

GREGARIOUS BUTTERFLIES □
YORUBA RITUAL □ DINOSAUR EVOLUTION □
TROPICAL ISLAND WATER BALANCE

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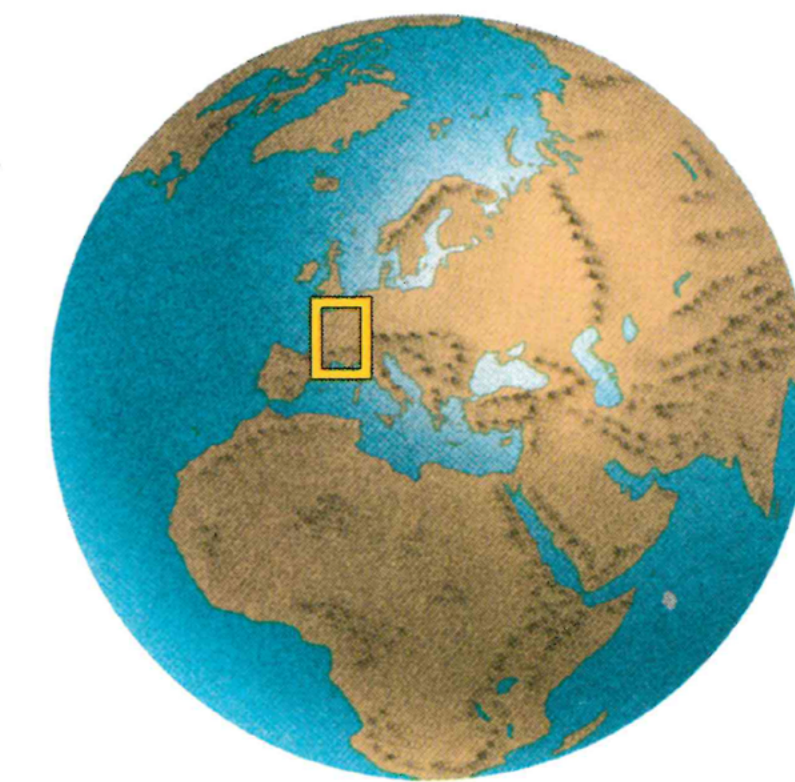
Habitat Segregation Among European Tree-hole Mosquitoes

Bark-lined cavities and rot holes in deciduous trees may hold water and harbor mosquitoes specific to that habitat. In north-central France and southern Britain — where tree holes experience an even rainfall pattern throughout the year, contain a variety of mosquitoes, and lack predators — competition should be especially important.

*Mosquito species found here occupy distinct subhabitats characterized by the exposure, size, and orientation of the hole and by the pH, conductivity, and tannin–lignin content of the contained water. At the same time, each species encounters a higher density of its own species than all other species combined. Among mosquitoes, weight at pupation is both an excellent predictor of future lifetime fecundity and a highly sensitive index of food level during prior larval development. Pupae of field-collected *Anopheles plumbeus* and *Aedes geniculatus* in north-central France and southern Britain weigh less than pupae of these same species grown at field temperatures but with abundant food in the laboratory. These results indicate that, as larvae, mosquitoes in the field encounter severe resource depletion so that, regardless of the mechanism by which habitat segregation has evolved, intraspecific competition persists within segregated subhabitats.*

Ever since Malthus and Darwin, competition has been envisioned to play a pivotal role in the process of community formation. Most theory over the last 20 years has emphasized competition as the major selective force affecting the number and coexistence of species in a community. Species may coexist only if they evolve subhabitat specializations and so avoid competing for the limiting resources (Cody 1968, Cody & Diamond 1975, MacArthur & Levins 1967, Schoener 1974). Competition might well be all the more acute in restricted habitats where inhabitants are forced to deal with one another at close quarters and where outside interference is minimal.

Of the various restricted habitats, water-filled tree holes are ubiquitous to all latitudes where hardwood trees occur from the equator to the subarctic. Tree holes form when a rotting cavity penetrates into the heartwood (rot holes), when branches grow together at a crotch, or when buttress roots are completely lined with bark (pan holes, sensu Kitching 1971). When these holes contain water, they almost invariably serve as the exclusive preadult habitat for a variety of mosquitoes. In southeastern North America, predators and periodic drought reduce tree-hole mosquito populations to levels at which resources are no longer limiting and mosquitoes do not compete within or between species



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