viewed as the narrative frame within which Shakespeare weaves a number of tales "of resistance and discord," the most problematical being the mechanicals' parody of Pyramus and Thisby, a "counter-model" of "the reconciliation and accommodation" (p.172) proposed by the play's typical comic conclusion. Similarly, Shakespeare's utilization in *Hamlet* of the festive ritual of "charivari" or "mirth in funerals" (p.161) reveals how the elements of clowning and "grotesque laughter" resist the reconciliation of "the unfathomable contradictions of political succession" (p.193). Bristol's claim, on the other hand, for the popular "agon or Battle of Carnival and Lent" (p.161) as a dominant rhetorical structure in *King Lear* – Lear, the "Carnival king," is replaced by "Lenten severity" which fails to bring about harmonious rule (pp.211-12) – is disappointingly cursory. The analysis of the Battle of Carnival and Lent in *Henry IV*, Parts I and II is the least engaging, for it does not pursue the full significance of Falstaff's defeat. Falstaff's Carnavalesque treatment of "honorable death as a joke" and his exultation in the excesses of the body render him the spokesman for "a plebeian consciousness that maintains itself despite sacrifices demanded in the name of the nation-state" (p.183) represented by Prince Hal, the "embodiment of Lenten civil policy" (p.206). Bristol, however, ignores the possibility that Falstaff's public rejection in *2 Henry IV* implies Shakespeare's negation of Carnival as the voice of historical continuity.

Although the problem of authority is not fully accommodated to Shakespeare's complex vision of history, the study is a significant and provocative contribution to revisionist criticism.

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Science and the Arts in the Renaissance. Eds. John W. Shirley and F. David Hoeniger. Washington: Folger Shakespeare Library. London and Toronto: Associated University Press, 1985. Pp. 220.

The ten essays published in this collection were first presented as talks at a two-day symposium on *Science and the Arts in the Renaissance* held at the Folger Shakespeare Library in October, 1978. Taken as a whole, they represent an eclectic harvest of ideas demonstrating diverse methodologies and sometimes contradictory theories about the early relationship of the two disciplines. The diversity of the contributions reflects what must have been an energetic scholarly interchange, and records for posterity an important event in the history of the field.

The first essay, by the venerable historian of science Alistair Crombie, seeks to establish a common cultural and philosophical context for Renaissance intellectuals, be they artists or scientists. It is difficult reading, moving forward with the ease of a medieval Scholastic treatise, but the point is ultimately made that, in the history of ideas, theory ("science") precedes to material analysis ("art"). To Crombie, mathematical rationalism was the seed from which the modern age grew.

The next two essays, by Jerome Bylebyl on medicine, philosophy and humanism in Renaissance Italy, and P.M. Rattansi on the Paracelsian vision, have very little to do with the "arts" as such unless, of course, we include the German word *artz* in our definition of the term. Bylebyl is concerned with the balance of theory and

practice in early medicine and the social and intellectual standing of doctors who championed one above the other. The Rattansi article explores the ideals of Paracelsus from the interesting perspective of 19th-century Romanticism. In so doing, Paracelsus is perceived as both rebel and traditionalist – a true transitional figure.

Claude Palisca's contribution investigates how the revival of ancient scientific knowledge intervened with practical concerns in the theory and performance of music. His essay explores the interesting possibility that humanists such as Gafurio were not necessarily at the forefront of the musical *avant garde* precisely because they were so enamored of the rediscovered classics. The essay examines the changing concept of consonance and dissonance derived from practical performance rather than abstract theory. A similar investigation of pragmatism and progress occurs in John W. Shirley's contribution on science and navigation in Elizabethan England. This essay is a lively and fascinating exploration of the impetus that middle class capitalism gave to the knowledge of astronomy and spherical geometry in the 16th century. It documents the efforts that scholars were forced to make to acquire the language of sailors and artisans. Only then could scientists merge art with craft, producing something useful and productive.

James Ackerman's is the first essay to survey the contribution of the visual artist to Renaissance science. His is also the first to define correctly the words "art" and "science" in the context of the Renaissance, when the two were not distinct categories of learning. Even so, the "scientific" concerns which Ackerman ascribes to Renaissance artists are those which evolved into modern disciplines, such as optics and anatomy, rather than those which were properly perceived as "sciences" (such as astrology and alchemy) in the Renaissance. Like Ackerman's essay, F. David Hoeniger's study of how plants and animals were studied in the Renaissance shows a sensitivity to the historical context of the words "art" and "science." His essay reminds us that the separation of the two disciplines, though acutely felt today, is historically fairly recent. To his mind, the new knowledge communicated by the new art of the herbalists and *animaliers* has been ignored by modern scholars because it did not contribute to "science" as we know it, that is, in terms of abstract mathematics. Illustrators worked diligently and calmly in the mainstream, never getting themselves banned or excommunicated, as did Paracelsus, that great reformer whose middle name (or one of them, at least) was "Bombast." Hoeniger's essay comes closest of all to an integrated study of art and science and, as such, pleads like a gentle voice among wolves in this volume.

The next two essays, by Philip Ritterbush and Samuel Edgerton, explore the problem of the Renaissance artist's relationship with the tradition of scientific illustration. The Ritterbush essay maintains that art led science in naturalism, and that this naturalism happened when art moved away from an "emblem" mentality to a "symbolic" one. This interesting idea, however, suffers greatly from a naive concept of the history of art. For example, art historians take for granted the symbolic use of plants and animals in pictorial iconography. They also know that emblems and symbols occurred simultaneously in the history of art – one did not give way to the other. Edgerton's essay is a brilliantly original exploration of the visual conventions of linear perspective. He maintains that the 15th-century artist-

engineer's development of technical drawing gave the impetus to technological development. In a vivid example, Edgerton demonstrates the power of scientific perspective by comparing Western technical drawings with copies made by Chinese artists working with a completely different set of visual conventions. The result is at once humorous and didactic.

The book ends with Michael Mahoney's essay written to refute Edgerton's thesis that artistic discoveries inspired technological progress. He argues that art had little to do with creative science, which was based on "philosophical mathematics." Aside from distorting Edgerton's conclusions - a tactic that makes them easier to refute - Mahoney's essay is extraordinarily insensitive to art historical conventions. He notes no distinction between "drawings," for example, and "diagrams" which, like emblems and symbols, exist simultaneously in the visual tradition. Mahoney's use of Galileo's mathematical diagrams to justify his point has been convincingly countered by Edgerton in a recent article (*Art Journal*, Fall, 1984) devoted to Galileo's formal artistic training and its influence on his astronomical theories.

In the end, this volume presents at least as many problems as it attempts to solve. This is not, however, a comment on the quality of the book, but a reflection on the state of scholarship. How should we define "science" before the Enlightenment? Certainly science was a different sort of endeavor in the Renaissance than it is today, incorporating those unthinkable pursuits of alchemy, humoral medicine and astrology among others. Is it proper to separate these occult elements from our perception of early science - to "launder" our perceptions of irrelevant historical refuse? Charles Raven's quote, humbly included in Hoeniger's essay (p.147, note 11), should be impressed upon any reader before tackling this volume. He maintained that "To read the origins of science in terms so limited is as unhistorical as to interpret the history of the earliest Church as if its only concern was the preparation for the Nicene creed." Perhaps a more fitting title for this volume would have been "Technology and the Arts in the Renaissance."

Despite the accent on technology and the disparate prose styles of the authors, which range from lively to tortuous, careful reading of this volume is recommended for anyone interested in testing the waters of an interdisciplinary scholarly undertaking. The reader will come away, as did I, convinced that the relationship of art and science is a field unto itself, requiring a proper background in, and respect for, both disciplines rather than expertise in one or the other.

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