

BOOK REVIEW

CHIVERS, D. J., Ed. (1980). *Malayan forest primates: ten years' study in tropical rain forest*. Plenum Press, New York. Pp. 364.

Anyone interested in reading an overall introduction to or analysis of the ecology and behaviour of Asian primates must inevitably be drawn to this interesting summary of the socio-ecology of Malayan primates. It is of particular interest to a Thai readership because all species of primates discussed in the book except the siamang occur in Thailand as well as peninsular Malaysia.

The book is a kind of testimonial to the energy and organizational ability of the editor, David J. Chivers of Cambridge University, who initiated this long-term effort with his intensive study of the socio-ecology of the siamang, the largest member of the gibbon family, in 1969. There followed during the 1970s a generation of students and colleagues who took up further studies of lar and agile gibbons, leaf monkeys and macaques, mostly in the Krau Game Reserve at Kuala Lompat, but also at other sites. Thanks to Chivers, the Krau Reserve site has the best studied primate fauna of any in tropical Asia, and more students have continued studies there since.

My first reaction upon learning of the preparation of this book was that it would probably be a largely redundant compilation of facts and figures already published elsewhere, of little use to the serious worker. The book does repeat much material published elsewhere, but I am happy to find it is a well organized and successful synthesis of great value in itself. It attempts to integrate different studies and successfully presents a comprehensive view of the Malayan primate fauna. It contains numerous figures and photographs, particularly of gibbons and siamang; photos of most monkey species are in short supply.

The volume begins with an historical and methodological introduction by Chivers, followed by a general sketch of the ecology of the forest by J. J. Raemaekers, F. P. G. Aldrich-Blake and J. B. Payne. Following this are analyses of the major genera of primates, beginning with the gibbons by S. P. Gittins and J. J. Raemaekers. Paul Gittins includes in this chapter his major findings about the ecology of agile gibbons in northern Malaya (this species gets into extreme southern Thailand; see MARSHALL, *Nat. Hist. Bull. Siam Soc.* 29: 129-136). Lar and agile gibbons are quite similar behaviourally and are ecological counterparts. Their allopatric ranges in

Malaya and Sumatra appear to reflect the result of strong competition to the point of competitive exclusion. This chapter ends with an analysis of selective forces promoting territoriality and monogamy in gibbons.

Sheila Hunt Curtin follows with an ecological comparison of the two leaf monkeys *Presbytis obscura* and *P. melalophos*, including social structure, behaviour; ranging pattern and diet. The two species differ rather markedly in forest level preference, diet and general level of activity. The next chapter by F. P. G. Aldrich-Blake deals with the long-tailed macaque, *Macaca fascicularis*, covering generally the same aspects.

John and Kathy MacKinnon present an analysis of niche differentiation in the primate community, including the siamang and lar gibbon, the two leaf monkeys, and two macaques. This is a most interesting chapter, and shows that the species differ significantly from each other in diet (especially in the degree of frugivory vs. folivory), level of the forest utilized, group size, home range size and other aspects. Differences in territoriality and overall density are correlated with the degree of specialization in the diet, the gibbon being the most territorial primate and feeding on relatively fewer and more scarce types of fruit. The differences clearly show how these species of primates can coexist in the same forest, but in my view the great differences in degree of territoriality, group size and ranging are not so convincingly explained by the differences in diet. It is interesting that the MacKinnons' observations on the differences in ranging behaviour between the dusky and banded leaf monkeys do not entirely agree with those of Curtin. Perhaps this is due to variation between groups.

In the next chapter, J. Fleagle shows how differences in anatomy correlate with differences in locomotion, in the types of supports utilized and in feeding posture. Fleagle's approach is novel in correlating locomotory differences with quantifiable differences in actual observed field behaviour and ecology.

Chivers and Raemaekers, under "Long term changes", next analyze changes in social relations in important gibbon and siamang groups over a period from 1969 to 1980. This is a worthwhile summary of all observations on these groups, as such long term observations on social behaviour are sadly lacking. After all, the mean generation time of humans is only about twice that of gibbons! The summary attests to the general stability and sedentariness of gibbon groups, but also to the occurrence of occasional major changes and crises in their lives, just as in those of humans. Attempts to correlate long term changes in weather, food abundance, ranging behaviour, feeding and general activity are not fully successful, although long term changes in several variables are evident.

A brief chapter by Payne on primate "competitors" mainly analyzes squirrel diets, but also summarizes general dietary features of a variety of other mammals and birds. The analysis of competitors suffers somewhat from a lack of detail and precision, although the problem is far too large for one person or one chapter. Rigorous evidence that resources other than space are in short supply has not been obtainable for forest primates. But the data show what we might expect, that different kinds of animals tend to eat different things in different ways and at different times. Interesting differences occur among the five species of squirrels studied which are comparable to some of those between primates. Squirrels in general eat more seeds than do primates, and hence are seed predators more than dispersers.

A final sum-up of the socio-ecology of forest primates in Malaya by Raemaekers and Chivers attempts to integrate previous material and arrive at some generalizations. An impressive table provides a comparison of group size, weight and biomass per area, home range size, activity budgets and diets. There is a rather strong conviction that competition for resources has resulted in the divergence of primate niches, especially between related species of the same genus. Finally, there is a further attempt to explain the differences in social structure and behaviour in terms of ecological and dietary differences. This is a difficult and complex exercise, but an important one being engaged in by many comparative primate ecologists. The key factors are believed to be the selectivity of the diet and the dispersion of food sources in the forest, the monogamy and territoriality of the hylobatids being largely due to a more selective diet of smaller, rarer and more highly dispersed food items.

This is a competent, state-of-the-art explanation, but I am not entirely convinced that food dispersion compels such great differences in ranging and social structure as we find among forest primates. Moreover, food dispersion has not been objectively measured and found to differ significantly among the species' diets. I think that some of the important variables have not been measured at this still preliminary stage of field studies, such as actual foraging strategies and efficiencies, exclusivity of food use, and the degree of coevolution between foragers and food species. For example, marked qualitative differences in ranging path patterns seem to exist between gibbons and monkeys which suggest greatly differing food finding techniques. Ranging path should be broken down into foraging distance and travelling-to-food-source distance. Several authors point out that gibbons seem to have great knowledge of where food items are located within their territories. The ability to use this knowledge would

certainly be affected by group size. This in my view is the key to their differences in diet, not food source dispersion so much per se, but the theme is not developed.

The next generation of studies of feeding and ranging should, I believe, pay closer attention to developments in foraging theory so that more meaningful and relevant questions may be asked and hypotheses tested. This I am sure will be stimulated by this excellent and important summary of a fruitful decade of primate field research.

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