

ever, the southerners who were in charge of taking and publishing this census found these results so useful in defending southern society from northern attack that they deliberately sabotaged efforts to re-examine the data. Although Americans' uncritical faith that numbers could solve their social problems was weakened, the capacity of highly numerate Americans to criticize numerical techniques and data increased.

The book ends with a broad discussion of what historians can learn about American society and ultimately about any society from looking at its level of numeracy and the domain of numbers. A society is reflected not only in what it counts but in what it chooses not to count. Similarly, the kinds of numerical skills that are stressed reflect the values it attaches to such activities as logical analysis or rote memorization. It is important for us to study who was expected to be able to manipulate numbers and symbols and why. Perhaps the most important conclusion of Cohen's book is that, although numbers themselves may be neutral, the means by which they are determined and the uses to which they are put are closely connected to the culture that surrounds them. This is an important lesson not only for the history of numeracy but also for those of us who are concerned with numerical analysis today.

ROBERT V. WELLS

*Department of History,  
Union College,  
Schenectady, New York 12308*

## A Woman Mathematician

**Little Sparrow.** A Portrait of Sophia Kovalevsky. DON H. KENNEDY. Ohio University Press, Athens, 1983. x, 342 pp. Cloth, \$25.95; paper, \$12.95.

In *Little Sparrow: A Portrait of Sophia Kovalevsky*, Don H. Kennedy has provided the first book-length biographical account in English in many years of an outstanding 19th-century mathematician and advocate of equal educational opportunity for women. Sophia Kovalevsky (née Korvin-Krukovsky) was a member of a Russian noble family and grew up in an atmosphere charged by the emancipation of Russian serfs, the Polish uprising, and radical and gentry politics. In 1869 she left Russia by arranging a marriage of convenience with a promising paleontologist, V. O. Kovalevsky, and succeeded in receiving special permission to study at Heidelberg at a time when women were denied access to most

European universities. She was then 18. She became the first woman accepted as a private student by the Berlin mathematician Karl Weierstrass, and eventually the first woman professor of higher mathematics (at Stockholm) and the first woman elected as a corresponding member of the Russian Academy of Sciences, although she was not permitted to attend its meetings.

For the caliber of her work alone, Kovalevsky merits attention. Three research papers written during her study with Weierstrass in Berlin earned her a Göttingen doctorate *in absentia summa cum laude*. One of these papers contains her reformulation of Cauchy's problem, expressed in what is now known as the Cauchy-Kovalevsky theorem, a cornerstone in the general theory of partial differential equations. Her work on the motion of a rotating solid body, the so-called "mathematical mermaid," won the prestigious Prix Bordin in 1888. In her brief career (she died in 1891) she also studied the refraction of light in crystals, the theory of Abelian integrals, and Laplace's theory on the form of Saturn's rings.

Kennedy's book clearly illustrates the richness of experience and personality woven into Kovalevsky's life. She moved in exciting intellectual and scientific circles and traveled widely. In Russia her friends included Dostoevsky and Turgenev, as well as the first woman physician and first woman lawyer in that country. At the home of George Eliot in England she debated the cause of women in mathematics with Herbert Spencer. She studied under Kirchhoff, Bunsen, and Koenigsberger at Heidelberg and later enjoyed fruitful scientific contact with such eminent mathematicians as Hermite, Poincaré, and Mittag-Leffler.

In his portrait of Kovalevsky ("Little Sparrow" was her nickname as a child), Kennedy has drawn primarily on works cited in the bibliography, including published memoirs and correspondence, as well as on recollections passed down through families related by marriage to Kovalevsky's. Nina Kennedy, the author's wife (herself a distant relative of Kovalevsky), translated much of the Russian material for Kennedy's use. In the interest of including a wealth of information gleaned from the numerous letters and memoirs, the author sometimes sacrifices a graceful prose style, and the sources of quotations are not always clearly identified.

In part because of Kovalevsky's own introspection, the personal nature of much of the surviving correspondence, and the character of her friends' reminis-

cences, Kennedy often dwells on psycho-emotional issues. He has not really attempted an analysis of her mathematical work; instead he includes as an appendix Weierstrass's letter of recommendation for his prize pupil, sent to Lazarus Fuchs when Kovalevsky was seeking a Göttingen degree. The letter admirably summarizes her work, but only up until 1874. What is still lacking in English is an integrated study of both the life and the works of Sophia Kovalevsky. In the meantime, Kennedy's book offers an intriguing account of the forces that shaped her career.

ROBIN E. RIDER

*History of Science and Technology  
Program, University of California,  
Berkeley 94720*

## Delinquents in Adulthood

**Physique and Delinquent Behavior.** A Thirty-Year Follow-Up of William H. Sheldon's *Varieties of Delinquent Youth*. EMIL M. HARTL, EDWARD P. MONNELLY, and ROLAND D. ELDERKIN. Academic Press, New York, 1982. xiv, 588 pp., illus. \$49.50. Personality and Psychopathology.

William H. Sheldon single-handedly carved out a niche in American science for constitutional psychology. Following a pertinacious search for the connection between physique and temperament, Sheldon undertook in 1939 a practical application of his discoveries and attempted to provide comprehensive "psychological biographies" of 200 delinquent boys. Published in 1949 as *Varieties of Delinquent Youth*, these biographies include detailed physical, psychiatric, and behavioral assessments along with the more typical social history information and culminate in Sheldon's personal prognosis for each boy. This work may be Sheldon's finest achievement. Not only did he establish the predominance of mesomorphic body builds among delinquents, a finding subsequently replicated by Glueck and Glueck (among others), he gave a compelling account of the development and exercise of delinquency among the boys he lived with and studied intently between 1939 and 1942.

A careful reading of this classic work will surprise many who think constitutional psychology translates as "biology is destiny." Sheldon lambastes society, and social science in particular, for failing to recognize the inherent delinquency of social institutions and, additionally, for failing to appreciate that only incompetent predation is labeled delin-

quent. The same readers may also be startled by the prominence given to values in Sheldon's theorizing about delinquency. Current fashion is to keep what people ought to do at least at arm's length while dealing with the more anti-septic—or is sterile a better word?—questions of how to improve performance. Sheldon would have none of this, and the sword he unsheathes cuts both ways. For him, Dionysian enthusiasm, complete with its impulsivity and take-what-you-can attitude, is at least honest, while those trying to control the revelers only appear to be busy doing good while actually feathering their own nests—competent predators living off the incompetent ones. Perhaps this is why many social workers (and social scientists) prefer to ignore values.

*Physique and Delinquent Behavior* is a 30-year follow-up of *Varieties of Delinquent Youth* that, following Sheldon's death in 1977, was completed by his colleagues. Face-to-face interviews were conducted in 1960 and 1964, and reviews of state records and telephone interviews constituted the follow-ups for non-Boston residents in 1970, 1973, 1975, and 1979.

Sheldon's characterizations of the boys in 1949 hold up reasonably well, although there are clearly some unanticipated outcomes. For example, two of the delinquent boys classified as having "severe mental insufficiency" (IQ less than 65) end up 30 years later as "normal." Similarly, two of the 18 psychotics and two of 16 "primary criminals" achieved normal status after three decades. Far from impeaching Sheldon's ability as a diagnostician, these regressions toward normality are actually small enough to warrant both Sheldon and his procedures.

The updating of the histories of these delinquent boys is an important contribution, but it is somewhat disappointing that the authors did not evidence greater curiosity and examine the relationships between and among the adolescent and adult variables more thoroughly. It is irritating not to be given, for example, any information concerning the stability of the psychiatric assessments or to know how dependent these and other measures were on the wide variety of life events documented in the biographies. This reviewer took the liberty of utilizing the data provided in one or both books in an attempt to uncover some of these relationships. A few of the more interesting ones are discussed below.

Sheldon had great hopes for the data gathered from the war records of the 115 boys who were inducted into the service

during World War II. He felt that the challenge of having to adapt in a military environment might "throw more light on the problem of institutionalization and treatment of delinquency . . . than will all the other aspects of the study." Sheldon's ratings of each boy's "value to the service" were ignored in the follow-up, but on a three-point scale they prove to be the most powerful predictor of the outcome measures, accounting for over 26 percent of the variance in the adult "index of disappointing performance" and over 18 percent of the variance in the "total of five panels of superior performance," a composite measure of success in the economic, social, reproductive, goal-orientation, and aesthetic domains. This finding is particularly interesting because "value to the service" yielded only a low and insignificant correlation with IQ, another good predictor of outcome. These analyses are all based on the 105 (out of 115) boys for whom service data were available and who, except for three suicides, survived and were followed up after age 40.

Another finding raises the issue of how to characterize the sample of 200 delinquents. There are an unusual number of significant correlations between stature and the variables used initially by Sheldon. Gynandrophrenia, mesomorphy, ectomorphy, aesthetic pleasingness of the body, IQ, and the hebephrenic psychiatric component all have highly significant ( $p < .001$ ) correlations with height. Whether this reflects a peculiar mix of delinquent types in the sample or indicates, as some have claimed, that Sheldon's three-variable approach to somatotyping really reduces to thickness and length awaits a more detailed analysis than the one provided in this volume.

JOSEPH M. HORN

Department of Psychology,  
University of Texas, Austin 78712

## Development and Evolution

**Embryos, Genes, and Evolution.** The Developmental-Genetic Basis of Evolutionary Change. RUDOLF A. RAFF and THOMAS C. KAUFMAN. Illustrated by Elizabeth C. Raff. Macmillan, New York, and Collier Macmillan, London, 1983. xiv, 396 pp. \$34.95.

This is a very appropriate time for the publication of a book such as this one. Recent years have witnessed a renewed interest in the role of development in evolution. The organism is viewed no longer as a black box tracking environmental change but rather as having inter-

nal structure and organization that constrain its responses to selective pressures. This book by Raff and Kaufman is quite different in its approach from other recent volumes on this issue. Gould's *Ontogeny and Phylogeny* (which was, perhaps, critical in sparking the rediscovery of developmental biology by evolutionists) has a historical emphasis and is largely restricted to heterochrony, or changes in phylogeny due to alterations in timing and rates of development. The methodology in heterochronic studies is essentially comparative, and the mechanisms of gene regulation and pattern formation are not discussed. *Evolution and Development*, edited by Bonner, has the traditional lack of focus of multi-authored volumes. In contrast, Raff and Kaufman, developmental geneticists by training, undertake the task of distilling the large amount of current literature on regulatory genetics and discussing its implications for evolutionary biology.

At the end of the first chapter the authors state their belief that "the time has come to take the final step in the modern synthesis: to fuse embryology with genetics and evolution" (p. 24). But a synthesis is not delivered. In the final chapter the authors appear to imply that the field is not ready: "Our ability to synthesize what has gone before in this book is severely limited by a currently poor understanding of the way in which genes direct morphogenesis of even simple metazoan structures and of the nature of high-level genetic regulatory interactions" (p. 336). Nevertheless, the book is unique and valuable as a review of knowledge bearing on how developmental changes can affect evolutionary processes.

The first chapter attempts to place the subject in a historical context. The authors' approach, emphasizing the genesis and control of morphological organization, is placed in the tradition of Huxley (on allometry), D'Arcy Thompson, de Beer, and Goldschmidt (to whom the book is dedicated). The discussion of the relationships between development and evolution as perceived by Haeckel and Von Baer is somewhat superficial. The reader should refer to the excellent and more thorough reviews by Gould (*Ontogeny and Phylogeny*) and by Russell (*Form and Function*) and to the pertinent papers in *The Evolutionary Synthesis*, edited by Mayr and Provine. The chapter improves in its discussion of the relation between developmental genetics and evolution.

The next two chapters are a review of the literature on evolutionary mechanisms from a paleontological and neonto-