*, August 8, 1885, p. 6.

23. 'The British Association at Stonyhurst' from *The Stonyhurst Magazine*, November 1883, pp. 215-6. 'Spectroscopy at Stonyhurst College Observatory' by 'G.E.H.' (Hale) in *Astronomy and Astro-Physics*, **13**, 1894, pp 58-9.

24. Advertisement for Stonyhurst College from the *Irish Catholic Directory and Almanac for 1900* (Dublin: James Duffy and Co., 1900), p. 58.

25. 'The Stonyhurst New Medical School', *The Stonyhurst Magazine*, February 1901, pp. 68-70.

26. Plans for physics laboratories and War Memorial Wing, Stonyhurst Archives F/2/7/7a. The handover of the new laboratories described in 'School Speech Days' from *The Times*, Monday, July 2, 1923, p 21. Plans for the 1965 building upgrades by Walter Stirrup & Son, Chartered Architects, Blackburn, Stonyhurst Archives F/1/2/4. New rooms for biology and chemistry were constructed in the 1990s; for plans, see 'Building Wisely' by David Knight in *The Stonyhurst Magazine*, **48** (1994), pp.267-276.

27. 'The Stonyhurst Seismograph', *The Stonyhurst Magazine*, August 1910, pp. 63-66. Stonyhurst Archives folder F/1/2/4 contains several documents from 1912 concerning meteorological instruments, including a letter from the Meteorological Office to Fr. Sidgreaves dated 30 March 1912 and several handwritten notes by Sidgreaves or his assistant, Fr. Aloysius Cortie, S.J.; quote from undated note signed by Cortie.

28. 'Reopening of the Dome Observatory - Sunday, 1st June 1980' by F O'Reilly in *The Stonyhurst Magazine*, 1980, 269-272. See also the typed note 'The Perry Memorial Telescope', Stonyhurst Archives F/2/11/5. Quote appears on the plaque commemorating the June 1980 reopening of the observatory.

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