

habitat disturbance are often indirect and stress-related, influencing habitat structure, microclimate, and food supplies (Andersen 1995). The importance of predation as a disturbance of ant communities has been little studied. Despite a wide range of animal species that feed on ants, some exclusively so (Redford 1987; Abensperg-Traun and Steven 1997), predation is not generally regarded as a major force structuring ant communities. However, there is increasing evidence that predation by other insects (Gotelli 1996) and more particularly parasitism by phorid flies (Feener 1981; Orr 1992; Porter et al. 1995c) can be an important factor in regulating foraging in some ant species, with significant effects on community dynamics.

From a global perspective, environments can be classified according to the relative importance of stress and disturbance as factors driving community structure, following the nomenclature of Grime (1979). Environments subject to severe stress or disturbance are characterized by highly specialized stress-tolerant species and unspecialized ruderal species, respectively. At very low levels of stress and disturbance, competition becomes the primary factor regulating community structure, and highly competitive species predominate. Three primary types of communities—stress-tolerant, ruderal, and competitive—can therefore be recognized in relation to stress and disturbance (Andersen 1991a, 1995). At intermediate levels of stress and disturbance, a variety of secondary community types can also be identified (Fig. 3.1).

Just as the degree of disturbance from a vegetation perspective does not necessarily reflect the level of disturbance to ant communities, the same environmental conditions can represent very different levels of stress from plant and ant perspectives, and can therefore support very different structural types of communities (Andersen 1995). For example, hot and open environments represent low levels of stress for ants and

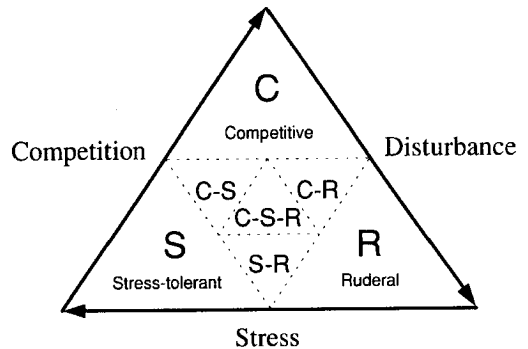


Figure 3.1. Classification of communities in relation to stress and disturbance, following the nomenclature of Grime (1979). See text for details. Modified from Andersen (1995).

support competitive ant communities. However, these same conditions are stressful for plants (i.e., primary productivity is low), and such environments support stress-tolerant plant communities, dominated by taxa such as cactuses in North America and hummock grasses in Australia. Environments support structurally analogous plant and ant communities only when ants and plants respond similarly to limiting factors. An example of this is the ground layer of rainforests, which supports stress-tolerant ant and plant communities because both ants and plants are limited by low levels of sunlight.

## Ant Functional Groups

Global community ecology requires the identification of functional groups that transcend taxonomic and biogeographic boundaries and vary predictably in response to stress and disturbance. Such groups have been identified for ants based on Australian studies (Greenslade 1978; Andersen 1995, 1997a). There are seven such ant functional groups, and their major representatives in Australia and the New World are listed in Table 3.1. A generalized model of the relationships of these groups to each other, and to environmental stress and disturbance, is