aristocratic privilege after another for himself and for his brothers in return for his admittedly excellent record in the production of scholarly books. Publication in those days did rather more for one than merely remove the threat of perishing; if the book was luxurious and dedicated, like this one, to two reigning monarchs—that is, to the Emperor Charles V of Rome and to his brother King Ferdinand of Spain—then one got various patents of nobility. One of these is, I think, my favorite among honors bestowed upon men of science; Apianus was appointed *Comes et Miles sacri Palatii et Aulae Lateranensis,* which entitled him "to appoint notaries and to legitimize children born out of wedlock."

The Love of Elaborate Perfection

In those last few decades of Ptolemaic astronomy, before Copernican thought and the new mathematics of Kepler and Newton swept all before them, there came an intoxication of perfection among astronomers. All were in love with the sweet completeness with which the universe had been mastered, and in this spirit so many toiled magnificently to show this perfection to the layman and to posterity. The huge and elaborate armillary sphere by Santucci in the recently ravaged Museum of the History of Science in Florence shows this perfection by its thousand carved and gilded wooden circles modeling the universe, and the mighty elaboration is in just the same genre as that displayed here by Apianus. All lovers of graphs and nomograms, of ingenious mechanisms and "beautiful" experiments, will appreciate the depths of emotion in the heartcry of Kepler, who in *Astronomia Nova* (chapter 14) wants his science straight:

> Who will provide me with a source of tears to bewail the misdirected efforts of Apianus, who in his *Opus Caesareum,* as a faithful servant of Ptolemy, has wasted so many fine hours and so many highly ingenious arguments on constructing a most complicated maze of spirals, loops, lines and whirls which represent nothing more than what exists in the imagination of man, and is wholly divorced from nature's true image. His work demonstrates one thing only, namely, that this man, with God's gift of a profound and penetrating intellect, could have mastered nature. Instead he was satisfied and even pleased that he had invented those artificial constructions (in competition with nature herself) and that he had succeeded in making those mechanical models. Thereby he may have earned the prize of perpetual fame, but let us not forget the damage he has caused through the success of his works; and what shall we say about the empty art of the producers of automatons, who used 600 or even 1200 wheels in order to produce the figments of the human imagination, and who were gloating in triumph about their achievements and were claiming prizes because of them.

I have heard the same feeling expressed among those who fear a similar intoxication today with the power of the computer used as an end in itself instead of, as they think should be, a means to an end.

All the prettiness of the book reminds one inevitably of a very clever computer program. The fancy typesetting and use of mirror type, and the embellishment of color and decoration, including entirely nonfunctional handles and the hands to hold them on each instrument, these are all extrinsic to the purpose. But in the scientific purpose itself the same neatness and elegance prevails; a pretty and elegant way to do things is always to be preferred, and this shows up again and again in the design of these instruments and in all the other instrument books and publications of Apianus. The essential beauty of science is not, after all, a bad thing, and this book captures so much of the essence of that essential beauty and was itself a most crucial and powerful force in bringing together at a single point in history the power of scientific theory, beautifully elegant instrumentation, and the technique of printing. At any price it is good to have available in perfect form this great milestone in scientific history.

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Spermatozoa

Animal Gametes (Male). A Morphological and Cytochemical Account of Spermatogenesis. VISHWA NATH. Asia Publishing House, New York, 1966. 342 pp., illus. $13.50.

Nath has written a detailed monograph on the morphology of spermatozoa, and their differentiation. The book deals with a wide range of animals—mammals, birds, reptiles, fish, insects, molluscs, crustaceans, myriapods, nematodes, arachnids, and a few other species. It has undoubted value as a modern specialized supplement to the classical writings of Retzius (1906–09) and Wilson (1928). The book contains several references to works published in India which may be unknown to many investigators elsewhere. Unfortunately the author has had to rely on many secondhand sources because of the unavailability of non-Indian journals. This is a problem which faces many scholars in underdeveloped countries and toward which one is sympathetic.

As a general work the book has certain shortcomings both in style and production. Only some of these can be listed. First, the author assumes that his readers are fully aware of the overall morphology of the spermatozoa of any species he chooses to discuss. For example, his chapter on avian spermatozoa plunges directly into a detailed discussion of acrosome formation in the fowl and duck, and not until three pages later are the uninitiated informed of the two types of avian spermatozoa. Second, it is difficult to understand why a modern student of cell structure should discuss separately studies done by light microscopy and those done by electron microscopy. Yet this format is followed in eight of the 12 chapters. However, in the first chapter, which covers mammalian spermatozoa and is probably the best in the book, an alternative style is adopted. Here the author deals systematically with all parts of the spermatozoon and integrates studies made with several techniques. It is a pity this format was not adopted throughout the book. Third, the book is not a general account of spermatogenesis, as its subtitle claims, but deals almost exclusively with the final stages. These stages involve the morphological transformation of the spermatid into the adult spermatozoon, and are therefore only a part of the total process of spermatogenesis. Fourth, the placement of 184 figures at the end of the book, after 141 pages of text, makes the book very irritating to read, and this is made even worse by the fact that several of the electron micrographs are inferior reproductions of the original publications. The information appears accurate, however, and it will be a useful source in future work.

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