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H. Kummer: Social Organization of Hamadryas Baboons. A Field Study. Bibliotheca Primatologica, No. 6. Karger, Basel/New York 1968. X + 189 pp., 67 fig., 17 tab. sFr./DM 39.50/72 s.

Hans Kummer presents the data obtained from his field studies and field experiments on the hamadryas baboons, and his interpretation and evaluation of the significance of his findings, in a book so well organized that it may be used as a model for publications in the field of Primate Behavior. The style is clear and precise; the design of the study is presented in detail and sufficient material is included to relate these findings to other behavioral studies and considerations of ecology and distribution. The discussion and interpretation of the data include the presentation of a broad theoretical structure, but at no point is the discussion far removed from the data. Sections which are speculative are clearly labeled and the logical transition from data to theory is always clear. The illustrations are well chosen and both elucidate the data and add a certain aesthetic pleasure to the reading of this book.

The introduction quickly outlines methodology and terminology and presents a brief sketch of the daily life of the hamadryas. The next chapter is devoted to items relating to ecology, morphology, troop composition, distribution relative to other primates and units of social behavior. This is followed by introducing the sample selected and then proceeding with a detailed description of social organization and social mechanisms. The one male units are described in detail followed by descriptions of affinities between individuals in groupings and next by the social structure of the troop and component bands. Experimental data on the transplantation of individuals, one male units and the introduction of extra specific individuals illustrate the descriptions of social mechanisms operating to maintain the society. This is followed by detailed descriptions of the two male team and how it functions. Kummer then returns to considerations of ecological influences, and sums available data on reproduction. Finally, he presents a list of social responses identified during his studies. If one were to wish for more, it would be that Kummer had presented a detailed formal catalog of behavior patterns rather than the informal catalog as he himself describes it.

In short, Hans Kummer has written a well organized, easily read description of an important contribution to the study of primate behavior. This book should be required reading for all students in primate behavior, and will be read with pleasure and profit by anyone with an interest in field work, animal behavior or primates. Its organization, clarity of presentation and lucid expression of concepts represent a goal often sought but seldom achieved by even the most capable students of animal behavior.

I. S. Bernstein, Lawrenceville

E. Genet-Varcin: Elements de Primatologie: A la Recherche du Primate ancêtre de l'Homme. Primates et Evolution. Editions Boubée et Cie, Paris 1969. 336 pp., 182 fig.; sFr. 87.80.

This scholarly new French review of fossil primates is mainly concerned with the basic problem of which particular ones can really be regarded as more or less close ancestral forms of man. A previous volume of this series by the same author (*Les Singes Actuels*

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et Fossiles. Editions Boubée & Cie, Paris 1963) had already been devoted to a systematic description of recent and fossil primates from the point of view of a palaeontologist. After an interval of only six years the author is introducing remarkably many quite profound changes in the interpretation and consequently the classification of the rapidly accumulating new as well as old fossil finds. For instance, the Tupaioidea, in 1963 listed as a super-family among the Lemuriformes, are no longer accepted as primates, a 'superfamily' Parapithecoidea, previously placed next to the Pongoidea, now follows the Ceboidea, and the superfamily Hominoidea, which here includes merely the families Hominidae and Oreopithecidae, has been elevated to a third suborder, named Hominii. That the term hominoid in French has been given a far more limited meaning than it has today in English, is unfortunately bound to cause many misunderstandings.

After having discussed in special detail all the fossil prosimian and simian primates, which at one time or another have been regarded as standing near the evolutionary path of the hominids, the author admits none of these claims as adequately founded, except that of Oreopithecus. The general conclusions of this thorough search for man's ancestors are illustrated in the final figure and on the cover in form of a hypothetical family-tree which shows the three suborders to diverge from a common source already toward the end of the Cretaceous period with the only branches on the separate path leading to the various forms of the genus Homo being those of the family Oreopithecidae and the genus Australopithecus. In view of the author's extremely critical attitude toward all proposed close relationships between the Hominidae and at least some of the fossil Pongidae it is surprising that she accepts Oreopithecus as the earliest known representative among man's precursors. Among her main reasons for this distinction of Oreopithecus the author claims that: 'Il nous apprend que le redressement du corps, l'élargissement du bassin, la marche bipède étaient sur le point d'être réalisés au Miocène supérieur; mais Oreopithecus ne peut être l'ancêtre des Hominiens ultérieurs; il n'est que le premier témoin du buissonnement des formes hominiennes...' Here the reviewer must mention that in his various studies on the well-preserved postcranial remains of this fossil ape he could not find any evidence for assuming that bipedal locomotion had been 'on the point of being realized.'

The final 200 pages form an up-to-date and comprehensive survey of the fossil Hominidae from the australopithecines to Homo sapiens. This part contains only few and minor deviations from most other corresponding treatises which have appeared in recent years. The very extensive, careful bibliography and the invariably excellent 182 illustrations add much to the usefulness of this volume.

A. H. Schultz, Zurich

J. Fooden: *Taxonomy and Evolution of the Monkeys of Celebes* (Primates: Cercopithecidae). *Bibliotheca Primatologica*, No. 10. Karger, Basel/New York 1969. VIII + 148 p., 38 fig., 13 tab. sFr./DM 34.–/US \$ 8.15.

This work stands as the most thorough and authoritative taxonomic revision yet published of a major group of macaques. The treatise, a refinement and extension of Büttikofer's 1917 review, is based on a detailed study of 393 Celebesian macaques represented by skins, skulls, tail vertebrae, penial glands and bacula preserved in the larger museums of the United States and

western Europe. External and behavioral characters were also observed by the author in an unspecified number of Celebesian macaques living in various

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zoological gardens. Anatomical parts other than those mentioned, and published results of serological and karyological investigations were found wanting for distinguishing the several Celebesian forms from each other and non-Celebesian macaques.

Seven allopatric species are recognized, their origin, evolution and dispersal reconstructed. The author suspects that the seven forms may prove to be strongly marked races of a few or only a single species. He contends, however, that clear evidence of morphological intergradation is absent in available study material. Diagnostic characters are discussed in detail with the externally visible ones portrayed in ingeniously posed figures of the species each superimposed on or near its corresponding part of a map of Celebes (fig. 1, and front cover). Figure 3, showing variation in the buttock pattern of the Moor macaque, *Macaca maura* recalls the three legendary figurines of moralizing Japanese macaques. Absence of a penis bone in the so-called 'black-ape', a character cited by authors and compilers as evidence of generic distinction, is shown by Fooden (p. 23) to be a persistent myth based on a misinterpretation of anatomical observations on a misidentified monkey. Graying of the pelage, peculiar to Celebesian macaques, is believed to have evolved as a symbol of social status. Charting of cranial variation reveals strong sexual dimorphism and well marked geographic variation in size and configuration. Fooden (p. 39) suggests that much of the variation, particularly of the muzzle, may be 'cosmetic or social rather than biomechanical.' Published eye witness reports of habits and habitats of wild living Celebesian macaques are few and of a general nature. The notes, nevertheless, are organized and reproduced in the text for what they are worth. Casual observations of interspecific social behavior and hybridization in zoo animals are also meager and seem to contribute nothing to the solution of taxonomic problems.

The species accounts are well organized, the descriptions and characterizations clear and coordinate. The geographic range given for each taxon is fully supported by locality and collectors data for all specimens examined and recorded in the literature. Two maps and a fully documented gazetteer summarize the zoogeographic conclusions. The synonymies and bibliographic citations appear to be exhaustive. In the account of *Macaca maura*, the citations require 227 lines of fine type compared with only 168 of regular type for remaining text including captions for 3 figures. This may seem to be a case of tail wagging dog. Actually the synonymies with annotated bibliographic references arranged chronologically and cited by author, year and page, document the entire history of the species in capsulated and easily retrievable form. The recapitulation is basic to the refinement of taxonomic appreciations, and essential for the correct identification of every Celebesian macaque mentioned in scientific (and not so scientific) literature under whatever name or name combination.

Keys to the species, one based on external characters, the other on cranial characters are, it seems to me, too widely separated from each other and from the species accounts. Vernacular names for the species, eschewed by Fooden, could have been used, even loosely, with advantage, especially for the benefit of non-taxonomists who may not find it easy to identify the celebrated 'black-ape', or *Cynopithecus niger* of most authors, with the *Macaca nigra* of the reviser. Such debatable flaws, however, are overly compensated for by the superb and effective art work and photographic reproductions of skulls and living animals. All users and students of macaques will find this work indispensable for reference and as a springboard for further research on Celebesian macaques.

P. HersHKovitz, Chicago

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A. H. Schultz: *The Life of Primates*. Universe Books, 'The Universe Natural History Series', New York 1969. XII + 281 pp., 16 pp. de photographies en noir et blanc, 4 pp. de photos en couleur, 79 dessins au trait. US \$ 12.50.

A. H. Schultz a consacré plus d'un demi-siècle à l'étude attentive des primates. Avec la rigueur qu'on lui connaît, le souci de l'analyse minutieuse, le contact étroit sur le terrain et en laboratoire avec la plupart des groupes prosimien, platyrrhinien, cercopithèque, hylo-bate ou pongidé; sur la base de collections uniques tant par leur richesse et leur diversité que par le caractère impeccable des spécimens qui les constituent, l'A. a successivement entrepris l'étude essentiellement anatomique des divers genres de primates de l'ancien et du nouveau monde. Depuis 1916, à la Carnegie à Washington, puis à Johns Hopkins et à Zurich, il nous a distillé, à travers des centaines d'articles, dans le Handbuch et la Bibliotheca primatologica, le sue de cette probe et patiente recherche. Le livre qu'il présente aujourd'hui est un condensé de tout ce prestigieux travail: une sorte de vaste synthèse après la rigoureuse analyse. Le familier des études et des publications de Schultz retrouve la marque du maître, ses idées-force (l'anatomie comparée, la croissance, la variabilité intraspécifique, la traumatologie et le développement ontogénétique...) – et jusqu'aux admirables dessins au trait, tous venus de la plume précise et artiste de l'auteur lui-même, qui eût toujours l'ambition d'être son propre dessinateur, et combien plus fidèle que le plus docile des techniciens!

Une quinzaine de chapitres proposent cette synthèse de la néo-primatologie: après un historique et un panorama général de l'ordre des primates, on envisage successivement l'origine et la distribution des faunes actuelles, les divers types de locomotion, le squelette, la cavité buccale, le pelage, le cerveau, les organes des sens, la croissance, la reproduction, la morbidité et la mortalité (coquille amusante: à travers 25 pages, le titre courant s'obstine à annoncer: moralité!), la variation sexuelle et intraspécifique, le comportement et les chenaux évolutifs. L'ouvrage se termine sur une bibliographie choisie: quelque dix à quinze titres par chapitre, ceux qui ont fourni la base de l'exposé ou proposent de centrales et récentes références; un appendice suggère l'essentielle systématique des 50 genres actuels valides; un index de près de 900 entrées facilite la consultation rapide de ce petit «traité».

Dense et précis, l'ouvrage sera précieux pour le non-initié. Qu'il s'agisse de la formation du promontorium, de la variation du nombre des vertèbres, de la densité du poil, de la structure du sternum ou de la capacité cérébrale, les très importantes collections étudiées par Schultz, réunies souvent personnellement par lui, sont mises à contribution et forment la base d'une enquête exceptionnellement documentée: elle s'appuie généralement sur des séries de 40 à 100 individus, voire même de plusieurs centaines (247 chimpanzés, 600 gibbons, etc.). Le familier des travaux d'A. H. Schultz ne sera ni déçu, ni blase – bien au contraire. Si les idées maîtresses, les travaux anciens, les tableaux déjà publiés se retrouvent ici, ils sont revus, mis au point, complétés ou corrigés, et proposent avec une base plus large de comparaison, un éclairage réciproque qui loin de lasser le lecteur déjà introduit dans la pensée du primatologiste de Zurich, comble plutôt son attente.

S'il est permis d'émettre un regret, un souhait plutôt pour une prochaine édition: celui d'un meilleur équilibre entre les divers problèmes abordés; peut-être la discussion de la signification des volumes craniens ou de la répartition géographique réclamerait-elle plus d'attention par rapport à l'examen des malformations digitales du gibbon, par exemple; dix lignes brèves sont

consacrées à la distribution des platyrrhiniens, tandis que la plus petite des surfaces dessinées (et le livre en abonde) illustre pauvrement la répartition géo-

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graphique de tout l'ordre à travers la zone tropicale, du Mexique à l'archipel de la Sonde et du Japon... L'A. puiserait aisément, dans sa vaste expérience et dans sa prestigieuse documentation, le matériau d'un passionnant commentaire.

La Vie des Primates n'est pas une œuvre de compilation ou d'érudition; c'est un livre essentiellement personnel et la longue obstination, intelligente du Professeur Schultz au cours d'une carrière exceptionnellement homogène, s'y retrouve à chaque page. Qu'il traite du Saimiri ou du singe-hurler, des Cebus d'Amérique centrale ou des Atèles, du gibbon du Sud-est asiatique, ce sont ses propres expéditions, ses observations directes qu'il utilise, même quand sa modestie ne croit pas devoir le dire; s'il traite de problèmes de variations, d'anomalies, de malformations, nous les voyons analysées, décrites, comparées au sein des prodigieuses collections que l'A. a eu le courage de constituer et qui garantissent cette longue et intime familiarité avec le matériau de son étude. C'est d'ailleurs le caractère très personnel et non compilatoire de l'ouvrage qui explique et justifie son cadre et ses limites. Le point de vue est délibérément celui de l'anatomiste et du morphologiste; l'accent est mis sur la connaissance des Simiens. On ne cherchera pas ici de considération d'ordre bio-chimique, immunologique, sérologique ou physiologique, voire même d'étude du comportement au sens où Carpenter, DeVore ou Washburn l'entendraient. Ces limites sont la rançon de la valeur même du livre de Schultz et en assurent la précision.

La science primatologique doit beaucoup à A. H. Schultz, comme lui doivent beaucoup tant de ses disciples de par le monde; le signataire de ces lignes est fier d'en être. Il est heureux de dire, pour cette nouvelle contribution, un chaleureux merci à l'ancien maître de Zurich, convaincu qu'il est d'être ainsi l'interprète de beaucoup d'adeptes et d'amis.

E. L. Bone, Louvain et Chicago

F. H. Rohles Jr.: Circadian Rhythms in Nonhuman Primates. Bibl. primat. No. 9, 127 pp. Karger, Basel/New York/München 1969. DM 33.-.

In den letzten 20 Jahren hat die Forschung auf dem Gebiet der Jahresperiodik gewaltige Fortschritte gemacht. Die endogene Natur der «circadianen» Rhythmen ist so gut wie unbestritten, und ebenso die Annahme, dass die circadiane Zeitstruktur zu den Grundeigenschaften lebender Systeme gehört. Weder Biologen noch theoretische oder praktische Mediziner können die wichtigen, hierdurch aufgeworfenen Probleme ausser acht lassen. Überraschenderweise sind Primaten erst in jüngster Zeit in die experimentellen Untersuchungen einbezogen worden. Die vorliegende höchst erwünschte Übersicht über das bisher Erarbeitete (8 Vorträge eines Symposiums) bringt im Beitrag von Farrer und Ternes für Vertebraten Beispiele für freilaufende Rhythmen einer erlernten Verhaltensweise, zugleich mit einem schönen Beispiel für die Abhängigkeit der circadianen Frequenz von der Beleuchtungsstärke (Schimpanse). Ohne Vorgänger ist auch das von Thach gezeigte Bige-minus-Muster im sozialen (optischen) Kontakt zwischen 2 Partnern (Papio papio). Registrierung der Tagesgänge von Körpertemperaturen werden von Winget und Mitarb. (Cebus albifrons, Macaca nemestrina) sowie von Smith vorgelegt (M. nemestrina). Viel Material enthält der Beitrag von Hoshizaki und Mitarb., die über ein 30-Tage-Experiment an einem M. nemestrina berichten; er enthält Tagesgang-Kurven zahlreicher physiologischer Größen und insbesondere ausführliche Auswertungen des mit 10 Elektroden registrierten EEG. Auch Stroebel hat (an isolierten Rhesusaffen) mehrere Größen gemessen,

darunter die Gehirntemperatur; trotz eines 12:12-stündigen Licht-Dunkel-Wechsels zeigen unter Stress-Situationen manche Tiere eine freilaufende Periodik («Neurotiker» nach dem Autor), andere eine 47-Stunden-Periodik (Psychosen). – Der lesenswerte Sammelband wird von Halberg abgeschlossen, der eigene Veröffentlichungen sowie solche anderer Autoren mit seinem Cosinor-Verfahren analysiert und in insgesamt 10 Tabellen die so gewonnenen Werte für einige Rhythmus-Parameter zusammenfasst.

J. Aschoff, Erling-Andechs

M. R. Malinow: *Biology of the Howler Monkey (Alouatta caraya)*. Bibliotheca Primatologica No. 7. Karger, Basel/New York 1968. VIII + 230 pp., 100 fig., 42 tab., 1 cp., \$ 11.50.

Howler monkeys are among the largest, most widely distributed and still most plentiful platyrrhines. They are rather slowly moving and hence easily hunted, but they are very rarely seen in captivity where they have never been bred. Our previously scant knowledge of the biology of these monkeys has become greatly increased through the collection of an adequate population sample under the auspices of the Oregon Primate Research Center. On some small islands in the Rio Parana in Northern Argentina 314 howler monkeys were shot and some additional ones trapped. Good facilities were obtained nearby for prompt autopsies and the preservation of organs, fetuses, raw skeletons, etc. The first results of this well organized undertaking have been assembled in the monograph under review and comprise the findings of 24 different authors, arranged in 17 separate articles which deal chiefly with age changes, anatomy and pathology.

A brief introduction by the editor states the aims and methods of the field work and describes the habitat and main features of the particular species. This is followed by a discussion by Betty Pope of the composition of the collected material according to age and sex in relation to family size. In the third chapter J. and V. de Egozcue report that the chromosome number equals 52, indicating a remarkable interspecific chromosome variability in the genus *Alouatta*. Four further chapters deal with age changes. Fetal growth and development could be studied on a unique series of 19 specimens by Swindler et al., who record many metric data for growth rates as well as the main changes in ossification and the development of hair, hands, feet and external genitalia. Rosenthal describes his estimation of postnatal age on the basis of the strontium-90 content of permanent teeth. Stahl and five co-authors contribute data for a detailed analysis of the relations between dental age and the weights of the body and of many organs as well as some bodily dimensions (taken only as tape measurements) in 298 specimens. Some phases of postnatal skeletal development have been studied roentgenographically by Lusted and Miller and compared with a few of the various other primates for which corresponding information has become available.

Four chapters bring excellent anatomical descriptions of these howler monkeys. Cramer discusses the thoracic and abdominal viscera and Grand the functional anatomy of the upper limb, illustrated by remarkably instructive drawings. The anatomical and histochemical properties of the skin and hair are authoritatively described by Machida and Giacometti. The detailed morphology of the masticatory apparatus and some of its functions are discussed and also well illustrated by Zingesser.

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In view of our still very inadequate knowledge of the variety and prevalence of pathological conditions in wild primates the reports on the relevant findings in this large series of howler

monkeys are particularly valuable contributions. Based upon thorough postmortem examinations of 292 specimens Maruffo deals with general pathology in systematic detail and Malinow and Maruffo devote a separate chapter to the specially interesting arterial pathology. The latter paper includes a description of the normal aortic growth changes in howler monkeys and reports that the incidence of naturally-occurring atherosclerosis increases greatly with advancing age, particularly in males. The periodontium and its remarkably common pathological conditions are discussed by Hall et al. A brief chapter by Pope deals with the few parasites observed during autopsy procedures. Persellin and Wilson report the spontaneous occurrence in *Alouatta* of macroglobulins resembling human rheumatoid factors which had not so far been demonstrated in non-human primates.

The final chapter by Malinow et al. contributes some laboratory observations on living howler monkeys, namely detailed blood values, the first growth curves for body weight and length in two captive males over a two-year period and the order of eruption of their permanent teeth. Extensive lists of references to mostly the newer literature follow all the chapters in which add much to the usefulness of this collection of studies by different specialists on the biology of one of the most interesting platyrrhines.

A. H. Schultz, Zurich