

STUDENT NEWS

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I started my PhD in October 2016, being co-supervised by David Yeates and Bryan Lessard (CSIRO), and by Dave Rowell (ANU). My project is a systematic revision of the tachinid genus *Rutilia* Robineau-Desvoidy, 1830, a relatively large genus containing 52 described species, most of which are endemic to Australia. *Rutilia* species are among the most visually appealing Diptera, and important parasitoids of scarabs and other plant feeding beetle larvae.

Rutilia species are generally large (1–2 cm) and robust flies (Figs. 1, 2), most frequently caught while either hill-topping or feeding on flowers. Many species display striking iridescence across their thorax and abdomen, although overall colouration is rarely a useful character for species level identification. *Rutilia* is most diverse in Australia, with 49 of the 52 described species only recorded on this continent. They have been collected throughout Australia in most environments, with the exception of the alpine and especially arid regions. *Rutilia* has a slightly unusual taxonomic tradition of being split into subgenera, of which there are currently seven, as well as two species (*R. micropalpis* Malloch, 1929 and *R. scutellata* (Enderlein, 1936)) thus far unassigned to a subgenus. ANIC's collection currently holds representatives from all seven subgenera as well as *R. micropalpis* (33 described species). Most of the remaining species are found throughout other Australian collections, however, several holotypes are located in Europe.

My path to tachinid systematics has been somewhat circuitous: towards the end of my undergraduate science degree at ANU (double-majoring in chemistry), I took an elective 2nd year course in invertebrate zoology, taught by David Yeates and Dave Rowell. I enjoyed this course immensely, and subsequently began volunteering at the ANIC in my free time. Embedded with David Yeates' Diptera group, I began learning about everything from conducting fieldwork to collection management. The following year I chose to do an elective undergraduate research

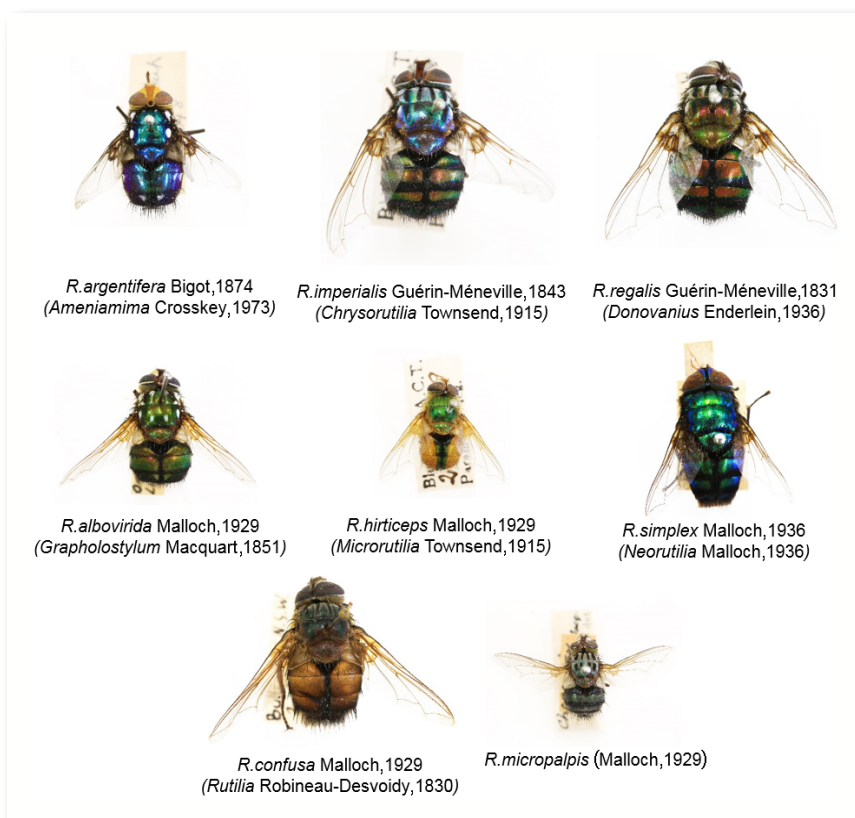


Figure 1. Representatives from each of the seven subgenera (in brackets) plus *R. micropalpis* from ANIC's collection.



Figure 2. *Rutilia* sp. (probably *R. vivipara* (Fabricius, 1805)) being harassed by an Australian bush fly (more than likely *Musca vetustissima* Walker, 1849) in Ngarkat National Park, South Australia. (Photo by Tom Semple)

project through ANIC, and also in association with Jeff Skevington from Agriculture and Agri-Food Canada, who was at the time working on Australian Syrphidae. This project was an insect biodiversity survey and involved the weekly collection and sorting of four 6-meter Malaise traps over the course of five months, which in some weeks yielded several kilograms of arthropods. It is satisfying to see that after three years, the almost 100 litres of residues generated from this project are still yielding interesting material.

After completing my undergraduate degree I was still uncertain as to which field to specialize in. After receiving an honours scholarship for organometallic chemistry I chose to remain at ANU for another year, however, I was still volunteering at ANIC during this time, and with the help of David Yeates and Bryan Lessard, was able to secure a Ph.D. scholarship in taxonomy the following year for a systematic revision of Australian *Rutilia*. I already had a particular interest in *Rutilia* after collecting them on holiday in North Queensland a year prior. Given my familiarity in the ANIC collection, and extensive laboratory experience with chemistry, I decided that a combined morphological/molecular project was an opportunity too great

to pass up. Thus, I decided to switch fields and devote myself to entomology.

My Ph.D. research comprises both a morphological revision of the genus *Rutilia*, and a molecular phylogeny which will also consider various outgroups within the Dexiinae. Using R.W. Crosskey's (1973a) revision of the tribe Rutiliini (now within the subfamily Dexiinae) as a starting point, I am revising the undescribed material that was either omitted from Crosskey's revision, or has since been collected – around half of the 4600 or so specimens in ANIC's *Rutilia* collection. In addition to getting my head around the morphology, I am currently working on databasing ANIC's *Rutilia* to generate distribution maps.



Figures 3–4. **3.** (top) Some of ANIC's Diptera group displaying the results of a recent field trip. From left to right: ANIC Director David Yeates, me (James Lumbers), and 2nd Year Ph.D. student Xuankun Li (studying bombylid systematics and asiloid phylogeny). (Photo by Alan Landford) **4.** (bottom) Collecting *Rutilia* on vegetation around the edges of the Eucla dunes - Eucla National Park, Western Australia.

Beginning in my second year, my phylogenetic analysis will utilise anchored-hybrid enrichment sequencing that requires high quality DNA samples from *Rutilia*. In the absence of such material already existing at ANIC, I have had to start from scratch, spending almost two months conducting fieldwork throughout the southern quarter of Western Australia, as well as a few locations in northeastern New South Wales (Figs. 3, 4). I am currently planning trips in the near future to South Australia's Eyre Peninsula, as well as to Mt. Moffatt in central Queensland's Carnarvon National Park, a legendary *Rutilia* hotspot. Finally, I'm looking forward to liaising with various agricultural agencies and collections to improve host records for *Rutilia* which, at present, are sparse (Crosskey 1973b, Logan 1999).

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