

## The Living Orrery

Dear Sirs,

In the August issue of this magazine the RAS meeting review for 13 January, 2006 gave an account of Professor Mark Bailey's talk concerning The Human Orrery installed at Armagh Observatory<sup>1-2</sup>. What struck me after reading the discussion summary was the enduring historical presence of the orrery in both the public and scientific consciousness. Indeed, as long ago as 1713, Richard Steele<sup>3</sup> eulogized the orrery as “a Machine which illustrates, I may say demonstrates, a System of Astronomy ... to the meanest Capacity”. To which he added, “it is like receiving a new Sense, to admit into one's Imagination all that this Invention presents”. This association of ‘sense’ and ‘imagination’ is seemingly intrinsic to the orrery, and was a topic developed by the Baptist minister, the Reverend John Collett Ryland (1723 – 1792), in his text book<sup>4</sup> *An Easy Introduction to Mechanics*, first published in 1768. Ryland's teaching method was to break-down the topics that he intended to cover into ‘study cards’ and in his *Mechanics* he describes the, “cards of astronomy, and living orrery, made with sixteen school-boys”. He begins with the question, “Astronomy is a most sublime and delicious science.... but can any notion of this science be conveyed into the minds of school-boys?” His answer to this question is ‘no’ unless it is taught by ‘play’, by which he meant direct participation and physical involvement. The text for the ‘living orrery’ describes how to map-out in the school ground, with a rope, the orbits for the planets – as far as the planet *Georgium Sidus* (Uranus). Lastly, Ryland explains that the circles indicating the limits for the Earth's Moon, as well as those for the larger moons of Jupiter and Saturn should be added to the planetary ‘paths’. And finally, Ryland commands, “Now begin your play, fix your boys in their circles, each with his card, in his hand, and then put the orrery in motion”. The minds-eye image of this scene is wonderful. Each participant moves around the Sun at the appropriate scaled rate, and in turn, each ‘human’ planet and moon reads aloud their card. Card 12 expounds, for example, “I represent stupendous Saturn. My diameter is 78,000 miles. I move around the Sun in 29 ½ years at the distance of 907,000,000 miles, and at the rate of 22,000 miles an hour”. It appears that Ryland placed greater

pedagogical value on physical numbers, rather than description – there being no mention of Saturn’s rings. “Half an hour spent in this play once a week,” Ryland comments, “will in the compass of a year fix clear and sure ideas of the solar system, as they can never forget to the last hour of life”.

It is interesting to note, as pointed out by Nicholas Roe<sup>5</sup>, that John Ryland was the founder of Enfield Academy to which the poet John Keats was sent in his adolescence (although after Ryland’s death). The ‘turning’ of the living orrery was still being practiced during Keat’s tenure at the Academy, however, and this perhaps places new light on his lines within *On first looking into Chapman’s Homer*: “Then felt I like some watcher of the skies when a new planet swims into his ken”.

The cometarium<sup>6</sup>, a specialized orrery to demonstrate the elliptical motion of a comet was invented by John Theophilus Desaguliers (1683 – 1744) circa 1732, but to the authors knowledge no ‘living cometarium’ has ever been constructed for public use (until the Armagh example) – this being said, Hughes<sup>7</sup> has described how one might be made to illustrate the full motion of Halley’s famous comet with 76 year-posts. Perhaps the closest approximation to an historic ‘living’ cometarium is that described by Gilbert Vale<sup>8</sup> (1788 – 1866). The comet modeled in this case was Biela’s comet of 1832, and the orbital track was “sixty feet” in length. The cometarium further incorporated an orrey showing the positions of the Earth, Moon, Venus and Mercury. Exhibited at St. John’s Hall in New York during the first half of 1832, this cometarium must have been an awe inspiring installation.

In spite of John Herschel’s 1833 dismissal<sup>9</sup> of orrerys as “those very childish toys”, the image of a mechanical (even peopled) model of the solar system is still very much an engaging one. The wonderfully ‘moody’ painting<sup>10</sup> of an orrery, complete with surrounding observers, produced by Joseph Wright of Derby (1734 – 1797) in 1766 beautifully illustrates the depths to which the orrery can take the human imagination. This imagination and wonder is further encapsulated within the superbly crafted orrery recently completed for the Long Now Foundation<sup>11</sup>. And, finally, we can perhaps forgive

Herschel his comments on the orrery, as noted above, since at that time he was deeply embroiled within the politics surrounding the construction of Babbages difference engine (which is certainly not a toy<sup>12</sup>).

I am, Gentlemen,

Sincerely yours

Martin Beech

Campion College, The University of Regina, Regina,  
Saskatchewan, Canada S4S 0A2

#### References

1. RAS Meeting, January 2006. *The Observatory* **126**, 236, 2006.
2. Bailey, M., Asher, D., and Christou, A. *Astr. Geophys.* **46** (3), 3.31, 2005.
3. Steele, R. *The Englishman*, no. 11 (27-29 October), 1713.
4. Ryland, J. C. *An Easy Introduction to mechanics. For the use of schools, as well as private Gentlemen.* Edward and Charles Dilly, London. pp. xix – xxi. 1768.
5. Roe, N. *John Keats and the culture of Dissent.* Clarendon Press, Oxford. 1997.
6. Beech, M. *Bulletin Scientific Instrument Soc.* **82**, 29, 2004.
7. Hughes, D. W. *JBAA.* **95**, 162, 1985.
8. Vale, G. *Cometarium, or the astronomy of comets.* Evans and Brooks, New York. 1832.
9. Herschel, J. *A Treatise on Astronomy.* Longman and Rees, London. 1833.
10. <http://www.geocities.com/jvertesi/wright/>
11. <http://www.longnow.org/projects/clock/orrery/>
12. Beech, M. *JRASC.* **100**, 118, 2006.