

problem associated with the use of Fourier analysis is that the technique provides information on the outline of the objects only, ignoring the structural features that may be inside the contours. In the case of the noseleaves, the relative size and shape of the horseshoe and the spear are important characteristics in separating the different groups (Arita, 1990). Fourier analysis allows the description of horseshoe and spear morphology only in a very vague way (Fig. 3). By the same token, this method provides no information on the position and size of the medial rib or on the separation between the nostrils.

A final limitation, in common with other comparative studies, is the possible effect of phylogenetic constraints (Brooks and McLennan, 1991; Harvey and Pagel, 1991). The Phyllostominae are a paraphyletic group (Honeycutt and Sarich, 1987), but there is disagreement on the correct phylogeny of the group (Baker, 1967; Baker et al., 1989; Patton and Baker, 1978; Smith, 1976). The subfamily Stenodermatinae seems to be monophyletic (Owen, 1987), but its relationship with the Phyllostominae is unclear (Smith, 1976). Consequently, when comparing morphological features of the two groups, I am neglecting the possible influence of phylogenetic inertia on size and shape.

Fourier analysis is a convenient way of describing the outline shape of simple objects, and can be used both in descriptive and analytical studies. However, the technique has some limitations, especially in the case where the objects possess some important morphological feature not associated with the margin. Fourier analysis is no substitute for other morphometric techniques, and it should be used in combination with other methods to fully exploit its analytical power.

ACKNOWLEDGMENTS

I thank the comments and suggestions of R. Kiltie, D. E. Wilson, and three reviewers. This paper is dedicated to the memory of J. Saw, who introduced me to the fascinating world of theoretical multivariate statistics and profile analysis.

LITERATURE CITED

- Anstey, R. L., and D. A. Delmet. 1972. Genetic meaning of zooecial chamber shapes in fossil bryozoans: Fourier analysis. *Science*, 177: 1000-1002.
- Arita, H. T. 1990. Noseleaf morphology and ecological correlates in Phyllostomid bats. *Journal of Mammalogy*, 71: 36-47.
- Baker, R. J. 1967. Karyotypes of bats of the family Phyllostomidae and their taxonomic implications. *The Southwestern Naturalist*, 12: 407-428.
- Baker, R. J., C. S. Hood y R. L. Honeycutt. 1989. Phylogenetic relationships and classification of the higher categories of the New world bat family Phyllostomidae. *Systematic Zoology*, 38: 228-238.
- Bookstein, F. L., R. E. Strauss, J. M. Humphries, B. Chernoff, R. L. Ender, and G. R. Smith. 1982. A comment upon the uses of Fourier methods in systematics. *Systematic Zoology*, 31: 85-92.