sonality into his work. Such men were rare in the 18th century.

In any case, Gillmor's book is a welcome addition to the literature of 18th-century science. Until recently, various periods in the history of science have seemed curiously disconnected, a result of the lack of sufficient monographic studies. Coulomb's life embodies one of the intellectual connections bridging the great divide of the French Revolution. We are fortunate that the story has been told so well.

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Inventor and Entrepreneur

Elmer Sperry. Inventor and Engineer. THOMAS PARKE HUGHES. Johns Hopkins Press, Baltimore, 1971. xx, 348 pp., illus. $15.

Elmer Sperry was, by almost any standard, a remarkable person. His success as a scientist and engineer was symbolized by his some 350 patents and the accolades bestowed by his peers: the John Fritz Medal, the presidency of the American Society of Mechanical Engineers, and membership in the National Academy of Sciences among others. Too, his was something of a "rags to riches" story; born in relatively humble circumstances near Cortland, New York, in 1860, he was at the end of his life the wealthy head of industrial enterprises. He even became an object of general public interest; though he hardly challenged Edison's status as America's number one inventor folk hero, he was widely known and in 1930 was profiled by the *New Yorker*. A small-town boy in his origins, he traveled widely, in his later years becoming particularly fond of Japan.

How could a young American with limited technical education achieve such eminence? Talent was a vital prerequisite. But equally important, Sperry managed to choose fields in which the technology was not beyond his grasp and which repaid creative efforts. His first contributions were to the development of the arc lamp, but he moved from there into mining machinery, electric traction, automobiles, chemistry, and finally gyroscopic closed-loop or feedback control systems. As Hughes correctly suggests in this biography, "his rich career is a microcosm of the history of recent technology." But Sperry's success was based on something more: his ability to play varied roles of inventor, developer, and entrepreneur. His chief interest was in organized inventive activity, but he was also skilled in converting ideas into marketable items. Much of his work in gyros, for example, demonstrated an ability to invent to meet emerging needs. Sperry's career suggests that invention and innovation are closely linked with developments in the larger society.

Hughes has provided a model of first-rate biography, exemplifying the very best qualities of modern American historical scholarship. He was fortunate in being able to draw upon a rich store of materials both printed and manuscript. But what is even more impressive is his ability to analyze his information with sophistication and insight. He provides, for example, a subtle analysis of Sperry's various roles as inventor and entrepreneur-innovator and suggests the complex processes by which the heroic age of invention gave way to the modern era of organized research. Hughes's expositions of the development of Sperry's ideas and the

"The Sperry streetcar at the Chicago World's Fair, 1893. Elmer Sperry, right, has his hand on the brake. With him were three pioneers in electrical engineering education: Louis Duncan of Johns Hopkins, Dugald C. Jackson of Wisconsin, and H. J. Ryan of Cornell." The streetcar "was notable for its superior hill-climbing ability. [It] used a single motor, while other streetcars employed a motor for each axle. Because all axles and wheels were a part of a coupled system on the Sperry streetcar, one set of wheels and one motor could not lose traction and slip. . . . When the car ascended a hill and the front wheels lost contact all of the power went to the rear wheels, which maintained contact where the power was needed." [From *Elmer Sperry: Inventor and Engineer*]

nature of his technological contributions are admirably clear. The reader with limited technical background may find sections of the book difficult going, but his efforts will be well rewarded. Hughes makes good use of illustrations, both line drawings and photographs, to make his points. Nor does he neglect the personal side; Sperry comes through as a comprehensible human being with characteristic human virtues and foibles.

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A Reassessment of Historic Miseries

Darwin's Victorian Malady. Evidence for Its Medically Induced Origin. JOHN H. WINSLOW. American Philosophical Society, Philadelphia, 1971. viii, 94 pp. Paper, $2. Memoirs of the American Philosophical Society, vol. 88.

The masses take sick, complain, and die; the great also die, but their complaints command notice. Few men have left a more voluminous record of their bodily miseries than Charles Darwin, and even fewer have engendered so extensive and contradictory a literature of *post hoc* diagnoses and interpretation. Darwin's gloomy record of affliction began in the 1830's and continued, with modest relief in later life, until his death in 1882. His entire career was thus marked by unceasing physical discomfort and mental distress.

Critics friendly and otherwise have to date emphasized the spiritual origins of Darwin's persistent malaise. Robert Darwin, they claim, Charles's forceful father, tyrannized over his son (among others) and thus generated in him an unacknowledged compulsion to free himself from the paternal bond. Charles, of course, failed to extinguish his earthly father; he succeeded, nonetheless, in doing in God the Father. If, remarked Rankine Good, surely the most intrepid of Darwin's psychoanalytic interpreters, the naturalist "did not slay his father in the flesh, then in his *The Origin of Species* . . . he certainly slew the Heavenly Father in the realm of natural history." Darwin was guilty of "unconscious patricide" and suffered in consequence a "crippling and lifelong neurosis." Much more than Darwin's personality and conduct is in question here; the naturalist's assault upon traditional wisdom in natural history—principally, the immutability of biological species, these being the direct product of Divine wisdom and power—becomes, together with his ailments, a consequence of the deeply disturbing psychic experiences of early life.

This interpretation is all the more beguiling for its internal coherence and apparent consistency with important intellectual and religious developments in Victorian England. It suffers only, as John H. Winslow aptly remarks in the book under review, from a dearth of evidence and inherent improbability. Winslow suggests that the notion of Darwin's suffering as psychosomatic emerges largely from our inability, despite no lack of suggestions, "to identify an organic disease which fits all or most of Darwin's symptoms." Winslow has therefore undertaken a detailed analysis of Darwin's complaints and, above all, a careful investigation of the development of his illness. The evidence he has examined and now presents in a brief and closely reasoned essay leads to the conclusion, designated a "high probability," that Darwin suffered from chronic arsenical intoxication.

The "Victorian malady" of the title is dyspepsia, which toward midcentury was recognized as a distinct malady by English physicians. The Victorian dyspeptic suffered from headache, nervousness, sleeplessness, dejection, "indescribable suffering," and a host of other ill-defined complaints. Calomel and Fowler's solution were very commonly prescribed for dyspepsia. The latter, containing potassium arsenite, is the true villain of the tale. Fowler's solution offered initial relief from vague dyspeptic complaints and then, as a result of chronic use and poisoning, produced and perpetuated similar complaints. Dyspepsia was widespread in Britain: in addition to Darwin, Thomas Huxley, George Eliot, the Carlyles, Herbert Spencer, and Robert Browning knew its miseries. Through comparison of the manifest symptoms of dyspepsia and of chronic arsenical intoxication Winslow bravely concludes that the two maladies are identical and suggests "Fowler's disease" as a suitable designation for both.

Was Darwin's dyspepsia really Fowler's disease? Darwin suffered, often severely, from eczema and probably was taking arsenic as a remedy even before sailing on the *Beagle*, and various evidence confirms his later and not infrequent use of arsenical preparations. His essential symptoms, and this is Winslow's basic argument (pp. 58–74), are wholly congruent with chronic arsenical intoxication.

While Winslow's essay is a case study of Darwin the patient, its implications are much broader. The wide agreement among Victorian physicians regarding the therapeutic necessity (and perils) of arsenic, other heavy metals, and various potent drugs of vegetable origin is notable but was hardly novel. Chemical remedies had enjoyed mixed popularity since the 16th century; certain elements, notably mercury used for the alleviation of syphilis, were deemed indispensable. But how widespread was the use of such powerful drugs? Which classes of society had access to and were in turn affected by them? Would only those who could afford to consult physicians be exposed to this often costly and potentially deadly medical armamentarium? Was iatrogenic disease of the pharmaceutical variety largely or even exclusively the lot of propertied men? Winslow's evidence suggests this as a real possibility for Victorian England. The class structure of medical practice deserves close scrutiny, and not least from the viewpoint of the actual or prospective patient. By midcentury certain London practitioners had, it appears, captured the bulk of the educated and moneyed clientele (Winslow indirectly records the close connections existing between patients from the scientific community, including, of course, Darwin, and a rather small set of eminent physicians), and these distinguished patients may as a result have acquired distinctive patterns of morbidity. Fowler's disease stands as a preeminent example of this intriguing possibility.

Darwin's Victorian Malady thus serves the reader on two levels. It reopens the possibility that Darwin's affliction was organic in nature and not psychosomatic. If this interpretation is sound (retrospective diagnosis, it must be emphasized, is always perilous), it means we may do away with much of the venerable, tedious, and not particularly illuminating psychoanalytic approach to Darwin's bodily complaints and intellectual development. The essay, furthermore, forces attention to—although it does not explicitly investigate—the social framework within which