University of Florida Book of Insect Records
Chapter 11 *The Longest Migration*

CHRIS TIPPING

Department of Entomology & Nematology
University of Florida, Gainesville, Florida 32611-0620

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A definition of migration that does not require migrants to have navigational abilities or to return to the point of origin has been used in this manuscript in an attempt to determine the longest insect migration. The desert locust, Schistocerca gregaria*, a dynamic migrator, migrated westward across the Atlantic ocean 4500 km during the fall of 1988.*

"In many books published in the past a distinction was made between migration and other forms of movements. But in recent years it has become increasingly accepted that this distinction is artificial and that movement and migration are one in the same thing" (Baker 1981). This statement perhaps best describes the problem with an exact definition of migration.

Migration in insects serves not only for escape from old habitats but also for reproduction and colonization in new ones (Dingle 1978). Because insects exhibit an extremely wide range of lifestyles and life histories, two of the four kinds of migration described by Taylor (1986), dynamic migration and homeostatic migration, were examined to determine the farthest insect migration. Dynamic migration is directed movement controlled by tides or wind, with navigation abilities not essential. The desert locust *Schistocerca gregaria* (Forskal), found in Africa is a good example of this type of migration. The majority of migratory insects fall into this category. Homeostatic migrations are two-way movements with migrants or offspring returning to breeding areas, hence the need for navigational abilities. The monarch butterfly (*Danaus plexippus plexippus L.*) is a good example of this type of migration. This insect migrates to overwintering sites and then migrates back toward its summer range taking several generations (Urquhart & Urquhart 1977).

Weather appears to be an important factor for the majority of insect migrations. Insect migrations are usually completely confined to the lowest 2 km of the atmosphere, the planetary boundary layer (PBL) (Drake & Farrow 1988). While migratory insects are within the PBL, they are subject to weather effects such as thermals, downvalley wind jets, and fronts (Pedgley 1982). Many insects that migrate with help from the wind such as the six-spotted leaf hopper, Macrosteles fascifrons Stal, travel on the wind by flying vertically until they encounter ideal currents that carry them north from locations of over wintering (Meade & Peterson 1964). They then fly down to ground when they encounter suitable habitats. The migratory aphid *Aphis fabae* Scopoli also disperses with local winds. Winged adult forms take off on strong vertical flights, attracted to the blue light of the sky (Johnson 1963). After several hours of flight and often many kilometers from their takeoff site, the aphids begin to descend, now attracted to yellow or green colors. Some insects can rise above lower air turbulence by wind currents or powered flight. Glider pilots have observed monarch butterflies at a altitude of 1200 meters (Gibo 1981). *Schistocerca gregaria* has been seen to reach heights of 1-2 km by riding thermals (Rainey 1974). Migratory flights at these altitudes can allow insects to disperse against wind directions found at lower altitudes.

Methods

Determination of the longest flyer was made after a search of AGRICOLA 1970-1994, secondary literature, including ecology and entomology texts, and discussion with several professors.

Results

The desert locust, *Schistocerca gregaria* inhabits the dry areas of northern Africa. Their breeding is synchronized with the arrival of the rainy season (Gillot 1980). Their wind borne migrations are associated with the movement of the convective air currents of the Inter-Tropical Convergence Zone (ITCZ). Within the ITCZ "opposing warm and humidity-laden trade winds meet, air ascends and, in cooling off, precipitates its humidity in the form of tropical rain" (Schmidt-Koenig 1975). Waloff (1959) reported that in 1950 individual swarms had been tracked from the Arabian peninsula over 5000 km to the west coast of Africa at Mauritania in less than two months. However, recruitment and die-off of individuals making the entire trip from start to finish was not mentioned or recorded. During October of 1988 many individuals of *S. gregaria* were found along a front reaching north from the island of St. Croix in the West Indies, south to the eastern coasts of the South American countries of Surinam and Guyana (Rainey 1989). These individuals were arriving with a sub tropical wave of low pressure that later spawned a hurricane. The distance traveled from the west coast of Africa to islands in the West Indies was 4500 km.

Discussion

The longest insect migration was performed by desert locust *Schistocerca gregaria*. The records of *S.gregaria* found in many Caribbean islands and parts of the east coast South America during October 1988 indicate that they flew within with a tropical wave pattern for a distance of 4500 km. The close observation of weather records for that particular region of the Atlantic made it possible to track their flight with a fair degree of accuracy. Also, members of the swarms probably flew for some distance in Africa before they began the trip across the Atlantic ocean. The report of the 1950 swarm could be misleading due to the unknown history of the individuals

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