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J. Schmitt: *Immunbiologische Untersuchungen bei Primaten*. Bibliotheca Primatologica, No. 8. Karger, Basel/New York 1968. 146 p., 21 fig., 69 tab. US \$ 9.40.

Immunobiological studies of primate proteins have interested a number of investigators recently. Schmitt of Justus-Liebig University in Giessen presents us with a survey of the literature and the results of his own detailed investigations on the blood group systems and some polymorphic plasma proteins of a variety of primate species. The serological work appears to be excellent, and the discussion of the biosynthesis of blood group substances has merit.

The monograph begins with an account of primate evolution. This is an attempt to present a brief survey of the major taxa and is not entirely successful.

The chapter on the techniques of blood grouping is valuable and comprehensive. In the chapter that follows, the ABO blood group system is reviewed. This is an adequate, brief review of the literature, and some interesting comments on the ABO blood groups in nonhuman primates are included. The same approach is used in the chapters on the P and MN systems. The Rhesus system is, as usual, a nuisance, and Schmitt clearly does no better than any of the rest of us in attempting to untangle the ghastly mess found in the literature. It is clear that he has done little work of his own on this system and he does not speak beyond his information.

The chapter on various serum groups is not a particularly outstanding review of the literature. There are some surprising omissions in the bibliography.

Chapter eight, in which Schmitt attempts to construct phyletic schemes using blood group systems and serum proteins, merely demonstrates that German investigators are as naive as Americans when it comes to using immunobiology to enlighten us about the phylogenetic history of living primates. It is a distinct disappointment to me that Schmitt's excellent laboratory work and the thoroughness of his survey of the literature are not matched by a sophisticated and thorough analysis of ways of relating phylogeny and serology.

All in all, except for the few weaknesses mentioned, this is a good survey of the literature, and it also contains the results of the author's well-conducted experimental work.

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Proceedings of the Second International Congress of Primatology, Atlanta, Ga. 1968. Vol. 1: Behavior. Ed. C. R. Carpenter. XI + 282 p., 82 fig., 24 tab.; vol. 2: Recent Advances in Primatology. Ed. H. O. Hofer. XIV + 223 p., 29 tab.; vol. 3: Neurology, Physiology and Infectious Diseases. Ed. H. O. Hofer. XIV + 203 p., 84 fig., 19 tab. Karger, Basel/München/New York 1969. sFr. 166.50.

Founded in 1963, the International Primatological Society celebrated its first international biennial congress in 1966, and is currently enjoying its third. The research interests in primatology have diversified, expanded and intensified phenomenally during the past two decades. The slim volume recording the papers presented at the first congress has bios-

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somed into three volumes totalling more than 700 pages contributed by about 200 authors for the second congress.

The publication of papers read at large congresses, especially when there is neither pre- nor post-congress intensive screening and selection for presentation and publication respectively, has limited value. Data are often of a preliminary nature and bound to be revised a year later and many papers are either modified versions or a re-hash of previously published information. In favor of printing proceedings, is the availability of the presentations to those who were unable to attend, but then publication must be rapid to be really useful. When congresses are held biennially and a vast array of papers has to be edited, it becomes difficult to publish much before the next international meeting is due. Thus these publications tend to become more of historical documentaries than useful investigative machinery for active research workers and students.

After a fair amount of congress-hopping, one tends to agree with Omar Khayyam :

‘Myself when young did eagerly frequent
Doctor and Saint, and heard great argument
about it and about: but evermore
Came out by the same Door as in I went.’

The pervasive scope of the disciplines in the three volumes does not permit the reviewer to do full justice to either the authors and the editors or the readers of this review. Consequently I shall limit myself to a broad outline of the range of contents, some generalizations and occasional barbs and praises.

The second congress honored one of the giants of primatology of the first half of the twentieth century in the United States, Robert M. Yerkes. In the first two papers of volume 1 , Carmichael (‘The past, present and future of primatology’) and Rohles (The impact of Robert Yerkes on chimpanzee research’) pay homage to Yerkes. In the Introduction, Carpenter links Yerkes’ work and vision with the current explosion in primato-logical research endeavor. Carpenter sums up the latter: ‘Experimentation with primates is becoming increasingly complex and methodologically sophisticated. Methods and procedures now involve advances notably in biochemical analysis; pharmacology; telemetry; remote stimulation of brain centers and tracts; sustained long-term studies, especially during early periods of development of individuals but also during their whole life histories; experimentation with social groups and complex-colonies; research on perceptual-motor learning capacities; and descriptions of networks of social interactions of free-ranging colonies. Advances also are being made in the difficult area of the precision comparisons of the characteristics of genera and species of primates’.

The rest of volume 1 deals with social organization and ecology (4 papers), studies of social behavior in (large) enclosures (7 papers), communicative behavior (4 papers), comparisons of behavioral characteristics (7 papers), early life and developmental studies (4 papers), physical and behavioral interactions in stress (5 papers), and methods, procedures and techniques in behavior research (6 papers). The papers indicate a large variety of animals being studied. An interesting inclusion is ‘An ethological study of agonistic behaviour in pre-school children’ by McGrew. More contact between primatologists and students of human behavior should be encouraged. Both groups would benefit considerably from each other, especially as the latter have developed a wide array of sophisticated techniques and models while the former also have the experience of a multitude of species.

Investigations of behavior and social organization of primates have been in vogue for some time. Although much information is yet to be collected on naturalistic behavior of

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many primates, the reviewer is impressed (i. e. depressed) by the number of papers, with a few notable exceptions, that do not seem to be focussing and developing their data-collecting around

major biological problems, for example, relating to ecosystems. It seems difficult to gauge the direction of some research programs, as for example in the repetitive studies of mother-infant interactions in various species.

Berkson and Ross emphasize the necessity of developing a reserve program for gibbons aimed at increasing their welfare and reproductive capacities. Marsden experimentally reversed dominance between two separated groups of rhesus monkeys occasionally connected by a tunnel. Agonistic intergroup relations appeared as a continuum of development from a stalemate and group territoriality to complete dominance regardless of location. In a study of the social organization in experimental groups of Saimiri and Calli-*cebus*, Mason and Epple demonstrated that the former tended to form isosexual groups. In the latter it seems that the female's preference for familiar over novel stimuli (social and ecological) may play an important part in territorial behavior and the maintenance of the pair bond. Reynolds and Luscombe, while investigating social structure characterized by rank order relationships in chimpanzees, conclude that the display behavior characteristic of mature males serves as a positive attractant leading to group cohesion. Michael's studies indicate that sexual excitation and activity in male rhesus monkeys is mediated, in certain cases, by a hormone-dependent, olfactory stimulating pheromone, possibly of vaginal origin. The ability of identifying females in the group with ovulatory follicles would have the selective advantage of increasing the likelihood of fertile matings. An investigation of the attentional skills of great apes compared with those of gibbons and squirrel monkeys, led Rumbaugh and McCormack to the hypothesis that associated with arboreality in primates is selection for readiness to attend to immediate foreground clues, which in the trees define routes of locomotion. Jarosch, studying the necessity of social contacts for developing motivation for instrumental learning in Saimiri, demonstrated that isolation suppresses directed activity while social contact develops directed activity.

Volume 2 comprises three major areas of interest: reproduction (11 papers), histology (4 papers), and anatomy and anthropology (15 papers). Hummer, May and Knight document the establishment of a chimpanzee breeding colony to study their reproduction. Erikson demonstrated the variation in vaginal epithelial desquamation that develops in the ovariectomized rhesus monkey in response to hormonal replacement therapy, and showed that the pattern of desquamation simulated that prior to ovariectomy. By means of light- and electron-microscopy studies, Butler demonstrated that the germinal cords in the ovarian cortex of the adult Senegal galago contain oogonia which enter the pro-phase of meiosis and form primary oocytes in arrested diplotene. Many oogonia also undergo atresia and disappear. Blakley found that the vaginal cytological changes found in the human menstrual cycle are closely paralleled in an orang-utan. A similar study in the chimpanzee, but also including sexual swelling and gonadotrophin excretion, was conducted by Graham, Guillod and McArthur. Meyer, Wolf and Arslan carried out a series of experiments which led to the conclusion that embryo implantation and maintenance of pregnancy can occur in progesterone-treated ovariectomized rhesus monkeys. Related to Michael's studies (vide supra), are the experiments of Herbert who effectively indicated that oestradiol increases the sexual attractiveness of the female rhesus monkey, probably by an action on her genitalia. This effect is antagonized by progesterone. Testosterone increases her receptivity, but her attractiveness remains low. The hormonally-

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mediated factors which stimulate the mounting activity of the normal male may become inoperative if the sensory neural input from his genitalia is disturbed by removal of afferents from the penis. It would be interesting to apply these studies to those developed by Perachio et

al. ('Sexual behavior evoked by telestimulation') outlined in volume 3. Katz-berg examined spermatogenesis in the wild East African baboon, while Hendrickx and Houston described gross and microscopic observations made on baboon embryos during the time of early organogenesis. The fine structure of the thymus of the fetal rhesus monkey with emphasis on the epithelial cell system was described by Chapman, and Sprankel outlined the comparative histology of the nail plate of *Pan troglodytes*, *Pongo pygmaeus* and *Hylobates lar*.

Chromosome and serological studies were poorly represented at the congress, so much so that the four papers were included in the 'Histology' section. Hawkey and Symons developed a study 'to explain in terms of the thrombogenic theory of atherosclerosis... the variation in susceptibility to spontaneous cardiovascular disease which is found in different primate species'. Six species, including man, were tested. Although the components of the blood coagulation mechanism are found to be similar in the six, there is some variation in the activity of the individual factors. In general the mechanism is more active in monkeys than in man. They also conclude that increased potential activity of the clotting mechanism is not the primary predisposing factor in spontaneous cardiovascular disease. The definition of karyotypes and identification of chromosomes of the chimpanzee were detailed by Low and Benirschke. By studying the variability of alleles at the trans-ferrin locus within and between allopatric and sympatric populations of different macaques, Prychodko et al. attempt a determination of the phylogenetic affinities of different species within the genus *Macaco*. Biochemical taxonomy was also attempted by Nakaga-wa, Hudgins and Whorton who studied myoglobin derived from 9 species representative of the three primate superfamilies. The homogeneity of myoglobin structure found within a superfamily may reflect a relative degree of stability of this molecule in the evolutionary process.

The section on anatomy and anthropology is also disappointing from the viewpoint of both the small number of papers and the paucity of original ideas. Prasad briefly reviewed the status of some fossil anthropoids recovered from the Siwaliks of India, while Simons and Chopra announced a newly discovered mandible of *Gigantopithecus* from the Siwaliks. Both papers are pre-occupied with conjectures and postulates on taxonomy. Carpenter and Durham attempt to define 'suspensory behavior' (with respect to 'brachi-ation') in nonhuman primates, and present a very useful analysis. Osman Hill gave a classic description of the blood vessels of the face in the long-snouted *Papio* and *Mandrillus*. Of particular interest is the paper (The mechanical basis of the morphological differences in the skeletons of apes and man') by Preuschoft, marred only by the lack of reference to publications outside Germany (for example, by C. E. Oxnard, E. H. Ashton, F. G. Evans). Modern bioengineering concepts and mathematical techniques have much to offer us in our attempts to determine and to understand form and function of the skeletal components, especially in relation to primate locomotion. In fact these techniques present opportunities for some real 'breakthroughs' in our knowledge of locomotor mechanisms. In relation to functional anatomy, observations on the behavior of primates in natural habitats and zoos have by-and-large served their major purpose, but the models and concepts of causation and function need to be attempted in the laboratory, through the computer and on the drawing-board. Thus the theoretical conclusions drawn by Spatz ('An

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interpretation of the sagittal shape of the skull of higher primates, based on observations on the skull of *Tarsius*) need to be tested by the above techniques: as they stand now his views are purely of speculative value. Bone and Haumont draw attention to the importance and need of positive international collaboration and action in developing an International Primatological Center in the West Congo in co-operation with Lovanium University and the government of the

Republic of the Congo. This project, with its far-reaching implications for research, warrants the immediate attention and consideration of promotional primatologists.

Volume 3 is divided into five sections: communication (3 papers), neurology (10 papers), physiology and pharmacology (7 papers), immunology (5 papers), and pathology (10 papers). The difficulty about cutting a cake is that there are so many ways of doing it. The editors (and, I assume, the program organizers) had to come to some sort of decision concerning the divisions and they have done so more-or-less along the lines of classical disciplines. Yet there are papers in the communication section dealing with vocalization that have close affinities to papers in volume 1, and similarly with papers in the neurology section. Some of the papers in the immunology section may have gelled better with some dealing with molecular biology in the 'histology' section of volume 1.1 merely draw attention to these relationships for readers who may only seek out one volume for particular papers under general discipline-oriented headings. No matter how one cuts the cake, everyone will not be satisfied: after all it is the quality of the ingredients that matters and not the slicing mechanism.

Myers ('Neurology of social communication in primates') seems to develop some anthropocentric concepts. He may be correct in stating 'Finally, man attains unprecedented heights in expression of face and voice for the transmission of states of mind and of social demands of various types' and 'complex use of face and voice first develops phylogenetically among the lower anthropoidea', but I do not believe that one can segregate face and voice from either the total behavior pattern or the concern for and estimate of the evolutionary success of the patterns of various animal forms. To brush aside threat and other emotional display of lower mammals by 'a few stereotyped threat expressions seen in lower mammals', is to consider the position and movements of the head and of the tail, the pawing of the ground, the erection of body hair, etc. of other animals as being inconsequential. A human smile can often be as misunderstood as the wagging of a dog's tail! This criticism does not detract from Myers' thesis of the role of volitional cortical control. The paper ('The present state of research on the dehumanization hypothesis of African ape evolution') by Kortlandt and Van Zon is based on a working hypothesis that is difficult for serious students of evolution to accept, viz., 'when the hominids developed the spear and could kill at a distance in open terrain, their ape relatives were gradually forced to retreat almost entirely into dense forests...' Paleontological evidence alone entirely negates such a statement. Among other doubtful remarks, is the supposition that 'the double barrier...' caused by '... the Rift faulting in Later Pliocene times, created the geographic isolation necessary to the differentiation of the African pongids and hominids on either side of this barrier.' Manocha described the cranial nerve nuclei of the chimpanzee brain while Shantha delineated the nuclei in the region of the thalamus. Based on a quantitative investigation on visual structures in primate brains, Stephan concluded that in the earlier phases of primate evolution (up to the lower simians) the Area striata, in comparison to the total neocortex, developed more rapidly than in the later phases. Noback et al. narrowly viewed phylogenetic aspects of the visual systems and proposed that

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anthropoids, prosimians and tupaiids have differences in their visual systems (e.g., color vision and the laminar patterns of the lateral geniculate body) which probably evolved independently in the three groups. Black and Myers performed various sectioning experiments on the neocortical commissures and optic chiasma of the chimpanzee to determine across-the-midline transfer of visual gnostic information (pattern, color, brightness). The commissures were found to be essential for interhemispheric transfer of pattern problems, while the transfer of brightness and

color problems occurred independently of the fore-brain commissures. Jürgens attempted to map out the cerebral representation for vocalization in the squirrel monkey, while Maurus and Ploog used telestimulation to elicit motor and vocal interactions in groups of squirrel monkeys.

One of the interesting results of attempts to acclimatize tropical monkeys to the environs of Moscow was described by Chernyshov as being an increase in storage and a more economical expenditure of fat.

Some authors described investigations which are directly related to laboratory and experimental usage and maintenance of primates. Smith and Stout stated that, in the anubis baboon, the administration of phenylcyclidine primarily causes depression of blood pressure, pulse and respiratory rates, while pentobarbital sodium produces depression of body temperature.

According to Thomsen, small daily doses of endrin, a chlorinated hydrocarbon and pesticide, may produce changes suggesting involvement of corticosteroids and catecholamines. Oxnard, Smith and Torres offered convincing evidence that captive monkeys maintained on vegetarian diets may develop vitamin B₁₂ deficiency. The interesting point is that in these apparently normal animals, widespread neurological lesions have been found. Kuntz and Myers recorded a wide range of parasites and commensals as well as malarial infections in chimpanzees examined about 4 months after capture. Stout outlined some studies on atherosclerosis in the great apes, while Kalter presented a microbial profile on various higher apes for a number of selected viruses of human and simian origin. Lapin, Shevtsova and Krylova detailed the results of an experimental study of a new disease, hemorrhagic fever, of rhesus monkeys which they attribute to a new virus.

The above sampling of the wide diversity of interest has created great difficulties of choice and emphasis for the reviewer, and it would have been most helpful if each editor had written a précis of the major contributions in each section.

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