Insect diversity over Indian Ocean

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Insects are primarily terrestrial animals and there is hardly any habitat which has not been successfully colonised by them. However, out of these, a small percentage of species have secondarily become adapted to aquatic environments, essentially fresh water.

There is only a single genus, *Halobates* (Heteroptera; Gerridae: Halobatine), which has successfully adapted to open oceans and lives in upper 1 meter of sea water. It lives on other zooplanktons. It skates on the water surface (hence the name Sea skater), just like it's fresh water cousins that skate gracefully on the surface of stagnant water. (Incidently, this was filmed by the legendry film maker Satyajit Ray in his first film *"Pather Panchali"*).

It has generally been believed that except for *Halobates*, there are no insects in the marine environment. Some insects however do frequent littoral waters. Some flying insects, living near the shores may also venture out for short distances over the open oceans. But even these insects would perish or return to the shores as the oceans are supposed to act as effective barriers against dispersal of terrestrial animals.

However, this statement may be true for various other terrestrial species, but not for insects, as the atmosphere over the sea waters, is full of small insects (always less than 10mm in length; mostly measuring 0.5 to 3.0 mm). This is true even as far away as thousands of kilometers from the nearest landmass. The aerial density of these insects varies considerably, being much higher in some regions and much lesser in others. These insects have originated from some land mass where they were carried up into the atmosphere with heat convection currents and were then carried over the oceans when seward winds blew from land. These insects are thus subjected to passive migration.

In order to conserve their energies, they do not beat their wings, but only keep them open so as to remain afloat as long as possible, and hope for the best. Most of these ultimately do fall in the waters below and contribute librally (due to their sheer numbers) to the oceanic biomass. Some are lucky and happen to land on islands. If food is available in the form of the host plants or prey and there are no predators or the predator density is sufficiently low, they may survive. However, some are very lucky and do cross over long distances (some times over 3000 miles !) and reach distant continents where with passage of time and favourable conditions, they may become established. This migration of insects, though passive in nature, throws new light on the Zoogeography of these tiny terrestrial animals.

Isolated reports of insect catches in ships, far away from landmasses were reported towards the end of the last century, but systematic studies started with trappings of insects over the North sea using Kite - traps, in 1937 by Hardy, but his observations could not see the light of the day during his life time as the second world-war started in Europe. Prof. J. L. Gressitt and his colleagues in the Bishop Museum, Honolulu, Hawaii, took up this work in early sixties as a part of the program *"Zoogeography and evolution of the Pacific insects"*. Unfortunately however, no work, either with regards to the Sea skaters and their distribution in the Indian ocean or trapping of air borne insects over this region, had been carried out in the Indian ocean, till it was taken in hand by the present author after a chance trapping of some insects in the open waters of the Arabian sea. With generous support from the Department of Science & Technology, Govrenment of India and cooperation from the National Institute of Oceanography, insect trappings have been carried out in various parts of the Arabian sea, Bay of Bengal and the equatorial Indian ocean. The results are a mind-boggling variety of insect species and almost unbelievable numbers of trapped insects.

These studies, undertaken together with recording of some meterological parameters (particulary the wind direction and speed) can suggest the possible lands of origin of these air borne insects and give us an idea of the insect fauna of various oceanic islands as well as maritime nations. Incidently most of the islands of the Indian ocean still remain to be surveyed for their insect fauna. Such studies will lead to a better understanding of the dispersal not only of the innocent insect species, but also of new pests of crops and new vectors of human and animal diseases.

This field of Insect ecology is wide open, calling on the adventurous and dedicated, to come forward and take up the challenge. We do not even have the data of air borne insects on Indian main land at different altitutes and in different seasons. Is this problem really unsurmountable ? Even insects of the coastal waters and those frequenting the beaches have remained unstudied in almost whole of Asia, barring Japan of course.

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