

## 8. *An Experiment on a Bird in the Air Pump*



*Artist* Joseph WRIGHT of Derby (1734–97)

*Medium* Oil

*Support* Canvas

*Size* 182.9 x 243.9 cm

*Date* 1768

***This large and dramatic painting shows an early scientific experiment in progress, and is included here more for the science in the painting than the science of making or conserving the painting.***

### *Joseph Wright*

Apart from a very few years in Italy and Bath, Joseph Wright spent all his life in Derby. He painted many portraits and classical scenes, but his most famous works are a comparative few which show scientific, technological, and philosophical themes which were of interest in the late 18th century – the time of the Industrial Revolution and of the Enlightenment – and which demonstrate his total control of the contrasting effects of light and darkness.

### The subject

The air pump was invented in Oxford by Robert Boyle with Robert Hooke between 1656 – 68, and it was used by Boyle to demonstrate the characteristics of air – showing the necessity of air for combustion, respiration and the transmission of sound.



In Wright's painting, made around 100 years later, a small group of people are gathered together to watch a demonstration of the air pump to create a vacuum. The demonstrator has pumped air out of the large glass globe containing a white cockatiel which appears to be at its last gasp. The globe is a remarkable piece of glass-blowing. When the air is pumped out, it would have to withstand a very

large force on it caused by atmospheric pressure. Any crack or weakness in the glass and it would implode – and glass splinters would fly everywhere.

In Wright's time, scientific demonstrations were often given by travelling professional lecturers who carried their equipment between the towns and large country houses in which they gave their shows. Wright is known to have been present at such demonstrations given by James Ferguson in Derby in about 1762. Ferguson felt that using a living animal or bird in his demonstrations was 'too shocking' (as we might also), and preferred to use a football – probably made from an inflated bladder – or artificial lungs.



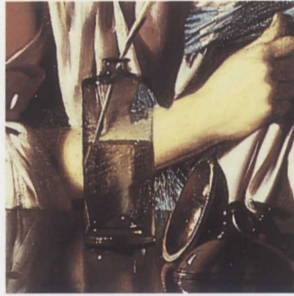
The candle which provides light for the whole scene is behind the large glass vessel on the table, and its distorted reflection can be seen on the inside left wall of the vessel. The stick or straw in the vessel shows the broken appearance caused by refraction. The object in the vessel has been the subject of some debate. It has been suggested that it is a damaged skull, and that the candle represents

the passing of time and the skull the inevitable result of time passing; and that the demonstrator's right index finger is deliberately pointing at these symbols of death ... and that therefore, the bird is about to die.

But, as mentioned above, the demonstrator Wright knew, James Ferguson, used artificial lungs – or maybe lungs from a dead animal. When examined closely, the thing in the vessel appears to have two lobes – which is what lungs, artificial or natural, would be expected to have.

Also on the table, in front of the older girl, is a pair of small Magdeburg hemispheres. These have flat flanges, and when the two hemispheres are put together and the air they contain pumped out, it is difficult to pull them apart

against the force exerted by atmospheric pressure. (The original demonstration was done many years before at Magdeburg in Germany using much larger hemispheres – two teams of horses could not separate them!)



The smaller glass vessel (in front of the little girl's right arm) contains what looks like a de-feathered goose quill – a small hollow tube, like a straw. This could be used to apply a positive pressure – *ie* to blow bubbles! – or a negative pressure so that the atmospheric pressure would push liquid up the tube and out of the vessel. Or, as we say incorrectly, to 'suck' the liquid out of the vessel.



Just in front of the little girl is a cork. If you look carefully you will see that this will fit the narrow neck of the smaller glass vessel. It is probable that another part of the demonstration of what used to be called the 'science of pneumatics' consisted of lightly corking the partly-filled vessel, putting it in the globe, and then pumping air out of the globe. The cork would 'pop' out of the bottle very satisfyingly.

Opinions vary regarding the fate of the bird. In the painting, it is not yet dead. The demonstrator's left hand is on the stopcock. If he opens it in time, the bird will live; if not, it will die. The bird is a white cockatiel, an extremely rare bird to find in England at that time, and certainly not one to risk in this kind of experiment. If demonstrators did use birds, they were the common ones such as thrushes, blackbirds or sparrows. It seems likely that Wright included it for

dramatic effect – to create a moment of tension, which is increased by the demonstrator looking straight at us as if asking for us to make the life or death decision; and also because its white plumage shows up so well. The actual outcome is possibly being anticipated by the boy on the right – is he lowering the birdcage ready to receive its occupant again?



Everyone is involved in the drama, except the young couple on the left who are obviously in love and oblivious to what is going on. (Almost certainly they are Thomas Coltman and Mary Barlow, who were painted again by Wright shortly after their marriage – this double portrait is also in the National Gallery).

Mr and Mrs Thomas Coltman  
by Joseph Wright, 1770-72





The man in the foreground has his watch out, timing the bird's agony, the very model of the detached observer. The older man on the right sits holding his spectacles in his hand, brooding; perhaps he is thinking about death and how soon it might come, not only for the bird? Another man, probably their father, is trying to reassure the two girls who cling to each other in their distress.

The boy on the left is completely fascinated.

### *Wright and his friends*

Wright's accuracy in painting scientific equipment and technical processes is easily explained. He knew, and painted portraits of, many of the great scientific thinkers and industrial innovators of his time. Among them were Josiah Wedgwood, the pottery manufacturer; Erasmus Darwin (the very knowledgeable grandfather of Charles Darwin), who was Wright's doctor; Sir Richard Arkwright, who revolutionised the textile industry; and the mechanic and geologist John Whitehurst. These, with others such as the great engineers Matthew Boulton and James Watt, founded the Lunar Society in 1764-65. This society, through its discussions of both theory and practice, played a major part in the Industrial Revolution. A likely symbol of, or reference to, the Lunar Society is the full moon seen through the window. Members of the society met for scientific and technical discussion at each other's houses on the night of the full moon, so that afterwards – many years before street lighting – they could more easily find their way home.



Wright painted two other major scientific pictures at around this time: *A Philosopher giving a lecture on the Orrery* (1764–6) and *The Alchemist in Search of the Philosopher's Stone discovers Phosphorus* (1771, with some alterations in 1795), which is illustrated here.