to square with several facts: (i) The feminine depiction of such qualities as truth and virtue antedates not only Christian neo-Platonism but even Plato—Wisdom already appears to Parmenides as a woman, as do of course the nine muses to poets since Homer. (ii) Whatever the favored place enjoyed by women in the Renaissance court, they were conspicuously absent in the avowedly neo-Platonist academies in the early modern period. And (iii) other, non-feminine neo-Platonist imagery rarely surfaces in the iconography Schiebinger discusses. In short, neo-Platonism and the feminine personification of science do not correlate in symbol or practice. It is equally dubious to make Kant bear witness to the decline of the feminine icon on the strength of a passage that is rather an instance of its survival—outcast metaphysics likened to mourning Hecuba—and moreover to make misogyny responsible for this decline when all emblems, not just female ones, were fast disappearing from frontispieces of learned works. A similar lack of attention to text and context plagues Schiebinger's attempts to align cosmology and gender. Given the subtlety and originality of the questions she poses, the reader is doubly disappointed by such unpersuasive answers.

The moral Schiebinger draws from her tale of women let into (and booted out of) early modern science is that scientific impartiality is incompatible with partial representation in science. On her account, a science that excludes women is also one that willy-nilly excludes certain topics and approaches, and, still worse, tricks out misogyny in scientific dress. The failure of universalism in science therefore, claims Schiebinger, carries with it a failure of objectivity. There is an undeniable kernel of truth in this view about the dismal inevitability of ideology when the balance of power is badly askew, and Schiebinger presents a good deal of damning evidence to this effect for her period. Yet because this evidence testifies to false consciousness as well as to ideology, it is not clear that the presence of more women in science would by itself remedy distorted science about women: the most egregiously feminized skeleton of 18th-century anatomy was the work of the Frenchwoman Marie Thiroux d'Arconville, and conversely, the most radical and outspoken defenders of women's intellectual rights were M. J. A. N. Condorcet and John Stuart Mill. We need a far more nuanced view of the relationships between power, interest, and knowledge, not to mention gender, in order to unravel their tangled history in modern science. But Schiebinger is no doubt on the right track when she makes specific lives and events speak, parable-fashion, for general themes, instead of ascending prematurely into grand, synthetic theory that can instruct by precept but not by example.

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Hörstadius and Beyond

The Neural Crest. Including a Facsimile Reprint of *The Neural Crest* by Sven Hörstadius. BRIAN K. HALL. Oxford University Press, New York, 1988. viii, 303 pp., illus. $60.

This book is in essence a chimera comprising a facsimile reprint of a seminal text published 39 years ago onto the front of which has been grafted an overview putting that original monograph into the context of current developmental biology. The host in this operation is Sven Hörstadius's *The Neural Crest: Its Properties and Derivatives in the Light of Experimental Research*. On publication in 1950 it constituted the first major scholarly work on the neural crest—a transient cell population in vertebrate embryos that gives rise to, or contributes to, a number of unique features (for example, the entire autonomic nervous system and much of the craniofacial skeleton and connective tissue, including that of the gill-branchial arches). Research interest in this structure has increased almost exponentially since the '50s, to a considerable extent because of Hörstadius's text. Talking with embryologists who were active at that time, one soon begins to appreciate the impact its publication must have had. The original version has long been out of print (my own much-valued copy was a gift from a colleague upon his retirement), and this reappearance is to be welcomed. Hörstadius's own work, whether on the vertebrate neural crest or on echinoderm embryology (his other area of achievement), was characterized by dexterous experimental manipulation and rigorous experimental design; his writing is characterized by carefully wrought argument and analysis. Consequently, his book is a joy to read, and some of the questions raised are as pertinent now as in 1950.

How does the graft itself fare in this chimera? Brian Hall has taken on the demanding task of updating Hörstadius's text by reviewing the neural crest literature published since 1950. As a researcher with active interests in both developmental biology and evolution, Hall is well positioned to provide such an overview. Clearly one of the major changes is the much wider appreciation of the pivotal role of the neural crest in vertebrate evolution. The dramatic increase in interest in this area has focused on the construction of evolutionary scenarios and on the identification of neural crest origins in protochordate forms (a topic of research activity still in its infancy). Hall's overview is excellent in covering this ground and that of the "neurocristopathies"—a collective term for those tumors and dysmorphologies arising in neural-crest–derived tissues or within organ systems with a contribution from the neural crest. There is, however, a curious bias in Hall's overview in that he does not give in-depth coverage of melanogenesis, gliogenosis, and neurogenesis. This is not an oversight but the author's stated intention (see p. 6 for a justification), and it is disappointing given the parallel exciting developments in the analysis of pigment-cell, glial, and neural differentiation and the current ideas on lineage within the autonomic and peripheral nervous systems.

This criticism, however, should be put into perspective. As an overview of the neural crest spanning evolution, developmental biology, comparative embryology, oncology, and syndromology, the book is unique. Although it remains slightly flawed in its developmental coverage, it is nevertheless an exciting read—ambitious in scale, with some fascinating anecdotal material (for instance, of the 38-year delay in the publication of J. P. Hill's analysis of the marsupial neural crest due to his reluctance to depart from strict adherence to the germ layer theory). The juxtaposition of the old and the new, the Hörstadius and the Hall, does in fact work remarkably well.

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All About Some Algae

The *Chlamydomonas* Sourcebook. A Comprehensive Guide to Biology and Laboratory Use. ELIZABETH H. HARRIS. Academic Press, San Diego, CA, 1989. xiv, 780 pp., illus. $145.

Few books are awaited as eagerly, particularly among its particular audience, as Harris's *Sourcebook*. For those who work with or are interested in *Chlamydomonas* the finished product is worth the wait. Every aspect of work on *Chlamydomonas* since research on these algae became popular in the early 1950s is reviewed. Mentioned also are earlier studies, including the initial discovery of these organisms over 200 years ago and the eventual naming of the genus by Ehrenberg in 1833.

The genus *Chlamydomonas* includes at least 459 species of single-celled, flagellated al-

gae. The algae have been isolated from a variety of environments around the world, including soil, fresh and sea water, and air at 1100 meters. The book emphasizes the utility of *Chlamydomonas* as systems for research on a broad range of biological questions. Few organisms have such versatility. More work has been done with *C. reinhardtii* than with other species, but *C. eugametos* and *C. moewusii* have also been extensively studied. The organisms provide nearly all the general features of plant cells and more. Two flagella (undulipodia) give the cell motility and are used for initial pairing of mating types. The manipulability of mating types and subsequent zygotes under laboratory conditions has made them classic systems for examining nuclear (Mendelian) and organellar (non-Mendelian, uniparental) inheritance. The magnitude of work already accomplished, the availability of a large variety of mutants, and the ease of generating additional mutations provide a strong foundation for the use of *Chlamydomonas* in studies of processes that would be more difficult with higher plants and animals.

The early part of the book reads like a detective story, with bits and pieces of information gathered to trace origins and lineages. From this Harris develops a standard for nomenclature of species and mutant strains. Approximately half the book is devoted to a detailed description of the major cellular structures and their functions. This review aptly illustrates the suitability of the algae for examining such processes as cell wall biosynthesis, the cell cycle, assembly of microtubules and flagella, motility and phototaxis, gametogenesis and mating, organellar and nuclear molecular genetics, photosynthesis and chloroplast development, and plant metabolism. Chapters concerned with these topics are liberally illustrated with electron micrographs and diagrams.

The last chapter provides experimental protocols. Most were contributed by the investigators who developed the procedures and are presented in sufficient detail that the novice will have no difficulty using them. Protocols for essentially every aspect of work on the organisms are provided, from those pertaining to the fundamental aspects of cell growth to the recently developed techniques for transformation. Even several laboratory exercises are included to introduce some intriguing aspects of *Chlamydomonas* to future investigators.

An index of known nuclear and chloroplast mutations (mostly of *C. reinhardtii*) is included near the end of the book. Interestingly, no mutant of the mitochondrial genome has yet been identified. For each mutation the genetic locus (if known), phenotype, source, and reference to the original description are given. Also included are the repositories from which these strains can be obtained. The major collection, of which Harris is curator, is located at Duke University. Unexpected components of the book are a list of Ph.D. theses of 184 graduate students who were trained by *Chlamydomonas* between 1913 and 1986 and a 123-page bibliography. After this much activity, the field is due a handbook.

The book is exceptionally free of errors. It is written in a clear and matter-of-fact style and is logically organized. In short, the book is a superb achievement. It should be on the shelf of every person who has an interest in *Chlamydomonas* as a research or teaching system and in every library used by students of biology.

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Quasi-Stellar Spectra

QSO Absorption Lines. Probing the Universe. J. CHRIS BLADES, DAVID A. TURNSHEK, and COLIN A. NORMAN, Eds. Published for the Space Telescope Science Institute by Cambridge University Press, New York, 1988. x, 348 pp., illus. $39.50. Space Telescope Science Institute Symposium Series, vol. 2. From a meeting, Baltimore, MD, May 1987.

QSOs, or "quasi-stellar objects," are distant galaxies whose centers contain black holes with masses up to 100 million times the mass of the Sun. Objects near the black hole—either gas clouds from the interstellar medium or shredded stars from the "host" galaxy—are drawn into the black hole by gravity. This accreting material must lose some angular momentum via viscous forces before dropping below the event horizon of the black hole. In this process, an enormous amount of energy is liberated, which either radiates away in the form of light or is retained by the gas as heat.

The supermassive black hole and accretion flow, called the QSO's "central engine," can far outshine the surrounding stars. The high luminosities of QSOs enable astronomers to use them as probes of the Universe at great distances and hence at epochs when the Universe was about 20% of its current age. This was a period when many important events took place—the formation and and rapid early evolution of galaxies, the beginnings of the collapse of large structures such as clusters of galaxies and superclusters, and the rapid turn-on of QSOs.

All QSO spectra show discrete absorption lines, caused by the absorption of the QSO continuum by atoms in intervening gas clouds that have nothing to do with the QSO. Traditionally, QSO absorption lines have been grouped into two classes: the "Lyman-α forest" and the "metal-line" systems. The Lyman-α forest clouds are extremely numerous (like trees in a dense forest, hence their whimsical name) and show absorption by hydrogen but not by any heavier elements. These clouds are fascinating because they may represent material with primordial abundances, that is, material that has never been contaminated by the products of nucleosynthesis from stars. Hence they may represent protogalactic or pregalactic material. The "metal-line" systems, on the other hand, probably arise in clouds in the gaseous halos or disks of very distant galaxies. These systems are of interest because they allow astronomers to study relatively normal galaxies, that is, galaxies that are not QSOs and that are much too distant and too faint to study any other way.

Ironically, with ground-based optical telescopes it is easiest to study absorption lines from the most distant clouds and relatively difficult to study the absorption lines from clouds nearby. This is because most of the strongest absorption lines are in the extreme ultraviolet part of the electromagnetic spectrum, which is blocked by Earth's atmosphere. The most distant objects are moving away from us at high velocities owing to the cosmological expansion of the Universe, so their ultraviolet spectra are Doppler-shifted into the optical and infrared ranges, which are observable from the ground. Objects nearby, on the other hand, are not moving as fast, and the most interesting parts of their spectra are in the extreme ultraviolet, observable only from space.

With the Hubble Space Telescope, scheduled for launch next spring, astronomers will for the first time be able to study the ultraviolet spectra of QSOs in detail comparable to that in the optical spectra obtainable with large ground-based telescopes. These observations will provide insight into the origin and physical conditions of the absorbers by allowing astronomers to study ones that are close enough to permit detailed comparisons with well-studied objects such as local galaxies.

The symposium that gave rise to this book was intended to take place shortly after the launch of HST. With the postponement of the launch after the Challenger tragedy, the focus of the conference shifted from space-based work to a review of the ground-based work of the last 10 years.

Despite the lack of data from HST, there were many new results to report. R. Hunstead and R. F. Carswell showed conclusive evidence that the number density of Lyman-α forest clouds has decreased sharply with