Information and Inspiration

Verbal Sources

Word-of-mouth transmissions of information require two things: a speaker and a listener. As dissemination strategies, they are more personal than print and less demanding than purely object-based transmissions. Ephemeral but powerful, common forms for verbal exchanges of information in the eighteenth century took place at lectures that offered knowledge as popular entertainment, at private and civic clubs, and societies dedicated to study or improvement. Apprenticeships and other workshop-based opportunities to learn from a knowledgeable person were also verbally-based opportunities for instruction and inspiration.

Lecture Presentations

> You may perhaps recollect our speaking of a microscope made by Mr. Martin to shew opaque objects medals etc. Mr. Warltire introduces one of them into his lecture upon light & colors, but he has no medallions to shew, nor seem'd to have thought of such an application. However it was not likely to escape a maker of cameos, I mention'd it to him and we have had two private exhibitions to try the effect & asertain what colors etc would answer best & we have been entertain'd with the finest picture imagineable quite beyond what we either of us expectd.
>
> This has induced him to propose an extra lecture upon the solar microscope which will be given the first fine day for the purpose and I have no doubt of its being well attended . . .
>
> Josiah Wedgwood to Thomas Bentley, dated Etruria, 8 March 1779, John Rylands Library University of Manchester, Eng. MS. 1108, f. 1148.

Lecture programs are a feature of eighteenth-century public life, recognized as social events that also contributed to public and personal notions of politeness.[1] The image of the itinerant lecturer as a conduit for both information and inspiration—through presentation and through the sale of books and tools to aid further study—is closely linked to eighteenth-century British science, yet equivalents existed in France and Germany.[2] Lectures on the sciences, among other subjects, were often undertakings assigned to or affiliated with social or trade organizations. Presentations, especially those in which examples "from life" were called on to illustrate theories, were key to the spread of ideas about scientific and technical subjects.[3] They might range from casual-seeming presentations offered in the salon or meeting hall to the officially-sanctioned courses in drawing or chemistry or mathematics for artisan apprentices.

As a format, lectures mediate between what is read and what is observed, offering access to an expert for further explanation or confirmation of understanding. Lecture-presentations were key to the diffusion of a wide range of practical and philosophical information about sciences and technologies. The transmission of information in this way is difficult to catalog with certainty, however. We can learn about exchanges, and about ways they addressed

questions of color, through transcriptions of lectures, reports, or personal archives of lecturers or attendees. Without a collection of reports from several participants at any one lecture, however, questions may remain about the contents and interpretation of a meeting or series of lectures. Printed versions of lecture presentations, which would have served attendees as a preview or an aide-mémoire, and a supplement to formal verbal transmission of a course, add considerably to our understanding of these opportunities even if we cannot establish that publication and presentation were identical.

Lecturing Traditions

The British lecturing tradition is frequently cited for the opportunity it offered people from a variety of social backgrounds to learn about (and make a living from) scientific endeavors. Public lectures offered varied occasions to teach and to learn about technology, the sciences, and many other subjects; cities the size of Manchester supported almost annual visits from itinerant lecturers in the latter part of the century.[4] We understand that the peripatetic habits of British lecturers helped to create a common basis of information throughout the country although A. Q. Morton has pointed out that the price of admission to a lecture series could restrict entry as effectively as a membership requirements might.[5] In contrast, the audience for introductory lectures at French institutions, whether academy- or guild-sponsored, or salon entertainment, was more closely controlled by custom if not by law. Lecture demonstrations offered in Paris or other large cities may have been open to permanent or temporary residents, but social distinctions played a more obvious part in admission policies. And, if Jean-Antoine Nollet's lectures were typical, the connections between science and manufacturing practices so frequently highlighted in British presentations were missing from the French offerings. Although the book of Nollet's lectures included instructions for making instruments of physics and equipping a *cabinet des expériences* as well as experimental lessons, the focus was on more purely scientific pursuits, and not on explorations of the relationship of scientific concepts to practical endeavors.[6]

The information presented in a lecture or lecture series, and the skill with which it was presented, depended heavily on the training and interests of the lecturer. The best may have been more entertaining than thorough; it may be that auditors learned no more and no better than isolated but voracious readers did. Certain obligations in the presentations may have been demanded and accepted by lecturer and listener alike: Fantastic visual accompaniments, the risk of disasters such as explosions, or the repetition of well-known demonstrations would have drawn audiences and kept them interested. Many lecturers incorporated mention of and examples drawn from Newton's *Opticks*: the prism experiments, in particular, may have seemed to many the more easily demonstrated portion of his science.[7] Yet these presentations could be Newtonianism without Newton: the famous experiment with the prism might be offered, stripped of all but the

simplest mathematics, made into a dramatic display.[8] For these reasons, public lecturing traditions may have been more important as a familiarizing strategy and general introduction than a motivating force for further study.

Peter Shaw's Lectures

Peter Shaw is well known as an eighteenth-century writer, translator, and lecturer on scientific subjects, one of those who made chemistry a popular and public focus in eighteenth-century Britain.[9] His book *Chemical Lectures Publickly Read . . . For the Improvement of Arts, Trades, and Natural Philosophy* appears to be a manual for study at home as well as a souvenir or textbook for his lecture demonstrations. *Chemical Lectures* is a printed object but is it also a valid representation of a verbal transmission? We don't really know. Lacking lecture notes from an auditor, we cannot be certain about the book as a faithful record of the lectures Shaw presented.[10] I believe we can treat this book as a realistic if somewhat idealized transcription of Shaw's lectures, conveying a sense of what was said, of which subjects received emphasis and how. From this, we can learn the ways that this lecturing tradition presented information and offered inspiration.

Shaw's book is divided into twenty lectures, each including a number of experiments and discussions. He often refers to deficiencies that might be corrected and to subjects about which knowledge could be enhanced. This is a rhetorical gesture, certainly. But these comments imply that there is work to be done and chemistry, perhaps chemistry learned at this lecture, will contribute to its success. It is a symbolic recognition of the value of the sciences as much as a tool for practical engagement.[11]

> For it is hence manifest, that slight mechanical alterations in Bodies, produce, alter, or abolish all kinds of colours therein; or that all the Colours of Bodies are only original Colours of Light, differently reflected, either in a simple or variously compounded State, according to the particular Disposition, Texture, Mixture or Arrangement of the small Parts of the reflecting Body, so as to afford that infinite variety of colours we meet with in natural and artificial things.
>
> Peter Shaw, "Of Colours" *Chemical Lectures* (London, [1734), 177.

Shaw devoted one chapter to the theoretical and practical aspects of color. He opened this set of lectures with queries that confronted the discrepancies found by all students of the subject. How do we improve color? What are the physical causes of the effects produced? He did not suggest a resolution, but the content of these presentations suggests the ways verbal transmissions and lecture demonstrations could serve as inspiration to the understanding and improvement of color.

Shaw's Color Experiments

> A Philosopher, who studies the Art of Dying, is in some Measure astonished at the Multiplicity of the new Objects which it affords; every Step presents new Difficultes and Obscurities. . . .

James Haigh, *The Dyer's Assistant* (Leeds, 1778), iii.

Lecture fourteen, "Containing Attempts to Illustrate and Improve the Business of Colours, Dyes and Stains," includes five experiments. The first reenacted Newton's experiment with spectral colors. Passing light through a prism showed that rays of white light were the combination of rays of colored light. A second experiment, also based more or less on Newton, hinted more directly at the assumed connections between theories and practice by showing that the color of any body depends on its ability to reflect certain-colored rays. Philosophies thus presented, the remaining lectures describe colormaking processes. Shaw demonstrated creation of a yellow, a blue, and a red color from the vegetable, animal, and mineral kingdoms respectively, simultaneously linking his work to common understanding of artists' primaries and of natural history. In doing this, he reinforced a common idea about potential sources for color: They were everywhere. Observers learned about lakes made from plant matter and about the animal color Prussian blue . Shaw offered them a demonstration involving a metallic compound that would color glass red. Shaw intimated through this group of experiments that the successful search for improved color required familiarity with potential coloring materials. He further supported this with a description of general expectations. He commented, for example, that deeper colors are generally the better fixed and more durable ones —not the shades but the true colors, corresponding to the original colors of light. He concludes the section on colors with a list of "Axioms and Canons," the twelve points his listener/observer/reader has learned, presented in a form that might remind the reader of other scientific treatises.[12]

Colour is destroyed by the rays of the sun. Thus dyed silk and other substances of that kind, when exposed to the sun's light, are deprived of their colour in every part on which the rays are allowed to act; while those preserve their colours which are defended from the light. The colours, thus *impaired*, may be restored, if acids are employed while the injury is recent.

George Adams, *Lectures on Natural and Experimental Philosophy* (London, 1794), 2:418.

Shaw's lecture demonstrations suggested a clear path to improved results for color, and its inherent simplicity was reinforced by some additional examples of color change. These latter were taken from everyday experience: burning sugar, heated talc, the way flowers (and silk) fade. As color phenomena, each example had a double life. All would have been familiar to amateurs of chemistry; all had been described, reenacted and discussed by others. These experiments could be repeated easily, without the intercession of a specially trained savant or, in many cases, without expensive or delicate equipment. This commingling made the science of color a very homely subject.

Shaw's *Chemical Lectures* contains similarities to Hoofnail's *New Practical Improvements*, in its specific goals as well as in its presentation, its format of experiments with commentary, and its root source of information. The inclusion of

instructions in each case suggests an interest in multiple styles of observation. Discussions in both books give prominence to replication as a participatory form. The public presentation of experiment was not only a didactic technique to solidify general principles. It also offered a basis for continued theoretical work. Here, experiment offered a fruitful practical end, through the identification of new colors and improved processes.

Other Public Lectures

Lectures about color or color-related subjects were also a part of projects undertaken by academic and trade-improvement societies, academies or guilds of the fine arts.[13] Several such organizations advanced lecture series and lecture demonstrations that, as part of the explicit effort to improve trade, were offered to apprentices or young workingmen to extend practical scientific ideas. In a sense these lectures were an acknowledgment of obligations to support public ideas about science and to extend that knowledge: they provided to artisans a formal or formalized instruction that paralleled presentations of information about artisan practice to academic or non-artisan, general communities. The lecturers offered current understanding in mechanics, physics, chemistry, or the sciences more generally, on the assumption that a more knowledgeable worker might improve practices, either through a more-ready acceptance of new techniques or through his own innovations.[14]

In 1778, Antoine-François Hardy, a medical doctor in Rouen, proposed a free public course in chemistry and natural history for that city. Hardy and François-Antoine Descroizilles, a pharmacist, would be professor and demonstrator respectively.[15] They suggested at least forty lessons, with a focus on medicine, pharmacy, and the arts and trades—all of them subjects of interest to practicing artisans and apprentices, merchants' assistants, and *marchands épiciers*. The hopes expressed by these men appear to be typical for all those who proposed of lecture programs. The public would benefit from courses that combined science and manufacture under the aegis (or with the approval) of the local academy. For artisans especially, lectures would supplement a strict focus on practice with greater understanding of materials and principles.[16] The underlying goal of any lecture series was essentially the same consumerism often found in many publications.

> Mais qui a enrichi la peinture elle même de ses couleurs les plus belles et les plus durables, de son vermillon, de son carmin, de son bleu de Prusse, &c., si ce n'est la chimie? La Peinture ne lui est elle pas redevable aussi de cette vive ecarlate, qui, trouvée par le chimiste Drebbel rapporta des sommes immenses à son gendre, et plus recemment encore, de ce beau verd de Saxe, qui est une vrai tresor pour les possesseurs de ce secret.
>
> Dhervillez and Lapostolle, Plan d'une cours de chimie, 13 February 1777, ADSM 5/E/108.

What might one learn from hearing lectures? An assumption expressed by the organizers of lecture programs for artisans and others was that greater

knowledge—and the arrangement of that knowledge in an organized, well-ordered manner—would reduce or eliminate possibilities of fraud and simplify production, thus contributing to improvement. Color is something you see, and even if you can't touch color you can touch colored objects. When its theories and practices are presented in lectures as aspects of one whole, a visual demonstration is beneficial even without adequate clarification, through books or objects or other means, of connections between theories and practices. The variables of audience and lecturer could make lecture presentations haphazard offerings of information. Nevertheless, there are instructional benefits to the social event of a lecture demonstration, and this almost certainly supported inspiration.

Society Meetings, Lectures, and Presentations

> I am going to Griffiths American Punch House, we are to form a society of Artists tonight to meet once a week.
>
> Josiah Wedgwood to Thomas Bentley, 11 February 1769 Wedgwood ms. E18228-25.

Participation in clubs or societies was a way to acquire knowledge and affirm to others the cultural goals of enlightenment, improvement, progress. It has been estimated that more than three thousand clubs and societies existed in London at the end of the eighteenth century.[17] The Scholarly Societies Project lists more than 190 organizations founded throughout Europe during the eighteenth century—local and regional groups devoted to intellectual investigation of some subject or of several subjects, groups that provided a forum in which elected members could present and discuss research and ideas.[18] These formally or informally constituted groups, the coffeehouse societies or private clubs that encouraged personal study, occupational improvement, or the sharing of information for personal satisfaction, allowed more personal interactions and engagements than lectures did. Of the more informal eighteenth-century groups, the Lunar Society of Birmingham is one of the best known.[19] This group was unusual in many respects, but not in its existence or its goals, and its members belonged to other gatherings that were both more and less formally constituted. Josiah Wedgwood for example, was also a member of the Royal Society of London and the Society of Arts, and he attended meetings at the Chapter Coffeehouse and Griffiths Punch House in London; his relationships with Matthew Turner, John Sadler, and others living close to Liverpool suggest that he may have participated in similar informal gatherings there.[20] Most of these groups, even the formally constituted ones, left scarce and scattered evidence of their members' interests. Sciences and industries, alone or together, were not the only subjects considered, but they were a preoccupation of many.

Apprenticeship

One of the most obvious forms of mediated verbal exchange, apprenticeship was

an articulated corporate responsibility, one that was taken seriously throughout the eighteenth century even as guilds weakened, were transformed, or disappeared.[21] We have only general information about day-to-day verbal transmission of information through apprenticeship; we assume it was principally the result of regular exposure to processes and procedures.

The image of the apprentice as child-of-all-work who absorbs skills, is slowly given more responsibility, and passes through different learning stages to that of journeyman and finally of master—based only on those experiences—does not to always match the reality we understand as work in eighteenth-century Europe. There is, first, the evidence of corporate support for certain kinds of instruction—especially but not exclusively design—for apprentices. There are questions about strategies to learn a range of skills when production is segmented or compartmentalized—for example, in ceramics and textile manufactures. And, perhaps most important, there are questions raised by the recognition of skills that were transferable for certain kinds of work—transferable from one kind of painting to another, from picture engraving to preparation of plates for textile or wallpaper printing, from creating pigments or dyes to creating lacquers or finishes. Jacques-Fabien Gautier d'Agoty was an apprentice or student of Jacob Christoph Le Blon, but he came to that work with opinions acquired through and shaped by prior experiences. How common, or unusual, were opportunities such as that offered by François Gonin who, sponsored by representatives of local manufactures, provided a month-long lecture demonstration designed to teach technical skills to already knowledgeable people? We don't know.

Other Verbal Transfers

> In the Year 1753, I sent a young man to *Turkey* on purpose to learn to dye [Turkey red]. He had. . . learned the language of those *Greeks* who dye it; and. . . got Admittance into their Dye-houses, and was instructed; and on his Return, brought the true Method. . . .
>
> He executed the Business I sent him about, and I rewarded him for his Trouble; but when I had got it, to my great Disappointment it would not suit for my purpose, that is, for Cotton Velvets; nor any other Sort of Piece Work I then Made.
>
> John Wilson, *An Essay on Light and Colours* (Manchester, 1786), 20.

Spying and the stealing of workers were often noted, if devious, ways to transfer information about color. Despite government attempts to inhibit their movement, practitioners with special skills occasionally chose to emigrate, or were encouraged to do so by foreign manufacturers desiring their skills: legislated prohibitions against this behavior support our understanding of eighteenth-century industiral espionage as a problem throughout Europe.[22] Alternatively, colormakers with practical skills might search for a sponsor who would finance their relocation, or a manufacturer might send a representative, overtly or covertly, to learn special skills.[23] Potential sponsors included manufacturers as well as individual patrons, or perhaps a society, the

government, or some combination of those groups. In France, the eagerness of government bodies, locally and in Paris, to attract foreign workers and adapt their expertise is particularly well known. The Jacobite John Holker, for example, established English-style factories in Rouen, later becoming an inspector of foreign manufactures and a respected advisor to government officials. Holker made secret trips to England to secure skilled workers in several manufacturing trades, including textile dyeing and ceramics manufacture.[24] Factory visits, a popular activity for eighteenth-century travelers, often raised suspicions among entrepreneurs, even when the tourists seemed middle- or upper-class or unable to understand the local language. Wedgwood and other manufacturers complained of factory visitors presenting themselves as idle, curious visitors but who might have been making a tour of production houses, asking questions on behalf of a rival manufacturer, perhaps even a local one.[25] As a technique to exchange information, industrial espionage was not significantly different from the legal, often temporary, emigrations of specialist workers.

As a device for information exchange, expert demonstrations and apprenticeships imply a degree of consent between teacher and student. The holder of information makes knowledge available to others, and there is some exchange for this instruction—labor, money, public recognition. The observer/auditor accepts the information as true. A parallel exchange exists, however, where information is not so freely given or happily received. Riots, reports of sabotage, complaints by owners or overseers that workers are reluctant to accept new methods—all suggest an undercurrent of hostility between practice and theory in the eighteenth century. Charles C. Gillispie, and others who have cataloged attempts to combine practice and theory in the eighteenth-century industry, identify attempts to regularize industrial processes—notably the appointment of scientists as inspectors of manufactures in France—as disasters.[26] The theorists or philosophers were willing to learn about trade, as efforts to create histories of arts and trades indicate, but these men joined in remarks on the stubbornness or "stupidity" of workers when faced with external changes. The accusations are taken as proof of workers' preference for the status quo: Reactions in some districts were sparked by guild activity and in all cases by the inherent conservatism of workers.[27] More–recently, scholars who have addressed the issue of artisan hostilities have done so with greater sympathy for the workers, describing sabotage, for example, as a response by workers to the devaluation of their critical skills, a development that led to a loss of pride in their work.[28] While these late-twentieth-century assessments justify the behavior of eighteenth-century workers, they assume a division that may not have existed between the goals of workers and those of manufacturers. François Gonin's work in Yvetôt, the long-standing efforts to introduce regular chemistry-based practices at Gobelins, even Jean Hellot's work at the Vincennes ceramics manufacture suggest that the hostility was not always automatic. Information about similar

relationships in Britain or German-speaking regions is less obvious. The examples of George Berg's experiments with vitreous colormaking, on which he worked with employees at several London glasshouses, suggest that perhaps exchanges of information between artists and savants or hopeful students were not always contentious.

Notes:

Note 1: Jan Golinski, *Science as Public Culture: Chemistry and the Enlightenment in Britain, 1760–1820* (Cambridge, 1992); Larry Stewart, *The Rise of Public Science* (Cambridge, 1992); Geoffrey V. Sutton, *Science for a Polite Society: Gender, Culture, and the Demonstration of Enlightenment* (Boulder, Colo., 1995); Alice N. Walters, "Conversation Pieces: Science and Politeness in Eighteenth-Century England," *History of Science* 3 (1997): 121–54.

Note 2: "The Demonstration of Enlightenment," in Sutton, *Science for a Polite Society*, 191–240.

Note 3: F. W. Gibbs, "Peter Shaw and the Revival of Chemistry," *Annals of Science* 7 (1951): 211–23; Michael Brook, "Dr. Warwick's Chemistry Lectures and the Scientific Audience in Sheffield (1799–1801)," *Annals of Science* 11 (1955): 224–37; John R. Millburn, "James Ferguson's Lecture Tour of the English Midlands in 1771," *Annals of Science* 42 (1985): 397–415; Alison McCann, "A Private Laboratory in the Late Eighteenth Century," *Annals of Science* 40 (1983): 635–55.

Note 4: John R. Milburn, "James Ferguson's Lecture Tour of the English Midlands in 1771," *Annals of Science* 42 (1985): 397.

Note 5: A. Q. Morton, "Lectures on Natural Philosophy in London, 1750–1765: S. C. T. Demainbray 1710–1782 and the 'Inattention' of His Countrymen," *British Journal for the History of Science* 23 (1990): 411–34.

Note 6: abbé Jean-Antoine Nollet, *L'Art des expériences, ou avis aux amateur de la physique* (Paris, 1770).

Note 7: George Adams, *Lectures on Natural and Experimental Philosophy, Considered in its Present State of Improvement Describing, in a Familiar and Easy Manner, The Principal Phenomena of Nature, and Showing That They All Co-operate in Displaying Goodness, Wisdom, and Power of God*,4 vols. (London, 1794); I. Atkinson, *A Compendium of a Course of Lectures on Natural and Experimental Philosophy* (Kendal, 1784); John Banks, *An Epitome of a Course of Lectures on Natural and Experimental Philosophy* (Kendal, 1794); Thomas Barnes, "On the Affinity Subsisting between the Arts: With a Plan for Promoting and Extending Manufactures, by Encouraging Those Arts on Which Manufactures Principally Depend," *Memoirs of the Literary and Philosophical Society of Manchester* 1 (1785): 72–79; William Farish, *A Plan of a Course of Lectures on Arts and Manufactures More Particularly Such as Relate to Chemistry . . .* (Cambridge, 1796); James Ferguson, *Lectures on Select Subjects in Mechanics, Hydrostatics, Pneumatics, and Optics . . .* (London, 1760); Thomas Garnett, *Outlines of a Course of Lectures on Chemistry* (Liverpool, 1797); George Smith Gibbes, *Syllabus of a Course of Chemical Lectures* (Bath, 1799); John Hadley, *Plan of a Course of Chemical Lectures* (Cambridge, 1758); *Leçons de chymie de l'université de Montpellier où l'on explique les préparations avec la meilleure physique, et l'usage de chaque reméde fondé sur la meilleure pratique médecine* (Paris, 1750); Pierre Joseph Macquer and Antoine Baumé, *Plan d'un cours de chymie experimentale et raisonnée avec un discours historique sur la chymie* (Paris, 1757); Adam Walker, *Analysis of a Course of Lectures on Natural and Experimental Philosophy: Viz. Astronomy, Use of the Globes, Pneumatics, Electricity, Magnetism, Chymistry, Mechanics, Hydrostatics, Hydraulics, Engineering, Fortification, Optics, Etc.* (Kendal., 1766); Martin Wall, M.D., *Syllabus of a Course of Lectures in Chemistry, Read at the Museum, Oxford, February 1782* (Oxford, 1782).

Note 8: Betty Jo Teeter Dobbs and Margaret C. Jacob, *Newton and the Culture of Newtonianism* (Atlantic Highlands, NJ, 1995); Alan E. Shapiro, "The Gradual Acceptance of Newton's Theory of Light and Color, 1672–1727," *Perspectives on Science* 4, no. 1 (spring 1996): 59–144, esp. 112–119; Michel Blay, "Les Couleurs du Prism ou Quelques Remarques et Réflexions sur les Expériences de Newton," in "La couleur et ses pigments," ed. Jean-Pierre Mohen, *Techne*, no. 4 (1996): 9–16.

Note 9: *Dictionary of Scientific Biography* (1970–80), s.v. "Peter Shaw," by Marie Boas Hall, 12:365–66; Jan Golinski, "Peter Shaw: Chemistry and Communication in Augustan England," *Ambix* 30 (1983): 19–29; F. W. Gibbs, "Peter Shaw and the Revival of Chemistry," *Annals of Science* 7 (1951): 211–23.

Note 10: Peter Shaw, *Chemical Lectures Publickly Read at London, in the Years 1731, and 1732, and Since at Scarborough, in 1733: For the Improvement of Arts, Trades, and Natural Philosophy* (London, [1734])

Note 11: See, for example, Shaw's description of the preparation of tartar, 153 §45 and p.155 §48, and the problems of lake pigments, 179 §49.

Note 12: Shaw, "Colour," in *Chemical Lectures*, 165–91.

Note 13: Anne Puetz, "Design Instruction for Artisans in Eighteenth Century Britain," *Journal of Design History* 12, no. 3 (1999): 217–39; Lesley Ellis Miller, "Manufactures and the Man: A Reassessment of the Place of Jacques-Charles Dutillieu in the Silk Industry of Eighteenth-Century Lyon," *Textile History* 29 (1998): 19–40; see also F. H.Schmidt, "Expose Ignorance and Revive the Bon Gout - Foreign Architects at Jacques-Francois Blondel's Ecole des Arts," *Journal of the Society of Architectural Historians* 61 (2002): 4–29.

Note 14: John Perkins, "Creating Chemistry in Provincial France Before the Revolution: The Examples of Nancy and Metz. Part 1" *Ambix* 50 (2003): 145–81.

Note 15: "Un cours de chemie et de l'histoire naturelle à Rouen, proposée par Hardy et Descroizilles," October 1778, ADSM 5/E/108.

Note 16: M. le Comte d'Auguay, "Plan d'une course de chemie, experimental, rationée et applquée aux arts par M. Dhervillez, docteur en medicine et Lapostolle, maitre apothecaire," 13 February 1777, ADSM 5/E/108; "Un cours de chemie et de l'histoire naturelle à Rouen,"; "Plan d'une cours de chemie proposée par Mesaire, Apothecaire Majeur de la Santé et de l'hôtel de dieu du Rouen, demontrateur en chemie, membre de l'Académie royale des Sciences, Belles Letters et Arts de cette Ville," March 1781, AN F/12/ 2259.

Note 17: Peter Clark, *British Clubs and Societies, 1580–1800: The Origins of An Associational World* (Oxford, 2000), 128 cited in Larry Stewart, "Putting on Airs: Science, Medicine, and Polity in the late Eighteenth Century," in *Discussing Chemistry and Steam: the Minutes of a Coffee House Philosophical Society, 1780–1797*, ed. Trevor Levere and Gerard L'E. Turner(Oxford, 2002), 207.

Note 18: "The Scholarly Societies Project," University of Waterloo, at www.scholarly-societies.org [accessed 26 March 2004].

Note 19: Publications about the Lunar Society include Robert Schofield, *The Lunar Society of Birmingham: A Social History of Provincial Science and Industry in Eighteenth-Century England* (Oxford, 1963) and, more recently, Jenny Uglow, *The Lunar Men: Five Friends whose Curiosity Changed the World* (New York, 2002). A study of a similar group in France is Maurice P. Crosland, *The Society of Arcueil: A View of French Science at the Time of Napoleon I*(Cambridge, 1967). Information about comparable German societies, as well as about less formal ones, can be found in Henry Lowood, *Patriotism, Profit, and the Promotion of Science in the German Enlightenment: The Economic and Scientific Societies, 1760–1815* (New York, 1991), and Karl Hufbauer, *The Formation of the German Chemical Community, 1720–1795* (Berkeley, Calif., 1982).

Note 20: Royal Society of London, Certificate of Election EC/1782/08; Trevor Levere and Gerard L'E. Turner, eds., *Discussing Chemistry and Steam: The Minutes of a Coffee House Philosophical Society, 1780–1797* (Oxford, 2002), 29; see also Josiah Wedgwood,

"Society of the Chapter Coffee House Now Held at Mr. Walker's Lecture Room," Commonplace Book (n.d.), p. 158, Wedgwood ms. 39-28408, n.p.; Josiah Wedgwood to Thomas Bentley, Etruria, 11 May 1771, Wedgwood ms. Leith Hill Papers; Josiah Wedgwood to Thomas Bentley, 11 February 1769, Wedgwood ms. E18228-25.

Note 21: For example, the regulations of the Académie de St-Luc specify the maintenance of a free school of design for apprentices, 6 October 1763, AN O/1/1910.

Note 22: "Samuel Jones" to the Staffordshire pottery (8 March 1784), Wedgwood ms. E22321-30; "William Jones" [Josiah Wedgwood] to "Samuel Jones," 10 April 1784, Wedgwood ms. E18964-26.

Note 23: Jacques Schlögel and H. Hazard to Mr. Green of the Society of Arts, 17 February 1784, [R]SA PR.MC/105/10/291; Weisbrod to Stephen Fuller regarding a factory "in the true Chinese manner" using German workers, July–August 1754, Somerset Record Office DD/DN/489, DD/DN/517.

Note 24: J.R. Harris, *Industrial Espionage and Technology Transfer: Britain and France in the Eighteenth Century* (Aldershot, Hants.,U. K.., 1998).

Note 25: Josiah Wedgwood to Thomas Bentley, 1 August 1779, Wedgwood ms. E18912-26.

Note 26: Charles Coulston Gillispie, *Science and Polity in France at the End of the Old Regime* (Princeton, 1980), esp. 390–412. See also Arthur H. Cole, *The Handicrafts of France as Recorded in the "Description des arts et métiers 1761–1788,"* Kress Library of Business and Economics Publication 8 (Boston, 1952); Kathleen H. Ochs, "The Royal Society of London's History of Trades Programme: An Early Episode in Applied Science," *Notes and Records of the Royal Society of London* 39 (1985): 129–58.

Note 27: William H. Sewell Jr., *Work and Revolution in France* (Cambridge, 1980).

Note 28: Whitney Walton, "Working Women, Gender, and Industrialization in Nineteenth-Century France: The Case of Lorraine Embroidery Manufacturing," in *European Women and Preindustrial Craft*, ed. Daryl Hafter (Bloomington, Ind., 1995): 87–107.
