

"not self," the physiology of lymphocyte surface receptors for antigen—major discoveries have resulted from investigations of all of these.

David Katz's book attempts something that has never been done before. It seeks to present an overview of cellular immunology not, as some others (including Ada and me) have done, through highlighting selected aspects of the subject in order to illustrate a particular view of the antibody problem but through a painstaking summation and integration of every significant activity in cellular immunology over the past decade. To illustrate how ambitiously the task was conceived, the book contains no fewer than 2317 references. Moreover, judging from the pithy and accurate summaries of those papers that I know, Katz has apparently really read all of these. The result is a well-organized, detailed, fair, and balanced, if somewhat weighty and specialized, compendium. It is clearly directed more toward the specialist in immunology than toward the outsider seeking to gain an overview of the field. Its real value will be to educate immunologists working in one branch about what their colleagues in another branch have been up to recently. Katz has realized better than most that cellular immunology is a curiously circular discipline, every specialty impinging on every other. The book, a distillation of his own learning experiences, may well stimulate readers to broaden their interests.

The book scores high marks for its sections on regulatory interactions between immunocytes, the subject of the author's own research, its even treatment of competing viewpoints, its surprisingly up-to-date character, and the way in which the reader is clearly guided to the key literature citations. Critics may question the way space was allocated to particular topics (is Katz *too* fair to all parties?) and the relative lack of emphasis on the great bridge-building areas between the traditions, such as immunoglobulin genetics or somatic cell hybridization. Also, in view of the value of the concluding remarks in several chapters, it is a pity that such overviews were not included in each chapter. However, these are carping criticisms of a largely successful effort.

One final point: Katz is to be congratulated on having escaped from the dominant epidemic disease in the United States, namely the virtually exclusive citation of national references.

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## Primate Sociobiology

**The Langurs of Abu.** Female and Male Strategies of Reproduction. SARAH BLAFFER HRDY. Harvard University Press, Cambridge, Mass., 1977. xx, 362 pp., illus. + plates. \$17.50.

*The Langurs of Abu* is one of the first attempts to apply sociobiological theory to the behavior and social structure of wild primates. Blaffer Hrdy first traveled to India's Mount Abu in 1971 to investigate the phenomenon of male infanticide among langur monkeys (*Presbytis entellus*). Her study quickly expanded to include the total reproductive strategies of both male and female langurs, and it is this theme that is developed in her book.

The langurs of Mount Abu were observed for a total of 1500 hours during five field trips made between 1971 and 1975. Observations were concentrated

on three troops seen during every visit, and each of these troops was observed for 300 to 400 hours. The study's design, with intermittent observations over several years, provided both strength and weakness to the data; on the one hand, the reproductive behavior of individuals and troop demographic changes were put into long-term perspective, while on the other hand large gaps were introduced into the behavioral record. In a few instances, Blaffer Hrdy attempts to reconstruct key events that occurred during her absences (including troop take-overs and apparent infanticide) by using the observations of untrained local informants, a procedure that leaves the validity of some portions of her data in doubt.

The sociobiological analysis of langur society presented by Blaffer Hrdy does not depict males and females cooperating peacefully in the vital process of reproduction. On the contrary, she reports that at Abu both males and females tend-



A female langur, carrying her newborn infant, takes food from a priest of Shiva who lives in one of the sacred caves or *gophas* in the hillsides surrounding Mount Abu. [From *The Langurs of Abu*]

ed to behave in ways that maximized their individual reproductive success and this tendency often led to intrasexual competition or intersexual exploitation. She hypothesizes that a monkey's reproductive history, current reproductive status, and breeding potential are important variables influencing behavioral decisions and that cost-benefit decisions made during phylogeny have shaped the monkeys' behavioral tendencies so that they generally act to maximize their overall reproductive success.

Blaffer Hrdy's analysis is well done and her arguments are carefully reasoned and thought-provoking. An example is her interpretation of the female dominance system. She reports that within langur troops at Abu adult females were organized into linear dominance hierarchies with aggressive, competitive, "prime" females (4 to 10 years old) at the top, and old, noncompetitive females in the lower ranks. Differences in females' aggressiveness and rank were not correlated with strength or fighting prowess, however, and old females often took an active role in troop defense. Blaffer Hrdy explains these features of female dominance in terms of differing reproductive potentials and each female's tendency to behave so as to maximize her inclusive fitness. A female's aggressive competition for status and access to resources during the height of her breeding career, hypothesizes Blaffer Hrdy, is a selfish strategy that should contribute to reproductive success. Old females, near the end of their breeding careers and low in reproductive value, are hypothesized to contribute to the success of their offspring and other relatives by withdrawing from competition for rank and resources, while still defending the troop against dangers such as invading males.

During the course of her study at Mount Abu, Blaffer Hrdy documented eight instances of troop take-overs by invading males, and in seven of these cases immature monkeys (usually infants) were killed or were found to be missing from the troop shortly after the take-over. She argues convincingly that infanticide by new alpha males is an ancient colobine reproductive strategy whereby the male increases his reproductive success at the expense of the former alpha male, the mother, and her infant. According to this hypothesis, in order to maximize his reproductive success during his short tenure with the troop (male take-overs occurred once every 27.6 months in Mount Abu troops), a new male kills unweaned infants in order to hasten the mothers' re-

turn to estrus and the conception of his own offspring.

*The Langurs of Abu* is a readable, well-illustrated account of langur social behavior and reproduction that is filled with interesting data and hypotheses. Even those who dislike the sociobiological approach will find it a valuable addition to the primate literature.

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## Books Received

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**Adventures of a Mathematician.** S. M. Ulam. Scribner, New York, 1977. xii, 318 pp. + plates. Paper, \$4.95. Reprint of the 1976 edition. Scribner Library, SL 728.

**Analytical Profiles of Drug Substances.** Vol. 6. Klaus Florey, Ed. Academic Press, New York, 1977. x, 600 pp., illus. \$27.50.

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**Application-Oriented Algebra.** An Introduction to Discrete Mathematics. James L. Fisher. Crowell, New York, 1977 (distributor, Harper and Row, New York). xx, 362 pp., illus. \$16.50. The IEP Series in Mathematics.

**The Bakke Symposium.** Mary Ten Thor, A. M. Aabenberg, I. Kraft, and F. Montmorency-Tedesco. Uncommon Lawyers Workshop, Sacramento, 1977. 284 pp. Paper.

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