

There once was a *Chrysis* from Pest,
 who invaded a *Sceliphron* nest.
 Her back end did guide her
 to a butt-load of spiders,
 which her offspring proceed to digest.

—anonymous ISH member

Collecting in High-Arctic Greenland

By: Claus Rasmussen, Aarhus University, Denmark, currently again in NE Greenland

Most of my past activities have been in the tropics due to a natural combination of an interest in tropical stingless bees (insects in general) and a warm climate. However, as times-are-a-changing and we are facing global climate change, so my research has expanded to include climate changes in the perhaps most fragile ecosystem on earth, the high-Arctic. One of the major challenges is to predict effects of global environmental changes on higher organizational levels in nature, e.g., at the level of entire ecological networks, encompassing hundreds of species and their interactions. Such effects are of course complicated to track, because they show cascading, multiplicative effects, and their study requires strong analytical tools, such as general network theory.

My Carlsberg (our national brew) supported postdoctoral fellowship at the Aarhus University, Denmark, is set out to explore changes over the last 15 years in an ecological network; the network being studied is that between any flower species and their insect visitors during the short flowering season at the Zackenberg research station in NE Greenland (74°28' N, 20°35' W). Previous interaction data are available from a PhD study undertaken from 1996-1997 (e.g., as published in *Ecology*, 89: 1573-1582) and my current study is sampling flower-visiting insects from 2010-2011. Though during the last c. 15 years, the station area has experienced less snow and an average rise in temperature of about a couple of degrees. Some flower species even appear up to three weeks earlier now, when compared to the 1996-1997 seasons.

When I first arrived in early June 2010 in Greenland, I soon collected all bee species ever reported from the country. There are only two bumble bees, and as almost typical for the genus, they are so similar that they are practically impossible to tell apart in the field (*Bombus (Alpinobombus) polaris* and *B.(A.) hyperboreus*). The latter species, interestingly enough, represents a social parasite different from the usual *Psithyrus* subgenus. Hymenoptera typically encountered in flowers elsewhere, the aculeates, are basically missing from Greenland. Even the ever-present ants are not found in Greenland, not even an introduced fire ant. However, the limited Lepidoptera fauna in Greenland is of course a paradise for parasitic microhymenoptera. We have at the most 20 different Lepidoptera species here in NE Greenland, and although I do not collect and rear parasitoids from caterpillars, I do get a number of nectar-feeding and sun-loving microwasps from the flower-cups. These include a few braconids (mostly *Cotesia*) and many ichneumonids (e.g., *Aoplus*, *Atractodes*, *Buathra*, *Cryptus*, and *Stenomacrus*). Other than these, I have caught a small number of eulophids (*Aprostocetus*) and pteromalids (*Pachyneuron*).

However, the real insect treat in the high-arctic NE Greenland turns out to be flies. Here, many diverse families and genera are present. The first ones on the wing, together with the *Bombus*, are fragile swarms of chironomids (e.g., *Chironomus pilicornis*), quickly followed by buzzing callophorids (*Protophormia terraenovae*), anthomyiids (*Fucellia ariciiformis*), and, as it turned out, the biggest problem during my sessile insect observation periods - sneaking *Aedes impiger* and *A. nigripes* (mosquitoes). Both species are extremely common from late June through July. Not even in the wettest part of the Amazon did I ever see a comparable number of mosquitoes as here. The only relief, of course, is that high-Arctic mosquitoes are only a nuisance and not disease vectors. I am now back in Greenland for the 2011 field season, where the late June temperature is about 5-10 degrees C, insects are active (still a few mosquitoes), and I am looking forward to eventually comparing the data from the four different seasons. Then, maybe, I will have an idea of what the climate change has done and will do to the flower visitors of NE Greenland. ❖

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