The bush dog, also previously thought to be polygamous, is "one of the few monogamous mammals in which the exclusivity of the emotional bond may itself prevent adultery, rather than just within sex aggression," says Kleiman. "If this can be adequately demonstrated, the importance of the emotional bond and its genetic consequences will have been shown."

The male lion tamarind (*Leontopithecus rosalia*), a small, arboreal primate, expends considerable amounts of paternal energy by being his youngster's main source of transportation—he carries them from tree to tree on his back. The tamarind pair shows synchronous behavior similar to that of the foxes and bush dogs. They rest in contact, groom each other and agression seems to be predominant among the females.

In an overview of the two patterns of monogamy, says Kleiman, "Paternal care is the crucial difference between the facultative and obligate types of monogamy [in mammals]." Bonds between the dominant pair are strong, kin are nonreproductive in the extended families and cooperation between the breeding pair in getting food and maintaining territory are characteristic of obligate monogamy. Dominance and aggression seem to be the female's domain. That the female is also dependent on familial support for her offsprings' survival is in sharp contrast to the facultatively monogamous elephant shrew, whose major need from her spouse seems to be secure territory in which to rear the youngsters. There is less paternal child-rearing support in the shrew's type of monogamy.

The reasons for these kinds of ecological specializations, say, in the elephant shrew's brand of facultative monogamy, can be understood. According to Kleiman: The species is too small to be highly mobile and, because of its size, can defend only a small area of territory. Resources such as food and shelter are rich but widely scattered, so they are outside of the little creature's turf and so are scarce. The male is too small to defend an area large enough to hold more than one female; the female cannot share a territory with another female, but cannot defend it alone and still care for the offspring. The best thing her mate can do for her and for future generations of little shrews is to defend the common territory, as opposed to the needs of the obligate female who has increased her reproductive burden so much that direct paternal, or kin, assistance is mandatory.

Coming full circle to human mammalian creatures, no clear-cut classifications can be easily made about reproductive strategies. "We do not live according to the realistic demands of our environment and the restrictions of our resources," says Eisenberg. "It is axiomatic that many cultural norms enforced through group ethics were once highly adaptive to a particular economic situation .... Were we to understand our history completely we would find that the ethical systems of humans were once rooted in biological necessity."

As the unique and highly mobile tribes of our ancestors settled into more stable lifestyles, intertribal behavior changed. The infant's increasing dependence and its slow maturation rate may have provided the impetus for greater paternal contribution to rearing the children. Kleiman does not think humans started out being monogamous but, she says, "Humans became monogamous because their evolution was dependent on the fact that the females were producing infants that were extremely dependent and would need prolonged parental care. This pushed humans into an obligate monogamous situation. We were expanding range very rapidly," she says. "and so, many culturally imposed sexual taboos designed to reduce infidelity may have resulted, but separating the biological reasons from the cultural reasons for monogamy is very difficult. Monogamy was imposed upon us and has been successful," from a reproductive standpoint.

According to Kleiman, the American middle-class brand of monogamy, as seen in the suburbs, is typically of the facultative or the simple obligate kind, depending on the amount of contact the spouses maintain and on whether their roles are clearly divided. "A typical household can consist of a woman essentially rearing her children alone ..., with the male protecting the home and indirectly providing food through wages received from his job, but having little interaction with the young and a weak emotional bond with his wife," she ventures. The chance for sexual infidelity is great because the man has so absolutely little to do with the woman.

"It is interesting to compare this to a farm family with a more obligate-like lifestyle where there's less sexual role differentiation and perhaps more likelihood of an extended family ...," says Kleiman. In the West, the extended family, composed of nonreproducing adult offspring with parents, aunts and uncles, is the exception, and this form of obligate monogamy has usually occurred where land was limited and populations expanding. For instance, in Ireland, where the young could not marry without holding land, it was common to postpone any matrimonial plans until the death of the parents.

Says Kleiman, "Man seems to have retained behavior that is more in line with polygamy." Human males are generally larger, more dominant and are encouraged to be the aggressors. There still tends to be great role differentiation, and the extent to which males become directly involved in child-rearing activities seems to stop at the nursery window. None of these traits concur with obligate-monogamous characteristics.

Bertrand Russell sensed this dichotomy of human behavior and in 1929 he wrote in his *Marriage and Morals:* "Uninhibited civilized people, whether men or women, are generally polygamous in their instincts." □

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ANNUAL REVIEWS OF PLANT PHYSIOLOGY, Vol 28—Winslow R. Briggs et al, Eds.—Annual Reviews, 1977, 615 p., illus., $17.

THE ARTICULATE MAMMAL: An Introduction to Psycholinguistics—Jean Aitchison—Universe, 1977, 256 p., diagrams and charts, $10. Why we talk, how we acquire language, and what happens when we produce or comprehend sentences.

BARRIER-FREE ENVIRONMENTS—Michael J. Bednar, Ed.—DH&R, 1977, 278 p., illus., $22. To aid in formulating a policy toward physical planning and design for the physically and mentally handicapped. Identifies environmental barriers and provides case-study examples of their removal.

BETTER LATE THAN EARLY: A New Approach to Your Child's Education—Raymond S. Moore & Dorothy N. Moore—Readers Digest Pr, 1977, 236 p., paper, $3.95. Based on the authors' premise that a normal child's maturation in vision, hearing, social-emotional areas and development of the central nervous system, does not ready him for school before the age of eight.

THE BIOSPHERE: Earth, Air, Fire, and Water—Carl Heintze—Nelson, 1977, illus., $6.95. A discussion of our planet's life-sustaining envelope which functions both as a bank and a shield, and the four ancient Greek elemental states that make up the biosphere.

THE BIRTH OF PHOTOGRAPHY: The Story of the Formative Years 1800-1900—Brian Coe—Taplinger, 1977, 144 p., illus., $9.95. Introduces the reader to the story of how photography began and illustrates the work of pioneer photographers.

BUILDING FOR SELF-SUFFICIENCY: Tools, Materials, Building, Heat, Insulation, Solar Energy, Wind Power, Water & Plumbing, Waste & Compost, Methane, Transport, Food—Robin Clarke—Universe, 1977, 296 p., drawings, $12.50, paper, $5.95. The aim of this book is to show how to make do with less and to live better as a result.

THE CENTER OF LIFE: A Natural History of the Cell—L. L. Larison Cudmore—Quadrangle, 1977, 176 p., illus., $8.95. The development of the cell, its growth into a complex organism, its dependencies on other cells, communication, locomotion, sex, energy conversion of cells are explained with clarity and wit.

COLOR ATLAS OF HUMAN ANATOMY—R. M. H. McMinn and R. T. Hutchings—Year Bk Med, 1977, 352 p., color plates, $27.95. Life-sized photographs of the human adult in the actual colors of the embalmed cadaver.

CONVOLUTION INTEGRAL EQUATIONS WITH SPECIAL FUNCTION KERNELS—H. M. Srivastava and R. G. Buschman—Halsted Pr, 1977, 164 p., $9.75. Develops alternative methods of solving certain equations, presents a number of tables of equations and their solutions and includes a bibliography.

COSMOLOGY + 1: Readings from Scientific American—Introduction by Owen Gingerich—W. H. Freeman, 1977, 113 p., drawing and illus., $8.50, paper, $4.50. Describes various aspects of our search for an understanding of the universe as a whole—galaxies, background radiation, black holes + 1 article on the quest for life beyond our planet.

THE DAY BEFORE DOOMSDAY: An Anatomy of the Nuclear Arms Race—Sidney Lens—Doubleday, 1977, 274 p., $8.95. An indictment of United States nuclear arms policy which to the author is the "greatest crisis in humankind's existence."

ECOLOGY AND BEHAVIOUR OF NOCTURNAL PRIMATES: Prosimians of Equatorial West Africa—Pierre Charles-Dominique, Translated by R. D. Martin—Columbia U Pr, 1977, 277 p., photographs and drawings, $17.50. A study of five different species living in the same area, gives a detail picture of diets, locomotion, defense against predators, patterns of activity, social behavior and points up the way each species fits into their environment.

FOOD FIRST: Beyond the Myth of Scarcity—Frances Moore Lappé and Joseph Collins with Cary Fowler—HM, 1977, 466 p., $10.95. In a question and answer format the world food problem is addressed. The authors feel that to solve the problem of hunger the basic assumptions of our present economic system must be challenged.

HUMAN BIOLOGY: An Exhibition of Ourselves—British Museum—Cambridge U Pr, 1977, 120 p., illus., $11.95, paper, $3.50. Copiously illustrated, this book shows how our bodies work and how our minds develop. Based on a new permanent exhibit in the British Museum.

IMPROVING ON NATURE: The Brave New World of Genetic Engineering—Robert Cooke—Quadrangle, 1977, 248 p., illus., $12.50. An up-to-date account of the work being done on recombinant DNA; discussing applications of genetic engineering in science, medicine, agriculture and industry and addressing the dangers of some experiments.

THE IRON SUN: Crossing the Universe Through Black Holes—Adrian Berry—Dutton, 1977, 176 p., drawings, $7.95. An attempt to solve the problems of the feasibility of travel to the stars.

LUPUS: The Body Against Itself—Sheldon Paul Blau and Dodi Schultz—Doubleday, 1977, 112 p., $5.95. Documenting the fascinating story of this usual disease, the challenge of diagnosis, the search for safe therapy and the most promising lines of current medical research.

MOUNTAIN MEDICINE: A Clinical Study of Cold and High Altitude—Michael Ward—Van Nos Reinhold, 1976, 376 p., illus., $19.95. For those interested in the stresses of the mountain environment, explains how adaptations are made, the illness and accidents that can happen and their treatment and the biology of mountain populations. The author was a member of the 1953 expedition that made the first successful ascent of Mt. Everest.

1977 SOLAR ENERGY & RESEARCH DIRECTORY—Ann Arbor Science Special Task Group—Ann Arbor Science, 1977, 386 p., paper, $22.50. Compiled from questionnaires distributed to individuals, companies and research facilities involved in solar activities. Each respondent is classified as to Energy Conservation, Manufacturers of Solar Components or Total Systems, Distributors, Design/Construction, Solar Research, Solar Energy-Related areas.

PSYCHOPHARMACOLOGY IN CHILDHOOD AND ADOLESCENCE—Jerry M. Wiener, Ed.—Basic, 1977, 226 p., $15. An assessment of the scientific basis and current clinical usage of psychopharmacological agents in children and adolescents. The specific drug treatment of major clinical syndromes is described.

THE SATURDAY EVENING POST FIBER & BRAN BETTER HEALTH COOKBOOK—Cory SerVaas, Charlotte Turgeon & Frederic Birmingham—Curtis Pub., 1977, illus., $12.95. The authors believe in the benefits of fiber-rich diets as a way to "ward off" many of the so-called Western diseases such as coronary heart disease, appendicitis, gallstones, and obesity.

SCIENCE FICTION: History, Science, Vision—Robert Scholes and Eric S. Rabkin—Oxford U Pr, 1977, 258 p., $12.95, paper, $2.95. Science fiction as an aspect of the history of fiction, as literature, and discussing the sciences most important for an understanding of science fiction.

THE SOLAR PLANETS—V.A. Firsoff—Crane-Russak Co, 1977, 184 p., illus., $10.50. The new knowledge about the planets in our solar system gained from space exploration. These planets are designated solar to underline the fact that there are other planetary systems.

SPACE SHUTTLE MISSIONS OF THE 80'S, Parts 1 & 2, Advances in the Astronautical Science Vol. 32—W.J. Bursnall et al, Eds.—AAS(UNIVELT), 1977, 1308 p., illus., $85. Proceedings of the 21st annual American Astronautical Society meeting, August 26-28, 1976. The theme of the meeting was how can the space shuttle transportation system be maximized for the benefit of mankind.

STARSCAPES: Topics in Astronomy—Gerrit L. Verschuur—Little, 1977, 202 p., illus., paper, $6.95. A popular-level collection of brief essays on some of the most fascinating current findings in astronomical research.

STUDIES IN HISTORY OF BIOLOGY—William Coleman and Camille Limoges, Eds.—Johns Hopkins, 1977, 218 p., $14. Papers by Arnold W. Ravin, William Randall Albury, Ruth Schwartz Cowan and Frederic L. Holmes.

WORKING WITH PEOPLE CALLED PATIENTS—Milton M. Berger—Brunner/Mazel, 1977, 154 p., drawing, paper, $7.95. Handbook intended to convey basic information to help in understanding and dealing with people who have emotional and/or mental problems. For the para- and subprofessional and those planning careers as mental health workers.