parents in Tudor and Stuart times, and Antonia Fraser, in her *The weaker vessel* (Weidenfeld, 1983) tells numerous stories of passionate marriages.

The Stonian interpretation has now been reinforced by Miriam Slater's anatomy of a seventeenth-century gentry family, the Verneys. Slater's is a bleak view indeed. She does not see the Verney family in the Stuart age as a "human socializing and nurturing agency devoted to the emotional and psychological welfare of its members" (p.144) but rather as an instrument of "social control". She stresses the tyrannical power exercised by the family head, Sir Ralph; and shows how practically all Verney marriages were not merely arranged for financial advantage but were emotional failures. Slater regards the Verneys as typical of their age (this was "family life in the seventeenth century"), but the inference may be dubious. Much of her evidence comes from the Civil War period, during which the Verney family was thrown into deep chaos by the death in battle of the family head Sir Edmund, the premature elevation of his son, Ralph, and constant major threats to the Verney estates. Emergency retrenchment measures at a time of Civil War must not be confused with the practices of routine, peacetime family strategies.

Altogether a sunnier picture of the early modern family emerges from Steven Ozment's investigation of sermons and advice manuals instructing family members on their duties and on the upbringing of children. These works—and Ozment's sample is mainly German, and mainly Lutheran—advocate love, care, responsibilities, and moderation. The wishes of wives are to be respected, and children are to be disciplined by example not by the rod. Ozment optimistically concludes that these tracts mirrored or shaped reality. A cynic might suggest that they instead indicate that the real world of the Reformation family was indeed as harsh as Stone has painted it.

Ozment's book is of direct interest to the medical historian, because his chapter on childbirth contains admirable summaries of midwifery and infant-rearing treatises of the sixteenth century, in particular Eucharius Rösslin's *Rosengarten* (1513) and Johann Coler's *Haus-Buch* (1591). It is noteworthy—though it may not be significant—that the earlier, Catholic Rösslin is markedly more "scientific", more "enlightened", more "forward-looking" than the later, Protestant Coler. Rösslin showed immense concern for the well-being of the pregnant mother, and required gentleness of the midwife. He urged mothers to nurse their own babies. Coler, by contrast, retailed gross superstitions (an eclipse at the hour of birth spelt death to both mother and child) and dabbled in therapeutic magic (removing a dead foetus from the womb would be helped by draping a snakeskin over the mother).

Medical historians will also be glad of Ozment's survey of the autobiographical writings of Hermann von Weinsberg, born in 1518. His youth was attended by all the horrors of infant mortality (all his sisters died). He himself suffered numerous near-fatal diseases, such as measles; he also suffered equally terrifying cures (for a nosebleed he was "hung somewhat by the neck"). His childhood was dogged with perennial ill health, notably by worms and ineradicable infestations of lice.

Battle will doubtless continue to rage over the health and happiness of families. These useful case studies tend to suggest that while the material conditions of life were appalling, personal relations may not have been so harsh and mercenary as they have been painted.

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W. E. VAN HEYNINGEN and JOHN R. SEAL, *Cholera. The American scientific experience 1947–80*, Boulder, Colorado, Westview Press, 1983, 8vo, pp. xvi, 343, illus., £24.00 (UK suppliers: Bowker Publishing Co., Epping, Essex).

During the two decades that followed the Second World War, the United States underwent a social transformation that affected virtually all aspects of domestic and international life. Fuelled by a buoyant optimism, relatively unscathed by the war, the American economy grew to unprecedented size, carrying with it a sense that all of the problems of the world were susceptible to solution if sufficient energy and support could be funnelled into their investigation. The growth of the National Institutes of Health, the extension of international

aid, the myriad other economic and social changes were all part of this thrust, and accompanied the ideological desire to demonstrate the superiority of the American system over those economic systems that had emerged in Eastern Europe and much of Asia. The means for achieving the conquest of cholera was one of the products of the time and illustrates the manner in which scientific, political, and economic forces could be brought together to achieve one of the most significant events in medical history. This book tells the tale expertly, and from the inside. Because the authors were two of the important participants in the drama they could speak authoritatively, not only about the scientific aspects but also about the personalities and the social and political background against which the fashioning of a simple and inexpensive treatment for cholera took place. That mortality on the Indian subcontinent was reduced from 30–50 per cent of cases to under one per cent, and that this simple treatment could be extended to diarrhoeas of other causes, was the ultimate and most important contribution. The recognition of the value of this treatment and the steps by which it emerged are a scientific drama that belongs in the consciousness of medical historians, scientists, politicians, and others who might be intrigued by the manner in which discovery and practical application of major treatments evolve.

The story begins with the recognition by clinicians such as Thomas Hodgkin, in the early nineteenth century, that cholera was principally a disease of the poor, that somehow it was contagious in a community, but that it did not seem to be transmitted directly from an afflicted patient to those who were in contact with that patient. Following this recognition, the epochal studies of John Snow taught that the contagion was spread largely through contaminated water. Within a few decades, the microscope had revealed the contagious agent—a comma-shaped bacillus that was found in the intestinal secretions of patients, and soon the organism had been cultivated. Then began the search for the mechanism by which the extraordinary loss of fluid was induced by the bacteria and there was the expected rush toward the development of protective vaccines and antisera in consonance with the extraordinary discoveries that were being made for other infections. Frustration was the product. No less than Koch, Pfeiffer, and Virchow tried to solve the mystery presented by the organism and repeatedly the only toxic fraction that was found was the "endotoxin" that we now know to be the lipopolysaccharide of the outer membrane of the bacillus. Injecting this material produced fever and death in experimental animals; injecting live bacilli produced a fatal infection; antibody protected against the fatal infection of experimental animals, but the illness that was produced was not at all like cholera. It became accepted that the endotoxin was the prime virulence factor of the disease and that immunity to the endotoxin or to the whole bacillus should be stimulated by appropriate vaccines—despite the facts that field trials were not carefully conducted and that shrewd clinicians repeatedly documented their disbelief in the efficacy of the vaccine. The voices of scientific authority offered no reasonable alternatives. Faced with the devastation produced by the illness, the field continued to press for the only solutions that seemed reasonable. Fortunately, in the more developed countries, improvements in sanitation and in general hygiene had led to the virtual disappearance of the disease, and the medical and scientific profession could accept some of the credit. Unfortunately, in most of the world the disease continued its devastating course, and the Indian subcontinent, with its dependence on the rivers for irrigation, sanitation, and many aspects of daily life, was particularly afflicted.

There the matter rested until an exuberant American team undertook to investigate the problem, to set up research stations in several parts of the world, and to convince appropriate authorities that these would do good medically and politically, at relatively little cost. A few forceful personalities stand out, none more vividly than Joseph Smadel. All who dealt with him were agreed that he was brilliant, driving, difficult, and capable. He inspired in those around him one of two quite opposed emotional responses. The authors have described this fully if gently.

One experiment, by De, turned the search for a toxin around completely. He demonstrated that in an isolated loop of intestine, in the rabbit, the injection of live cholera bacilli caused outpouring of fluid that was similar to the fluid that poured from the intestinal tract of choleric

patients. The demonstration led to the realization that an exotoxin was produced in the experimental animal but it took many experiments and much subsequent work to define the conditions whereby such an exotoxin could be isolated and purified under laboratory conditions. The work was slow because there were many who did not believe that such an exotoxin could possibly exist.

Simultaneously, particularly under the leadership of William Phillips, a former naval officer, a team began investigations of the physiological consequences of the disease and demonstrated the chemical content of the fluid that was being passed in such huge volumes. That it was essentially a filtrate of plasma, with added bicarbonate, became evident. Research stations began to pour back balanced fluids. Earlier attempts to return electrolyte and fluid to the blood were considered failures. This was because when the patients became somewhat rehydrated, the diarrhoea returned. Soon, however, it was realized that this was to be expected. However, biochemical studies had led some to use hypertonic fluids and others hypotonic fluids with sometimes disastrous results. Finally, came the realization that a balanced mixture of salts could be returned to the body of the affected victim, in volumes equal to those that were being lost and that, almost miraculously, the mortality rate was then reduced to negligible proportions. Not much later, in consequence of the availability of the exotoxin and the intestinal loop of the experimental animal, it could be demonstrated that in the presence of glucose, the electrolytes and the fluids would re-enter the body from the intestinal tract and oral rehydration was instituted. It was not all that simple. Each of the steps was opposed by many, for what seemed to be adequate scientific reasons at the time. Perhaps the most important scientific failing was the absence of carefully controlled clinical trials of the type that would now be considered virtually a necessity before any treatment could be evaluated. This was a time, not yet completely gone, when the laboratory observation reigned supreme and the techniques of large-scale clinical observation through controlled trials had not received widespread acceptance, particularly among those who fancied themselves as "hard" scientists. These are chapters from which all may learn, the most important lesson being that the closed intellect, no matter how skilled and highly trained, will make errors in judgement if the guiding principle is not empirical results of carefully conducted experiments.

This is a good book. It tells what happened in a manner that is rarely told about a major scientific process. It tells it from the viewpoint of expert participants, and it leaves out little, although it deals delicately with the foibles and errors in judgement that, in retrospect, may have delayed the process of saving lives. Once again we are impressed by the wisdom of Santayana's words—if we do not absorb all of the lessons of this tale, we will be condemned to repeat the errors of the past.

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GIULIANO PANCALDI, *Darwin in Italia*, Bologna, Il Mulino, 1983, 8vo, pp. 294, L.25.000 (paperback).
GIULIANO PANCALDI (editor), *I congressi degli scienziati italiani nell'età del positivismo*, Bologna, Cooperativa Libreria Universitaria Editrice, 1983, 8vo, pp. 225, L.16.000.

Giuliano Pancaldi, one of the leading Italian historians of biology, has produced almost simultaneously two highly attractive books. The first is an original contribution, whilst the second consists of a collection of essays edited by Pancaldi.

Darwin in Italia is a further step towards an understanding of the relationship of Darwin's thought to the works of some of the important Italian scientists of the nineteenth century. Glick's *Comparative reception of Darwinism* (1974) did not include a chapter devoted to Italy. A few subsequent studies have contributed to filling that gap, such as those by Giovanni Landucci in 1977 and 1981, and that by Pancaldi himself in 1977. *Darwin in Italia* consists of essays on five scientists who, in different times and with different perspectives and motivations, are related to Darwin's works. The first essay is concerned with Giambattista Brocchi, the geologist whose views on extinction were favourably received by Lyell and