

## DISCUSSION: A THEORY OF THE TAXON CYCLE

Enough zoogeographic and ecological data have now been accumulated to justify a preliminary reconstruction of the generalized taxon cycle of the Melanesian ant fauna. Let us start with the actual process of speciation. The evidence suggests that the chief geographic barriers are the water gaps. Speciation probably occurs by internal fragmentation of some populations on the great island of New Guinea, but this appears to be a minor phenomenon, principally involving retreating endemic species. As a rule, semispecies and superspecies, comprising the populations at the threshold of speciation, break at the water gaps. Furthermore, the wider the water gaps, the more frequent the breaks between the allopatric populations. Finally, accumulations of related species on single archipelagoes or islands is chiefly the result of multiple invasions (Wilson, 1959a).

Expanding species in Melanesia originate almost entirely from tropical Asia, New Guinea, and Australia. These are moreover the "potent" species that must from time to time give rise to new taxa. However, the fossil record reveals that ant evolution has been relatively conservative since the early Tertiary (Wheeler, 1914; Carpenter, 1931). The zoogeographic evidence indicates that the origin of new potent taxa of higher rank is a rare event in tropical Asia and Melanesia. Among the 41 smaller ant genera confined to tropical Asia and New Guinea, only three (*Myopopone*, *Odontoponera*, *Pseudoponera*) contain expanding species. Of 51 ant genera of comparable representation in tropical Asia and New Guinea but with representation in other faunal regions (hence, older genera?), 17 contain expanding species. (See table 3.) Other distinctive endemic genera have been evolved in the Solomons, Fiji, and New Caledonia but are strictly limited in size and show no sign of extending their ranges. Thus, the origination of higher taxa is a relatively common event in the Oriental-Melanesian region, but the new products are usually strictly limited to the archipelagoes in which they are born. The combined evidence indicates strongly that the creation of the occasional potent new genera and higher taxa is confined to the large source areas of tropical Asia and New Guinea. Indeed, since *Myopopone*, *Odontoponera*, and *Pseudoponera* are all Asia-based, it is possible that tropical Asia alone serves as a significant source area of potent taxa higher than the species group. Retreating taxa can shift their headquarters from larger to smaller land masses but not in the opposite direction (figure 9).

At lower taxonomic levels, the ants seem to conform to the rule expressed earlier by Darlington (1957, 1959) for vertebrates, that dominant taxa tend to arise in and spread from the largest favorable land masses. It is possible to go a step further and specify that in Oriental-Melanesian ants, the degree of faunal interpenetration is closely correlated with land mass and only secondarily correlated with faunal size, as shown in figure 4.

There is good reason therefore to focus special attention on the ecology of the large land masses generating Stage-I species: tropical Asia and New Guinea. From our somewhat more advanced knowledge of the New Guinea