life-span. This scenario, however, is not supported by data on hunter-gatherers nor by much of the evidence presented in Hrdy's book. If the grandmothers-as-main-helpers view were correct, societies in which grandmothers reside with their daughters should have the lowest rates of maternal infanticide. Yet no observations suggest that matrilocality has this effect. Instead, in foraging societies like the Hiwi of Venezuela, women kill their infants at a high rate even though they live in close proximity to their mothers. Paternal absence is the strongest predictor of infanticide. Moreover, the effects of paternal food acquisition and childcare on a woman's fitness are likely to be much greater than the effects of her mother's work. Among Ache, Hiwi, and Hadza foragers, the average food acquisition of grandmothers is less than one-half the average for men of reproductive age. Recent analyses of time-activity data from the Hiwi show that adolescents and fathers give more care to infants than do grandmothers. And data on Ache foragers of Paraguay show that grandmothers have a positive effect on their sons'—but not their daughters'—fitness. In addition, having a father alive decreases child mortality sixfold compared with having grandmothers alive. Thus available evidence suggests that fathers, not grandmothers, are critical in the evolution of female life-history traits. This is not belittling to women. It simply means that human life history reflects coevolution in response to constraints operating on both sexes.

Knowing the effects of different allocaretakers on relative fitness has important implications for policy. As Hrdy points out, in evolutionarily novel environments it is difficult for women to hold jobs because the tasks "occur in separate domains from child rearing." In addition to this spatial separation, I would add that women lose the scheduling flexibility they had as hunter-gatherers. Among foragers, women quit work earlier when nursing and then work longer hours as their children get older. Today, trade-offs for mothers are particularly cruel: working outside the home and caring for children full-time are both fitness-enhancing activities, but inflexible work hours and commuting make them mutually exclusive. Our modern work structure forces mothers to rely more than ever on allocaretakers, but it is unclear whether societies' interventions should be aimed at increasing grandmaternal assistance, paternal help, or the quality of accessible non-kin help. In the meantime, as Hrdy states, the behaviors of women who opt only for careers will be selected against. Natural selection will instead favor the behaviors of women who reproduce regardless of the unpleasantness of the trade-offs they face. And the legacy of maternal ambivalence towards work will be passed on along with such behaviors. Whether these phenotypes bring joy, satisfaction, anger, depression, or homicidal tendencies is of no concern to Mother Nature.

BOOKS: METEOROLOGY

Spiraling Storm Systems

Charles J. Neumann

Hurricanes rival major earthquakes as the worst of natural disasters in terms of loss of life and property damage. Thus they are of considerable interest to many scientists and decision-makers, especially those involved in urban planning, disaster relief, and insurance. James Elsner and A. Birol Kara have written an account for such readers that emphasizes physical models to explain the relation of hurricane activity to meteorological and oceanographic events. As the book's subtitle indicates, the authors devote considerable attention to links between hurricanes and climate and to social and economic vulnerability to such storms.

Hurricanes of the North Atlantic Climate and Society
by James B. Elsner and A. Birol Kara
Oxford University Press, New York, 1999. 504 pp. $49.95. ISBN 0-19-512508-8.

Hurricanes of the North Atlantic is longer and more technical than previous books on tropical cyclones. Surprisingly, the authors do not discuss tropical storms (winds of 18 to 33 m/s). Because almost all hurricanes begin as tropical storms, it might have been appropriate to devote at least part of a chapter to these systems. It should also be noted that the authors limit their discussion of motion and intensity prediction models to one table and a short paragraph.

These omissions aside, Elsner and Kara offer the most complete account and discussion of Atlantic hurricanes that I have encountered. Using newly researched pre-1900 data, they extend many of their analyses back to the year 1851. They have prepared a large number of original tables and figures to illustrate their points; nearly every page includes at least one figure or table. To ground their subsequent discussions, the authors go into considerable detail about—and devote entire chapters to—purely tropical (warm-core), baroclinically initiated (initially cold-core), and baroclinically enhanced (by strong temperature and moisture contrasts) hurricanes.

A chapter on hurricane cycles and trends discusses the observed effects of *El* Niño–Southern Oscillation (semi-regular shifts between warm and cold phases in the equatorial Pacific Ocean), quasi-biennial oscillation (shifts in tropical stratospheric winds between east and west phases), sea surface temperatures, and solar activity on past and present hurricane activity. In considering the potential effects of these factors and global warming on future hurricane activity, the authors, commendably, do not make scientifically unwarranted speculations. Several chapters cover other timely topics such as hurricane return periods, seasonal forecasting (including history), the relatively new field of sub-basin forecasting, and how this approach relates to the insurance industry and society.

Given the length of the book, the presence of several minor faults is understandable. The section on general hurricane climatology could have been improved. For example, a single chart showing hurricane days (for various classes of storms) would have been easier to understand, more meaningful, and less "noisy" than the separate charts that show beginning and ending dates. Elsewhere, the authors' use of observed coastal county hurricane return periods along the U.S. Atlantic and Gulf coasts can suggest spurious discontinuities in what is actually a smooth gradient of coastal hurricane frequency. Although the authors note the effect of county size on their statistics, a chart showing the unbiased coastal strike expectancies would have been helpful.

The authors discuss the usefulness of the Poisson distribution to estimate rare hurricane events. Earlier in the book, however, many of their tables that use relative frequencies to illustrate extremely rare events (such as three or four landfalls during a single month) are labeled "probabilities" or "observed probabilities." A more appropriate term might have been "empirical probabilities" (as used by the authors in later tables).

Hurricanes of the North Atlantic is a suitable reference in applied climate science. I would certainly recommend it to those looking for up-to-date insight into the nature of Atlantic hurricane activity. It is, however, too detailed and specialized for those seeking a broad overview of Atlantic tropical cyclones.

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