riveting analysis of politics, the press, and excerpts, published for the first time, from testimonials that Marie's friends wrote in her defense at the peak of the Langevin scandal. Quinn notes that Curie, like many women, did not always make the wisest choices in love, but her life went on. She brought up her daughters, established and administered the Institut du Radium, provided mobile x-ray units for the military during World War I, traveled to America, and continued her research. Quinn's account of the comparatively high incidence of radiation-induced illnesses and deaths among Curie's co-workers is particularly interesting, as is her description of Curie's near-blindness and the pernicious anemia—almost certainly radiation-induced—from which she died, at the age of 67. This is an exemplary work, rich in the details and connections that bring a person and her era to life. It is certain to be this generation's definitive biography of Marie Curie.

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Neanderthal Carnivory

Honor Among Thieves. A Zooarchaeological Study of Neandertal Ecology. MARY C. STINER. Princeton University Press, Princeton, NJ, 1995. xxii, 447 pp., illus. $69.50 or £46.50.

The fossil record suggests that modern humans originated in Africa and replaced the Neanderthals in Europe around 40,000 years ago. Some authorities argue that African invaders essentially extinguished the Neanderthals, while others propose interbreeding, based on putative Neanderthal traits they see in early modern and even living European populations. These differences aside, most authorities agree that the Neanderthals were behaviorally (culturally) primitive compared to their successors and that this helps explain their disappearance. More limited cultural abilities for the Neanderthals are implied by numerous archeological traits, including their relatively unsophisticated stone tools, their failure to manufacture standardized artifacts from bone and related materials, and their apparent lack of art.

In the research that underlies the present book, Mary Stiner sought to determine whether the Neanderthals also differed in their ability to obtain animals. To this end, she analyzed the animal remains from four presumed Neanderthal cave sites, three cave sites occupied by later modern humans, and an apparent fossil spotted-hyena den, all in west-central Italy. In one of the Neanderthal sites she also detected a layer in which the bones were apparently accumulated by wolves. From detailed comparisons of bone damage, species and skeletal part representation, mortality profiles, and other fossil data and from the ecological literature on hyenas, wolves, and other predators, she concludes that west-central Italian Neanderthals were probably less specialized than their modern successors. As she sees it, Neanderthals both hunted and scavenged, whereas modern people hunted almost exclusively. She emphasizes, however, that the difference is subtle and that some west-central Italian Neanderthals actually anticipated modern humans, particularly in their ability to obtain prime-age prey through "ambush hunting." There is thus something in the book for both advocates and opponents of continuity between Neanderthals and modern Europeans.

Stiner's conclusions are patently relevant to a key issue in human evolution, but are they warranted? I think the answer is "maybe." Her presentation is clearest and most compelling when she uses surficial bone damage (chewing and cut marks and the like), the relative abundance of associated objects (mainly artifacts and coprolites), and the frequency of hyena or wolf bones to infer whether people, hyenas, or wolves were primarily responsible for a particular fossil assemblage. Her argument is much harder to follow when she analyzes species abundance, skeletal part representation, and mortality profiles to test for ecological differences or similarities among Neanderthals, modern humans, and other kinds of large predators. Part of the problem is that her fossil samples are few and mostly small, and her analyses often proceed from percentages, ratios, or other transformations rather than from raw numbers. Without independent effort, it is thus difficult to know whether many of her numerically based conclusions would stand up statistically.

There are also some potentially limiting methodological quirks. For example, in her comparisons of skeletal-part representation among assemblages, Stiner explicitly excludes teeth, carpals, and smaller tarsals, "because the uniformly dense structure of these elements tends to inflate their relative abundances in archaeological contexts, and they may arrive as non-nutritious riders on more substantial food-bearing elements" (pp. 237–238). This may be true, but it does not preclude informative differences in dental or carpal/tarsal abundance among samples. I have found, for example, that southern African archeological assemblages contain many more carpals and small tarsals than like-aged hyena assemblages, probably because hyenas often digest such small bones. Surely it would be useful to investigate whether west-central Italian archeological and hyena assemblages differ in the same way.

The most serious problem, however, lies in Stiner's use of mortality profile analysis. Like most other paleobiologists, she introduces the subject with a discussion of "catastrophic" and "attritional" age profiles. These are essentially mathematically interdependent, theoretical representations (i) of the age structure of a stable live population and (ii) of the age structure of the set of individuals that must die to maintain population stability through time. The two age structures are complementary mathe-

Vignettes: A Low-Key Profession

There are aspects of statistics other than it being intellectually difficult that are barriers to learning. For one thing, statistics does not benefit from a glamorous image that motivates students to persist through tedious and frustrating lessons. . . . there are no TV dramas with a good-looking statistician playing the lead, and few mothers' chests swell with pride as they introduce their son or daughter as "the statistician."

—*Chap T. Le* and *James R. Boen*, in *Health and Numbers: Basic Statistical Methods* (Wiley-Liss)

Strangely, the motto chosen by the founders of the Statistical Society in 1834 was *Aliis exterendum*, which means "Let others thrash it out." William Cochran confessed that "it is a little embarrassing that statisticians started out by proclaiming what they will not do."

—*Edmund A. Gehan* and *Noreen A. Lemak*, in *Statistics in Medical Research: Developments in Clinical Trials* (Plenum)

matical expressions of a single principle and are related in essentially the same way as the fullness and emptiness of a container. However, both verbally and graphically, Stiner treats them as if they were independent phenomena, and she interprets her data as revealing other, equally fundamental age structures. She particularly emphasizes a "prime-dominated" pattern that characterizes some of her Neanderthal and later human prey samples and that is distinguished by an abundance of prime-age adults (as opposed to juveniles, which are more numerous in both theoretical catastrophic and attritional profiles, and to old individuals, which are relatively more common in attritional ones). In fact, however, it is not possible to discover a new fundamental age structure, and even in wildlife biology most observed age profiles depart significantly from theoretical catastrophic or attritional expectations, mainly because of uncertainties in age estimation, population instability (short-term growth or shrinkage), or unavoidable census bias. The departures may suggest the forces that shaped a sample, but they are not grounds for defining a new fundamental pattern.

Stiner's difficulties with the difference between observed and theoretical distributions also lead to a problem in her interpretation of "prime-dominated" age profiles. She attributes these to a uniquely human form of "ambush hunting" practiced by at least some Neanderthals and most later people. The difficulty is that the kind of hunting she envisions would have reduced prey populations over time. She argues otherwise, on the example of modern game-management schemes. However, game managers preferentially remove prime-age animals to curb population growth, a predicament that Neanderthals and later Paleolithic people probably did not face. A more basic problem, though, is that Stiner's approach is based on only three age classes ("juvenile," "prime," and "old") of unequal length, and the result is that it is hard to detect departures from theoretical distributions for essentially the same reason that it would be difficult to assess statistical normality from a histogram comprising only three bars of unequal breadth. A more conventional analysis involving a sufficient number of age classes to gauge profile shape might show that her "prime-dominated" profiles conceal some truly interesting mortality profile variation.

My methodological concerns are not trivial, but they are offset by strong points that I have not discussed, such as an interesting chapter in which Stiner and a close colleague attempt to integrate faunal and artifactual data. Stiner's prose style is also lively and engaging, and there is no denying the intellectual attraction of her paleoecological approach. Some flaws aside, the book should be read by anyone contemplating a similar, behaviorally oriented analysis of fossil bones.

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Other Books of Interest

Quantum Mechanics. Historical Contingency and the Copenhagen Hegemony. JAMES T. CUSHING. University of Chicago Press, Chicago, 1994. xvi, 317 pp., illus. $65 or £51.95; paper, $27 or £21.50.

"The Copenhagen hegemony" at issue in this work refers in general to the physicists' rejection of—indeed refusal even to consider seriously—any interpretation of quantum mechanics that seeks to retain some features of the space-time visualizability and determinism that classical physical theories incorporated, and in particular to the cool reception accorded the interpretation of quantum mechanics put forward by David Bohm in 1952. Cushing, a physicist-philosopher, takes it as "a *historical* problem to explain [the] marginal status" of the Bohm interpretation. He addresses this historical problem by elaborating physicist Edward Nelson's hypothesis (quoted on p. 175) that "had the Schrödinger equation been derived [from stochastic mechanics] before the invention of matrix mechanics, the history of the conceptual foundations of modern physics would have been different." This brings Cushing back to the origins of the quantum mechanics and of the Copenhagen interpretation in the 1920s, with the result that his argument is divided over two, only very loosely connected historical fronts.

It is impossible not to be sympathetic to a philosopher who rejects his discipline's canonical distinction between the context of discovery and the context of justification and who, rather, believes that "any division between scientific practice and a metalevel of the methods and goals of science is largely a false dichotomy." On these grounds Cushing is prepared to give "an emphatic yes" to the historicist position that "if certain equally plausible conditions, rather than the actually occurring and highly contingent historical ones, had prevailed . . . our present understanding of the behavior of the fundamental laws of nature in terms of an inherently indeterministic physics [would] have been replaced by the apparently diametrically opposed view of absolute determinism." However, to make this case—indeed *any* counter-factual case—is considerably more difficult than Cushing appears to recognize. Moreover, the body of historical evidence he does bring forward goes so little beyond Max Jammer's long-standard historical examination of the interpretations of quantum mechanics (*The Philosophy of Quantum Mechanics*, 1974) that his theses remain at the end of this book just about what they were at the beginning. Although it fails to persuade, the book will have utility through the many capsule summaries, in two or three pages at a technical but accessible level, of theorems, thought experiments, and the like encountered in the early and the recent history of the interpretation of quantum mechanics, as well as through its very full bibliography and its exceptionally complete index.

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The Quantum Generation. Highlights and Tragedies of the Golden Age of Physics. MARGARITA RYUTOVA-KEMOKLIDZE. Springer-Verlag, New York, 1994. xxii, 327 pp., illus. $39.50. Translated from the Russian edition (Moscow, 1989) by John Hine.

The title of this book only remotely suggests its content, indeed is an artifact of the obstacles that the Soviet Union of the 1980s placed in the way of its original publication. True, some hundred of its 300 pages are just the sort of popularized physics that the title might lead one to expect, but most of these were written as substitutional material at the suggestion of the "two 'surgeons' [who] handled my case. One was a lady suffering from a serious goitre condition who simply would not look me straight in the eye. . . . The other was a buxom lady with a bouffant hairstyle who never doubted for a moment that she was right about everything." What these guardians of "the traditions of Soviet publishing" solicited from the author was material to substitute for some of the less pretty features of the life and times of the Russian theoretical physicist Yuri (Georg) Borisovich Rumer (1901–1985), whose biography is the real subject of this book. (Ironically, Springer-Verlag continues those traditions to the extent of adopting the misinformative title of the Russian edition.) This biography, in the concrete, down-to-earth, not-taking-themselves-too-seriously manner often found in the memoirs of Russian physicists (but much less often in those of Europeans and Americans), is based in large part upon Rumer's reminiscences as recorded by the author. The less valuable half of these 200 biographic pages is that devoted to Rumer's years, 1929–1932, in Göttingen, where he assisted Max Born and befriended "the